Three Essays on the Political Economy of Public Sector Governance

by

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POST SCRIPTUM

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Abstract

This Ph.D thesis is made up of six chapters: together with Introduction and Concluding Remarks, there are one extensive literature review and three main essays. The theme of this thesis is “The Political Economy of Public Sector Governance” and I explore it by analysing the two main actors in the interaction between citizens and politicians: Mass Media and Bureaucracy.

The World Bank in several publications since early 2000 has brought to the attention of politicians, public servants, social scientists and, as far as an institution like the World Bank can do, the general public that what really is important and does make a difference in the economic growth and social development of nations are not policies but (political and social) institutional quality (WorldBank, 2004b). In order to make institutions work well, so they are able to promote the greatest welfare for all the citizens, it is necessary to have good governance. One of the ingredients of an optimal governance arrangement is the possibility for the citizens to make their government accountable for what it does (not) and responsive to their needs. Therefore, in order to have good political institutions citizens have, on one hand, to control their government and, on the other hand, to voice their needs, preferences and ideas, also when the ballot box is not ready at hand.

Mass Media has at least these two functions in the relationship between the citizens and the (incumbent) politicians.

In the first essay I analyse citizens’ voting decisions and collusion between media and politicians and how this phenomenon affects the behaviour of citizens towards disciplining and selecting the incumbent politician, when citizens have at their hands two sources of
information about the quality of the incumbents and their performance: the quantity of a good publicly supplied by the government and a signal coming from the mass media on politician honesty. The setting comprises a two period game, where voters, in the first period, have to decide, observing the information available through media and good publicly produced, whether to vote off or reelect the incumbent politician to the second period electorate mandate.

By employing both two signals, citizens manage to sort out honest politicians from dishonest ones more often than if they were relying on media information only. Moreover the existence of both signals makes collusion harder to achieve than in the case of one signal only. Furthermore, the welfare analysis reveals that, contrary to previous findings, the presence of media is not always welfare improving. The usefulness of media for citizens depends critically on the time discount factor between the two periods: when the time discount factor is larger than a certain threshold, it is optimal for the citizens to receive information from media; when the time discount factor is lower than the threshold, their optimal decision is not to get any information. Finally, I argue that when rules at the constitutional level are not possible and citizens cannot commit to have less information, then collusion between media and politician can be welfare improving for citizens, contrary to previous results in the literature.

In the second essay I investigate the role of Mass Media as a bottom-up way of communicating dispersed information from citizens to incumbent. Citizens transmit useful information thanks to the newspapers they buy and read. However, these newspapers are produced by a third party (a Media Tycoon) that has his own incentives. In particular the Media Tycoon has to decide whether to produce a newspaper that allows the citizens to participate in the public debate (Broadsheet) or does not (Tabloid). Given the fact that this instrument can be bought but not directly produced by the citizens, there exists a tension between the benefit of using a newspaper to express citizens’views and the possibility that this newspaper can be actually produced. Results show that producing a Broadsheet always improves the quality of policy decision making on part
of the incumbent. A notable result is that in order to enhance the quality of the public
decision making it is better to have any Broadsheet than not having one, whatever is the
public stance the newspaper takes about the issue at stake. In this essay I first assume
that there is only one group of citizens which is interested in having the optimal policy
adopted, i.e. the Middle Class and I assume the Middle Class citizens are the only one
who read newspapers. Subsequently I analyse how the results change when citizens from
the other classes read newspapers as well. I show how the “partisan readers”, committed
to buy the Broadsheet supporting the policy they prefer, can ease the production of the
Broadsheet. In this case the existence of partisanship and of ideological readers make the
implementation of optimal policy easier, not harder, contrary to conventional wisdom.

In the work of the World Bank, and in all the scientific production about how to
establish and foster the development of good governance, corruption is one of the main
diseases that can affect the correct relationship between citizens and public officials. So
it is important to study how good institutional quality can fight corruption in several
different fields of the political and economic environment. The third essay evaluates the
effect of corruption on the regulation of business entry. A theoretical agency model of
bribes is introduced, with strategic interaction between the firm, the corruptible public
sector employee and the government. This model allows the evaluation of reforms tar-
geting business startup procedures with regards to the incentives of the various actors
involved in this process. Findings show that corruption in equilibrium between entrant
firms and public servants could be self-sustained in the absence of government inter-
vention. When deriving the equilibrium outcomes of some reforms like performance wages,
privatisation and full liberalisation of entry, results show that transaction costs related
to bribes are central in determining the optimal reform strategy. Although liberalisation
is the preferred reform option for firms, government fiscal revenues and overall social wel-
fare, firms surprisingly would prefer performance wages implemented in public registry
service rather than the privatisation of this service. This holds despite the additional tax
burden on firms necessary to finance higher civil servants’ wages.
Chapter 1

Introduction

This thesis consists of four chapters plus an introduction and a conclusion. The core is in the three central substantive chapters, corresponding to three independent essays, dealing with two different but interrelated topics: i) mass media and its interaction with citizens and politicians in a political system; and ii) corruption in the regulatory branch of the civil service managing the bureaucratic procedures for the start-up of new firms. The common thread between these two apparently quite different subjects is the necessity, on part of the citizens, to control and influence the quality of public policy and of public officers, be they either bureaucrats or (incumbent) politicians. Due to the division of tasks between citizens and public officers and the principal-agent nature of the relationship between the former and the latter, public officers’ behaviour may not be in the best interests of the citizens, i.e. it may not maximise citizens’ welfare.

Having recognized the existence and the extent of this problem in several fields where politicians and citizens interact, the research in political economy has spent a considerable amount of effort in studying the various institutions through which citizens manage to hold public officers accountable. The function and the behaviour of lobbies, the role of elections, the interactions between executive, legislative and judicial power, the yardstick competition among the incumbents of different jurisdictions are only some of the topics which have been investigated (see Grossman and Helpman (2001); Persson and Tabellini
(2000); Besley (2006)). All these issues deal with the topic of how citizens can act in order to select the right public officers for the task at hand or discipline them in order to serve the public interests, if they are not willing to do so. Of course, corruption (together with incompetence) is one of the most feared negative feature affecting public officers that the citizens would like to avoid or, at least, restrain.

Surprisingly mass media has been one of the least analysed institution in the political economy literature. Only recently has the research started to investigate this topic, both theoretically and empirically. Although politics, sociology, media studies and other social sciences have long dealt with mass media and their impact on politics and its different players, economics is new in the analysis of this topic.

Notwithstanding this relative novelty, the political economy literature has burgeoned recently; the articles written by several authors can be categorised in three views of the media and of their relations with the rest of the political arena:

a) Media as “megaphone” : the *top-down role* of media;

b) Media as “cahiers de doléances”: the *bottom-up role* of media;

c) Media as “watchdog”: the *supervisory* role of media.

Furthermore, a topic of extreme interest in relationship with mass media, both in the public discourse and in research, is the existence, extent and influence of bias in media and how this affects citizens’ perception of politics in general and of political actors in particular.

Before reviewing the literature in this field, it is worth explaining the categorization used above.

When mass media are viewed through the *top-down role* they play, this means that they act as intermediaries between politicians and citizens, and help the incumbent to spread useful information on their quality as politicians or on the implemented policies. In a way, according to this view, the media act as a megaphone of what the politicians...
would like to let the people hear. Of course, this is one of the roles that mass media has played in the past. For instance, the heads of totalitarian regimes like Mussolini and Hitler were the first to make heavy use of radio to create a broad consensus towards their policies. However, democratic politicians like F.D. Roosevelt in USA also used the radio in the famous “fireside chats” in order to address the citizens, reassure them in hard times and create support for his political action and proposed policies (Mankowsky and Jose, n.d.). This role of media as “passively” reflecting the views of the politicians and helping them to reach the largest possible number of citizens can also be found in recent times. For instance, so called “spin doctors” like Alistair Campbell in the UK or Karl Rove in the USA have routinely tried to use mass media reporting in order to pursue the agenda of the political parties or the leaders they were working for (Campbell, 2007).

The political scientist John Zaller (Zaller, Forthcoming) has recognized that the tensions between the different interests of politicians, journalists and citizens is fundamental in shaping the news that ultimately get published. In his words: “the goal of politicians is to use journalists to Get Our Story Out” while the goal of journalists is to produce news they can choose and to which they can give their own personal contribution. On the other hand citizens have an interest in being informed about politicians’ accomplishments and to consume news that are less sophisticated than the journalists wish to produce.

The second role mass media can assume in their relationship with politicians and citizens is the bottom-up role. In this case mass media reverse the direction of interactions: instead of letting voters know something that the politicians want them to know, mass media operate in order to transmit useful information from the citizens to the politicians. In fact politicians, given their distance from the “normal and powerless” citizens might be uninformed about their preferences. Moreover, there might be some feature of the state of the world influencing citizens’ preferences or optimal policy responses to some events that might be in the citizens’ knowledge and that the incumbent politician would be willing to know to implement policies maximising citizens’ welfare and/or his chance to stay in power. For instance Sen (1999) explicitly recognizes the informational role of
the democracy and quotes even a dictator such as the former Chinese President Mao as saying that:

Without democracy you have no understanding of what is happening down below; the situation will be unclear; you will be unable to collect sufficient opinions from all sides; there can be no communication between top and bottom; top-level organs of leadership will depend on one-sided and incorrect materials to decide issues [...].

Furthermore, it is not only in the dictatorial regimes that the ruling class needs some information to implement policies useful to the population (or at least to a subset of it). In fact, in dictatorial regimes the voting mechanism either does not exist or cannot be trusted to transmit truthful information, both on the politicians or on the different, alternative policy options at their hands. However, also in democratic societies the voting mechanism has a limited power to decide which policies have to be adopted. As noticed by Besley and Coate (2008) this happens when each citizen has the chance to express just one vote, but the decisions he would like to express his preferences on have multiple dimensions and are bundled together (for instance in a party manifesto running for office in a general election). In this case a direct initiative from the citizens might be useful in order to adopt better policies, policies that, when implemented, increase citizens’ welfare. While the behaviour of institutions or citizens’ direct political activities like referenda, protests, petitions and strikes having the role of aggregating dispersed information and communicating it to the (less informed) decision maker have been analysed (see Lohmann (1993) and Lohmann (1994) and Piketty (1999)), the literature on mass media performing this role is really sparse. Nevertheless anecdotal evidence shows that some newspapers perform the role of campaigners and press the decision maker (usually the incumbent politician) to implement (or repel) some policy they and their readers deem worthwhile. For instance, in the UK the Independent newspaper during July 2008 ran a campaign in order to prevent restaurant owners paying the waiters’ wages out of their tips and to let waiters pocket all the tips they got from clients. The campaign was so successful that the
government was forced to pass a law banning the use of restaurant tips to pay waiters wage.\footnote{The law came into force on October the 1st 2009 (Dickinson, 2009).}

Another successful campaign, this time on TV, was the one by Jamie Oliver, the famous celebrity chef. He was shocked when discovered that most of the school meals in UK were made of pizzas, chips, and other processed food with virtually no fruit and vegetables. He started campaigning both on the press and on TV for better meals prepared directly by kitchen ladies at school, arguing that these would reduce children obesity, increase their intake of fruits, vegetables and good nutrients and favour their performance at schools. The campaign got such a big coverage that, eventually, the government implemented a national programme to encourage schools to adopt a policy of supplying their pupils better meals, financing training courses for kitchen ladies to learn cooking them, at reasonable price.\footnote{The initiative led to a documentary series broadcast on Channel 4 in 2005, called “Jamie’s School Dinners” and to a broader campaign called “Feed me better”. For a first reference see Wikipedia (2010).}

Since newspapers are for-profit firms, it has to be the case that if they perform the role of campaigning newspaper their readership has to be ready to buy the newspaper, maybe because they agree with that campaign and want to know more about it or to show their support for that campaign by buying the newspaper. My second essay deals precisely with this topic; it aims to analyse when it is possible to produce a newspaper which is informative about the state of the world and which campaigns to implement one of the policy options instead of a newspaper that simply is enjoyable to read but does not support any policy.

The third role of the mass media envisaged in my categorisation is the supervisory role: in this view, the mass media have the role of “watchdog”, i.e. of an independent supervisor on behalf of the citizens. This role could be performed independently by any single citizen, but it would be too costly to carry out and, moreover, as with other activities of information collection, it would be exposed to problems of rivalry of consumption in the produced good. These issues which could make it hard for the single citizen to carry out
the supervisory role, may be solved by a firm which acts as an intermediary, performing
the role of a supervisor and selling the results of its activity to a public wishing to pay to
read or watch the news about the character and competence of the incumbent politician.
This role is now considered “the” role of a free press (and journalistic activity in general,
which ever is the medium employed in this activity) when it deals with politics, but it
was not always like this, at least in the anglosaxon world. In fact as Zaller (Forthcoming)
notices, in the USA newspapers were, until the 1850s - 1860s, very partisan and acted
as a proper political and propagandist arm of the political party or politicians they were
affiliated to and never behaved like an independent watchdog. It was only between the
late 19th century and the beginning of the 20th century that a new view of “independent
journalism” affirmed itself and became dominant, thanks to the emergence of a new class
of political journalists who managed to sever the links between newspapers and party
machines (Mc Gerr, 1986). According to Gentzkow, Glaeser and Goldin (2006), this was
possible thanks to the coexistence of multiple factors, and in particular to a decrease in
the production costs, increase in market size, and growth of advertising revenues.

There have been quite a few examples of scoops broken by newspapers and lately
also by other mass media, like, to mention just a few, blogs, TV, both broadcast or
satellite, radio. In the USA the Clinton presidency was discredited and put in peril when
a website, the Drudge Report, broke a story that the then-in-charge President Clinton
had had a sexual relationship with a White House intern, Monica Lewinsky. Interestingly
the story had been discovered by a Newsweek investigative journalist but the magazine’s
editors had decided not to publish it. The subsequent development of the story led to
the impeachment of President Clinton for perjury for having lied about his conduct in
front of a Grand Jury. In this case what was interesting was that the Media exposed a
personal feature of the character of President Clinton (“liar”) that, though originated in
a private life contest, could have a political significance in terms of his untrustworthiness.

Other recent scandals where newspapers have had a relevant role in discovering them
or, at least, breaking them to the public were the “Clean Hands” scandal in Italy and
the MPs’ expenses scandal in UK. In both of these cases newspapers and the mass media in general spread to the general public news of politicians’ misbehaviour which made the public genuinely question their honesty. The scandals and the subsequent publicity led to a dramatic change of the political class in Italy and to the disappearance of almost all the political parties which had dominated the political life during the 50 years after the WWII. Although less dramatic than in Italy, in the UK the MP’s expenses scandal have forced a few cabinet ministers and the House of Parliament Speaker to leave their jobs. Of course, the Watergate scandal broke by two investigative journalists of the Washington Post represents the quintessential example of political journalism, since it led to the resignation of the then President of the USA, Richard Nixon.

From the above discussion and related anecdotal evidence it could appear that it is always the case that more information supplied by media about the quality of politicians is good for the citizens, since they manage to sort out honest politicians from dishonest ones. A recent political economy of mass media literature has dealt exactly with this topic and it has suggested that it does seem always the case (Besley and Prat, 2006). In my first essay I aim to investigate precisely this topic and see when the use of mass media in their supervising activity results in higher citizens’ welfare and when, instead, the presence of mass media results in too much sorting and too little disciplining of politicians’ effort. Contrary to most of the literature and especially to this first seminal essay by Besley and Prat (2006), the presence of the media does not always increase citizens’ welfare, but it might be welfare reducing when citizens observe not only the signal coming from media, but also another signal like the quantity of public good, which, in turn, depends on incumbent’s type. Nevertheless, the presence of mass media and of an observable good publicly produced increase the sorting of incumbent politicians and makes collusion between media and politicians harder than when just the signal coming form the media is present. Furthermore, in this context, when media and citizens cannot commit not to transmit and observe more information, collusion between media and politicians to suppress useful information about the latters’ quality might increase citizens’ welfare for
certain values of the parameters.

The last chapter in this thesis is about corruption in the regulatory branch of the civil service dealing with the start-up of new firms. Corruption is a multi-faceted phenomenon which affects the political, economic and social environment of any society where it appears. Although its effects are more serious in the emerging economies, corruption represents an acute disease in the more advanced societies as well and might undermine their own functioning when it becomes more and more widespread (Rose-Ackerman, 1978). This has led an ever growing number of researchers and the largest international organisations like UNO, IMF and WB to spend more and more time and resources on dealing with the analysis of corruption, its causes and its consequences. This collective effort has become stronger when it has been noticed that large investments and aid in the emerging countries failed to alleviate citizens poverty and, instead, contributed to the kleptocracy of a few dictators and of their close political and social allies. This failure has brought the international organisations, and especially the World Bank, to focus on the reasons why large economic investments have been so ineffective in promoting economic growth and social development. The reason has been indentified in poor governance (WorldBank, 2004b) and, especially, in the lack of citizens’ voice and politicians’ accountability in the political arena. One of the main consequences of poor governance is the existence of corruption, which causes the public official (politician, public servant, judge and any public officer) to exploit his power and position to his own advantage and not to the citizens’ benefit. It is clear how this corruption stems from lack of accountability (the citizens cannot punish the public officers for their behaviour) and/or from lack of voice (the citizens cannot communicate with public officers and induce them to adopt one policy or the other).

The economic literature on corruption has become larger and larger in the past years, thanks to the enormous interest in this topic of the social science research community and of different international organisation. Jain (2001), Tanzi (1998) and Aidt (2003) are only some of the surveys on the ever growing literature on corruption. Following Jain
(2001) I distinguish three types of corruption, according to who are the corruptors and the corrupted: “Grand Corruption” (corruption in the government and the political class), “Bureaucratic Corruption” (perceived as petty corruption) and “Legislative Corruption” (happening when interests group try to buy out legislators in order to induce them to implement laws benefitting them and not, necessarily, the general public). Jain (2001) makes an interesting methodological distinction about the theoretical approach used to model the situations in the Grand Corruption and the Bureaucratic Corruption: while the Grand Corruption uses the agency theory model, the Bureaucratic Corruption models make use of an equilibrium approach in markets where demand and offer of bribes meet. Aidt (2003) instead considers mainly models employing agency theory and categorises the different types of corruption according to whether the principal is benevolent or not, and whether corruption is efficient (allowing citizens to correct inefficient government policies) or, rather, for given institutions, depends on history.

My third chapter deals with a situation of Petty Corruption and employs an agency theory model between a politician delegating to a public employee the task of giving the permit to start up a business to a would be entrepreneur. With regard to Jain’s categorisation, this is a novelty since the agency theory paradigm is used, according to his survey, mainly to deal with the Grand Corruption phenomena. In modelling the players’ incentives, I make the assumption that the incumbent politician delegating the task is a benevolent principal and therefore my aim is to verify which optimal institutions the benevolent principal might design and implement in order to reduce the existing corruption in the office for the regulation of new enterprises. The novelty in this approach and in the modelling choice allows me to determine jointly the level of public sector wage, the level of bribes paid by the would-be entrepreneurs in order to speed up the administrative procedure and the level of company tax levied by the politician. While a number of papers have investigated the joint determination of maximum two out of the three variable named above, this is the first work, at the best of my knowledge, that manages to expand the investigation. Thanks to this, it is possible to find again
a result well-known to the literature on incentive in the public sector, that is that the presence of a certain level of corruption is correlated with a low level of public sector wage, since the government knows that the public employees manages to increase his income by pocketing some bribes (see Besley and Laren (1993) and Van Rijckeghem and Weder (2001)). Furthermore, I find a result less well investigated in the literature: since the bribe represents a tax on the entrepreneur to enter in the chosen industrial sector, a benevolent politician should anticipate that the firm will have to pay not only the profit tax, but also the bribe. This means that, together with the public employees’ wage, the government has to decrease the legal company profit tax in order not to discourage many firms from entering the market. Having established the framework in a context of a benevolent government facing a situation with a large level of corruption, I am then able to conduct an analysis of different reforms that the politician might want to implement: implementation of performance wages in the public sector; privatisation of services connected to the firm entry ; liberalisation of the entry and abolition of the controls. For any of these reforms I am able to analyse the outcome in terms of welfare for any of the player and, then, identify who might support it and who might oppose it and then prefer the corrupted status quo. Here results show that transaction costs related to bribes and private sector wages are central in determining the optimal reform strategy. A notable result is that firms do not always want public service privatisation and might prefer to see a better public sector, with more motivated public servants, despite the additional tax burden necessary to finance higher civil servants’ wages.

To sum up, this thesis aims to analyse some phenomena of the interaction of citizens and public officers in the public domain. The governance of this interaction is crucial and we need to better understand what incentives are involved when citizens hold politicians accountable for their performance, when information about their type supplied by mass media is available. I reach the conclusion that more information does not always increase citizens’ welfare. While accountability has been widely investigated, voice has been less so. The study of political economy of mass media has followed the same path of the
more general research in political economy. In my second essay I investigate what are the conditions under which a for-profit newspaper decides to be a campaigning one or a not-campaigning newspaper. In the latter case citizens will read a newspaper just to enjoy themselves, while in the former citizens will read it when they agree on the campaigning stance. Through this readership behaviour, the newspaper will aggregate and transmit useful information to an incumbent politician, inducing him to implement one policy option. Finally, in the last essay, I highlight how problems of control of public officers’ behaviour exist not only with regard of politician but also with respect to bureaucrats, even when incumbent politicians are benevolent. I model a situation which allows me to jointly determine bureaucrats’ wages, bribes and company income tax. My results shows that institutional reforms have to be carefully designed and crucial to assessment of any reform are the transaction costs of the hidden exchange and the outside option that public sector employees have in the private sector.
Chapter 2

Literature Review: Political Economy of Mass Media: A Comprehensive Survey

Until very recently the research about mass media in economics was extremely tiny. It has been only in the last very few years that mass media has started to be analysed by economics under different aspects.\footnote{There is a growing literature that deals with the industrial organisation and regulation of both new and old media industries (among others, see Anderson and Coate (2005)). Moreover mass media role in spreading information about financial markets could help explaining some anomalies in finance, like stock prices abnormal returns (see Veldkamp (2003) and Dyck and Zingales (2003)). Finally some authors have pointed out the fact that mass media operate as informal watchdogs of CEO and top management on behalf of shareholders and other stakeholders (see Hamilton and Zeckhauser (2004) and Dyck and Zingales (2002)). This could make up possible shortcomings in the corporate governance legislation.} In particular, mass media has attracted the attention of a number of researchers in economics especially regarding their role in politics: if most of the communication between politicians and citizens takes place through mass media, then it is crucial that the interaction between all the actors in the political arena is analysed.

In this chapter I will focus on the literature dealing with this interaction, a literature which constitutes a small, recent but blossoming subfield in that area of economics which
goes under the name of Political Economy, the discipline which analyses politics with the tool box of economic science.\footnote{For this definition see Myerson (1999).}

According to Persson and Tabellini (2000) one can distinguish in the political economy literature two classes of models: models of pre-electoral politics, and models of post-electoral politics. Models of pre-electoral politics are models of full commitment and (usually) of complete information. In these models two (or more) candidates compete for office, by proposing a political platform to the citizens prior to the election. Citizens will vote for the candidate whose political platform maximise their expected welfare. Since the platform will be implemented by the winning politician, the electoral stage is really a choice between alternative and competing policies.

On the other hand, models of post-electoral politics are models of less than full commitment: they can be with either complete or incomplete information and usually are structured as two period games. In this literature the promises made during the electoral campaign are not enforceable and so citizens do not vote depending on the announced electoral platforms. Instead, citizens can only punish or reward the incumbent depending on his performance while in office. The focus of this literature is on how the post-electoral game among the different political players shapes the policy implemented and the political outcome.

In order to give a structure to this literature review, I will categorise the several articles surveyed here according to two different criteria: role of the media and structure of the model employed. Regarding the structure of the model, I will highlight whether the model is one of pre- or post-electoral politics and whether it features a game of complete or incomplete information. As concerning the role of media, I will think of them as intermediaries between the citizens and the incumbent government in the flow of information between these two players. Moreover I will distinguish three different directions that the information flow can present: Top-Down; Bottom-Up; Supervision, categories already introduced in the Introduction of this thesis. Finally, I will consider a
phenomenon that has received huge attention in the popular press and in political science and has been recently formalised by economics, i.e. Media Bias. I define Media Bias as the phenomenon of media reporting the information they receive in a not-objective way, that is in a way which is influenced by their ideological leaning. It is worth noting that, since the research in political economy of mass media is still at the beginning, some of the topics in the literature review will show less coverage than others. However, this is due to the fact that some of the topics have received less attention than others by the existing research.

The rest of the present Chapter is organised as follows: in Section 3.2, I survey the literature where the media have the role of communicating to citizens the policies adopted by incumbent politicians in their manifestoes and then implemented once in office. In Section 3.3, some articles which see media as communicating the ideas and demands of citizens to governments are presented. In Section 3.4, the articles reviewed deal with the media as informed supervisors. In this strand of literature, there is an asymmetry of information between citizens and government regarding some features of the incumbent politician or of the state of the world on which the optimal policy depends. Mass media has the function of inquiring this asymmetry and reporting it to the polity. Section 3.5 presents some evidence of the pervasiveness of the phenomenon of bias in media and why this could be a problem for optimal policy. Moreover, I review some papers which try to explain what is the origin of media bias, whether competition could eliminate it and if mass media really influence voting decisions, as it is widely assumed. Section 3.6 concludes and indicates some possible future directions for research.

2.1 Mass Media as a Megaphone: The Top-Down Direction

In this section I will survey some of the research considering the role of mass media when the flow of information goes from the Politicians (Top) to the Voters (Down). One of
the most important contribution in this strand of literature is represented by the work of Stromberg (2004a). In this article, he studies a model of full commitment and symmetric information where two parties compete for reelection. In order to persuade citizens to vote for them, the parties have to announce how they will divide the fixed budget $I$ among several $S > 2$ government programmes. Every programme $s \in \{1, 2, \ldots, S\}$ will benefit a number $n_s$ of citizens and every citizen will benefit from one programme only. There are two newspapers and they have to decide how much space to assign to news on the different $S$ programmes. Newspapers are profit maximising firms and their revenues come from selling news and advertising spaces. Every voter buys one newspaper to get informed about the policy platform of the two parties and to decide whom to vote for.

There are two crucial assumptions here. One regards the reason why citizens get informed about politics. In large elections the probability of a voter being pivotal in the electoral outcome is very low if not infinitesimal: so it seems that a rational voter will never bear the cost of getting informed as her expected benefit will be very low anyway. Instead, Stromberg assumes that the reason why every voter buys a newspaper is another: the voter wants to decide about a private action to take before the election. This action is going to affect her utility from the particular government programme $s$ on which the voter wants to know more. So if the voter is better informed about party platforms she will be able to take a private action which will increase her welfare from the programme. As a consequence the voter will still vote for that party whose platform maximises her utility. The second assumption is about the cost structure of the media industry. Stromberg argues that this industry has large fixed costs and small variable costs. So this industry favours large volumes of production and produces at decreasing average costs.

He finds that the political equilibrium is driven by the equilibrium in the media market: since parties want to reach as many voters as possible and newspapers want to maximise their audience, it follows that the political platforms proposed by the two parties is shaped by the features of the readers. So the announced platforms will be
skewed towards the interests of the largest, more valuable groups of readers and towards 
groups having a high private value of news.

The important feature of this article is that it borrows ideas from economics (es-
pecially theory of the firm) to explain some features of the relation between political
competition and mass media. In particular, this paper explains how media do not in-
fluence or manipulate citizens voting behaviour as such. However the very presence of
media industries, of their technology, interests and strategies have an effect on the policy
platform implemented by the parties and on the political equilibrium.

Building upon the paper’s theoretical findings, Stromberg makes some conjectures
about how the policy platform of the parties is changed once media comes to play a
major role in political communication. He expects that since media decrease the cost
of getting informed, large groups of citizens with diffuse but not-organized interests will
become politically valuable. For instance, tax-payers longing for a reform or consumers
who could benefit from free-trade legislation become politically valuable if media can
communicate to them the parties’ stance on such issues.

In order to test such claims, Stromberg (2004b) uses an interesting natural experi-
ment. In this article he tests whether there was any difference among beneficiaries of an
important New Deal relief programme, depending on them being radio listeners or not.
The programme was the Federal Emergency Relief Administration and its beneficiaries
were poor and unemployed USA citizens during the Great Depression of the 30s. That
very same period saw the birth and the spread of the radio in all the American fami-
lies. Apart from the entertainment function, this new medium soon became a crucial
tool to achieve an effective political communication.3 Coherently with his theoretical
findings Stromberg predicts that counties where the diffusion of radio was higher would
have been targeted more by the FERA. In fact in those counties voters would have a
higher probability of being informed about the relief programme. Being more informed,

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3 Think of the “Fireside Chats” made by F.D. Roosevelt in the middle of the Great Depression.
Obviously the importance of radio was highly recognized also in undemocratic society, like USSR, Germany
and Italy during their, respectively, Communist, Nazi and Fascist regime.
citizens would be more likely to vote for the politician who had delivered the welfare programme. In turn this would lead the politicians to increase the amount of funding to those counties. In fact, Stromberg finds strong empirical support for the fact that the effect of radio diffusion on the allocation of funds was positive and highly significant.

2.2 Mass Media as “Cahiers de Doleances”: The Bottom-Up Direction

This section deals with the literature about mass media and politics when the direction of information passing through media goes from citizens to politicians. Most of the research in political economy sees the citizens as having a rather passive role: the only political action they take is during an election to vote for one of the candidates based upon their preferences towards them or their platforms. However, it is a well-known feature in democratic political societies that citizens are not just “voters”: not only do they vote in elections but they have and take many other sorts of political actions. For instance, strikes, political demonstrations, uprisings and revolts are political phenomena which have received little attention in formal - rational choice - political theory. My interpretation is that all these political phenomena belong to a category of political communication or action whose direction goes from the citizens up to the politicians. Thanks to these actions the politicians become informed of the interests of the citizens between two successive elections

4.

In political economy of mass media there is a rather tiny strand of literature seeing media as a way to insure that what are important social and political issues for the public reach the attention of politicians. Given the novelty of this approach and Besley and Burgess (2001) and Besley and Burgess (2002) are the first and most important articles in this line of research. These works focus on how mass media help citizens’

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4 For a first attempt to model how citizen initiatives could influence economic policy “from the ground up” see Barankay and Lockwood (2007).
interests to reach politicians’ attention and how this is crucial especially in less developing societies, for instance India. India is a federal state and it is affected quite regularly by social and economic shocks brought about by weather catastrophes. So for Indian citizens the sensitivity and responsiveness of their state governors to those catastrophes are fundamental, literally vital issues. The authors argue that the existence of free and widespread media is fundamental in raising the salience of those policy issues and the sensitivity of politicians to those issues. They test this conclusion using a panel data of Indian states and find strong corroboration to their hypothesis: the most responsive state governments to shocks like drought, flood and famine are the ones where the newspapers circulation is higher.

2.3 Mass Media as Watchdog: The Supervising Direction

In this section I will survey the literature where the role of media consists of supervising the activity or some characteristics of the politician in charge of office and then reporting to the citizens. In order for the media to have a valuable function, their reports have to have an informative content, unknown to citizens. So there must be some sort of asymmetry of information between politicians and citizens which media can help reduce. This asymmetry is justifiable on the grounds that, most of the time, governments have more information than citizens regarding the conduct of public affairs.

In this strand of the literature media have the initial move: they inquire about politicians activity and then report to their audiences. In this way media respond to voters’ desire to be better informed about politics and to hold the politicians accountable. Thanks to their activity, media avoid the citizens with the large costs of collecting this kind of information.

The seminal paper in this strand of research is Besley and Prat (2006). They employ a game of incomplete information between voters and politicians in a framework
where politicians cannot commit to an electoral platform. Since the political contract is incomplete and the content of the task of governing the res publica cannot be fully specified, voters want to have the most able politician in charge of the office. Looking at the past performance of the incumbent, citizens have to decide whether or not to reelect him. The authors make the assumption that all the political information is supplied by media, which are the informed supervisors. Information is hard, that is news cannot be fabricated but only hidden. Given this three-tiers hierarchy among citizens, media and politician, collusion between media and politician is a possibility: the former may conceal the bad news regarding the latter, in exchange of monetary bribes. In this way media can influence citizens’ beliefs on politician’s type, so helping this one to disguise his type and to get reelected. The authors focus on deriving the conditions such that collusion between media and politicians is harder to take place. They find that collusion is more difficult to be carried out successfully when the number of competing media is large and when the market for news is big. After extending the model to allow for endogenous entry, moral hazard, ideological media and endogenous monitoring, they test the predictions of their model on a large international dataset, finding strong support for them. In particular, they find that in countries where mass media audience is larger, where media industry is more competitive and where media companies belong to foreign owners, corruption is smaller, and politicians turnout is higher.5

Gentzkow, Glaeser and Goldin (2006) show that media ideological stance is crucial for their informativeness and effectivity. Although not a systematic inquiry, their work gives some empirical support to the thesis that the reduction of political corruption in USA between 1870 and 1920 was due to a change in the newspapers’ characteristics. While in the early days of the USA the press was highly partisan and tended to editorialise and dramatise the political information, later on it became more informative and reduced its degree of partisanship and spin. With the help of a simple model the authors argue that

5For another empirical analysis of the implications of media ownership structure on the features of the economic and political system, see Djanik, McIesh, Nenova and Shleifer (2002).
this was due to: i) a decrease in the average cost of production of a newspaper’s copy; ii) an increase in the advertising revenue that the informative newspaper could generate if it could attract more readers. So this led to the transformation of newspapers from ancillary tools of the politician and political party activity to a proper profit maximising company. This means that the newspapers could cut their ties with their political patrons and could rely more on the market: they reduced the amount of partisanship and attracted more non-partisan readers by printing more informative news about the ongoing pervasive political corruption. In turn this led to a reaction of the public opinion which ultimately led to political action to reduce the political corruption.

Along this line of research, which sees media as an informed supervisor, Prat and Stromberg (2005) construct a model in order to analyse the effect of an increased liberalisation in a particular sub-sector of the media industry, broadcast television. They remark that almost the entire broadcast TV in Europe was a State monopoly until the 80s, but then the situation was reversed by the end of the 90s: in every European country (and USA as well) the commercial channels outnumbered the public ones. The authors want to analyse whether the increase in the information supply thanks to the commercial channels led citizens to deepen their knowledge of political issues.

Building on the contributions of Stromberg (2004a) and Persson and Tabellini (2000) they construct a retrospective voting model between citizens and incumbent politician, where citizens have incomplete information on politician’s ability to provide a public good. Citizens who manage to discover the incumbent’s type can take better private decisions and increase their utility more than uninformed citizens. Other than allocate fiscal resources to public good production, the government can choose how to assign the public funds available to the public television. The government does not manage directly the public TV but can decide whether certain particular socio-demographic groups will receive more media coverage than others. In equilibrium the incumbent trades off the benefit of providing more information with the cost of it: more information means that citizens will be more able to find out the incumbent’s type and to reelect him (sorting
effect); on the other hand, more information makes more difficult for the politician to divert public funds (disciplining effect). Their finding is that the incumbent gives more coverage towards those groups deriving more benefit from the correct private action, given that they discover the true politician’s type. Then a commercial television company enters the broadcast TV market. The commercial TV has the objective of maximising its profit, i.e. of maximising advertising revenues. In equilibrium the new entrant will provide coverage to groups with a greater per capita advertising potential and to groups previously under informed in state monopoly.

The authors test their theoretical predictions on a panel data from Swedish Election Studies. This panel contains a large amount of information about the objective knowledge of politics by Swedish citizens and about their consumption of political information as conveyed by mass media. They found that commercial TV in Sweden between 80s and 90s had an overall positive effect: commercial TV especially targeted viewers previously underinformed; moreover it increased their political participation and knowledge of politics. This effect was larger among the young and the groups previously left out from the State TV allocation of coverage.  

An interesting feature of some of the models in political economy of mass media is that they are, formally, models of pre-electoral politics with asymmetric information and therefore, somehow, they cross the borders of the categories as defined by Persson and Tabellini (2000). In models like these all the interaction among media, politicians and

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6 A different result is found in Gentzkow (2006). In that article the author investigates the relationship between diffusion and entry of broadcast television in different local markets to a measure of political participation, i.e. voter turnout. He finds a strong negative effect: the spread of TV is responsible for up to 25% of the total decline in voter turnout. The author argues that the diffusion of TV induces many citizens to substitute the consumption of media with lots of political information content (like newspapers) with the consumption of broadcast TV which is more entertainment oriented.

However George and Waldfogel (2002) find that the same effect of political disengagement due to the spread of television is found when the same analysis is carried out for a USA national newspaper, i.e. The New York Times (NYT). After the targeting and penetration of the NYT in local markets, they found that the sales of local newspapers tend to decline. Moreover they found that the typical consumer targeted by the NYT selling strategy (the college educated individual) is less likely to vote in local elections. It seems that since she is too busy reading about the exciting national and international politics, she starts forgetting about the local “boring” politics!
voters takes place at the electoral stage and therefore they are models of pre-electoral models that, according to Persson and Tabellini (2000) should have complete information. However media has a role insofar it investigates some characteristics of the politicians or of their electoral platforms, which are unknown to voters. So they are “supervising” models according to the terminology adopted earlier. In the remaining of this section I will survey the research which has employed models of this kind.

In Chan and Suen (2009) the authors employ a one period game where there is asymmetric information between voters and candidate. The candidates have preferences on a one dimensional policy space which are more extreme than the median voter’s one. The policy’s option to be decided upon depends on a state variable. If this state variable is common knowledge, the usual Downsian convergence result obtains. However, if candidates observe the state variable and voters do not, a divergence result obtains in equilibrium. In this case electoral competition fails to limit the partisan behaviour of the political parties. In this setting the media has the role of discovering the state variable and then supporting the candidate in the electoral race. Media’s policy preference is a random variable, whose distribution is known to all the players, but whose realization is observed by media only. Once the preference is realized, media will endorse the political party whose policy platforms it prefers the most. In equilibrium being endorsed by the media increases the probability of the candidate to be reelected. In turn, the probability of being endorsed increases when the candidate chooses less extremist policies. So the presence of media limits the divergence result and in equilibrium candidates implement policies closer to the median voter preferences. However, the above result is true if the media is not biased, i.e. it does not choose repeatedly one candidate over the other. If the media is biased, and voters anticipate this, candidates will chose extreme policies. Finally, when the number of media in the market increases and media preferences are distributed over the candidates, a full policy convergence result obtains.

Another paper where media has the role of discovering and reporting which is the optimal policy conditional on a state variable they can observe is Chan and Suen (2008).
Similarly to Stromberg (2004a), this paper investigates how the presence of media affects the political equilibrium i.e. the electoral platforms announced by the parties. The model features a one-period game of incomplete information between parties, voters and media. Parties have to adopt a liberal or a conservative policy in their manifestoes and have partisan preferences towards those policies: the optimal policy depends on the state of the world, observed by the parties prior to the policy announcement. Voters’ preferences depends on the policy implemented and on the state of the world which they do not observe directly. However, they can learn about the state of the world prior to the election through media. Media have preferences towards policies and may adopt a conservative or a liberal viewpoint resulting in a diverse editorial position. Finally building on Suen (2004), this paper explicitly models the fact that voters tend to learn from sources sharing their same ideological position. In this paper media have three different effects on voter’s electoral decision and party’s equilibrium platforms: \textit{direct effect}: when a media changes its editorial content, it persuades some of its readers to change voting behaviour; \textit{readership effect}: when a media becomes more liberal, it attracts a more liberal public, but it loses out some of its more conservative readers; \textit{policy effect}: since the ideological position of media affects citizens’ voting behaviour, this results in changing the parties’ incentives to choose a certain policy. The first two effects work in opposite directions: in fact, regarding the first effect the readers of any outlet are held fixed in number, but they change their voting behaviour; in the second effect, the readers’ identity changes and becomes more similar to the new editorial position. The last effect is not monotone: as a less-liberal-than-average media becomes more liberal, it carries with itself some old more moderate readers and gains some new liberal readers who will read news which are less reformist than they are. This means that the liberal party could keep their votes only if it implements the liberal policy less than often. However, as the outlet becomes even more liberal, in order to have all media readers vote for the liberal party, this one will have to adopt the liberal policy even more often. An interesting result regarding the effect of competition in the media industry
is that a new entrant in the market for media makes party equilibrium platforms more centrist. Moreover, holding fixed the number of media, voter’s welfare is maximised when outlets’ ideological stance is spread widely along the left-right spectrum. Finally, the authors analyse voter’s welfare in different industry structures when media companies are driven by a profit maximising objective. They find that voter’s welfare is higher under a duopoly than under a monopoly only when the policy effect is weak compared to the other two. Interestingly, when the effect of media editorial stance towards policies is taken into account, then more competition does not always increase citizen welfare.

Andina Diaz (2004) develops a model featuring a one-period signaling game between candidate politicians, media and voters. Candidates can be either moderate or extreme, but this is private knowledge of the politician. Candidates propose platforms which maximise their probability of being elected and which can be either moderate or extremist. However, these platforms are not binding: the announced platform needs not to be implemented by the winner once in office. Voters want to maximise their utility which will depend on the implemented policies, not on the announced ones. The crucial voters are the centrist ones who prefer a moderate platform to an extremist one. Media want to maximise their profits either audience-related (if they are politically neutral) or politically-related (if ideological). Their role is to send a signal about the congruence between candidate’s type and announced platform. The results are that when no media is active, candidates pool at extreme or moderate platforms; when media are neutral and revenue maximising, their existence leads politicians not to use pooling strategies. This successful role for media will appear when there is a large number of centrist voters or with strong competition among media. The positive role for media extends to a setting where media are ideological but outlets distribute their political preferences among candidates and swing voters receive information from ideologically differentiated sources. However, when the media industry unanimously supports one candidate, this leads to distortions in the political equilibrium. Andina Diaz (2006) starts her analysis of the role of media in the electoral competition with the following observation: candidates to
elective offices spend a huge amount of time end effort in order to build a positive image of themselves before the electorate. This positive image can (and has been) dubbed in different ways as charisma, valence or leadership but has one common feature: it is channelled mainly through media which may present some candidates in a more favourable way than others. The author links this observation with another consideration: voters suffer from confirmatory bias, i.e. they buy the news from the outlet ideologically closer to them. Starting from these two observations, she builds a model to analyse the electoral competition between politicians when ideologically-oriented media perform their role as watchdogs. In her model two politicians have to decide where to locate on a Left-Right dimension. Voters value valence and ideology. There are two ideologically oriented media which transmit information about the valence of a candidate. Valence is defined as a decreasing function of the distance between candidates’ and media’s ideological position. Again crucial is the behaviour of the informed citizen: if voters buy news from both the two media, candidates position themselves in a more moderate position. In fact voters receive signals about candidates’ valence from two sources: in order to gain both media endorsements, candidates moderate their platforms. On the other hand, if voters listen to just one media, candidates moderate themselves closer to that media’s ideological position. In this case candidates polarisation is more accentuated than it would be if citizens were less informed.\(^7\) Although addressing some features observed in politically polarized societies, it seems to me that the model falls short of explaining why citizens are not aware of the fact that valence depends upon the relative distance between media and candidates’ ideological positions. Moreover, in her results the author concludes that less ideological voters tend to buy two media and to be more informed. However this seems at odds with research in political science which has shown that it is in fact the reverse: more politically informed and active citizens are indeed more ideological as they tend to conform more to their beliefs.\(^8\) To modify this it would be interesting to allow for

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\(^7\)The idea of this paper have some resonance with the main argument in Mullainathan and Shleifer (2005). However the setting in Andina’s paper is explicitly an electoral one.

\(^8\)See for instance Zaller (1993).
entry in the media market: in this context it seems that a non-partisan newspaper could find enough buyers among centrist voters. In this way it would be possible to remove the assumption that centrist voters have to buy two distinct and ideologically opposite sources of information to be informed.

On the strand of research merging political economy and psychology an interesting work is Puglisi (2004b). His paper focuses on a feature of decision making models, typical of the psychological literature, i.e. the one of salience. Any election deals with a multidimensional policy space: in fact in any election there are many issues to be decided upon and the manifestoes that competing parties write and publish before the election comprise all of them. Even though the choice is potentially multidimensional, it is effectively unidimensional: in any electoral race there is at maximum one issue on which the political discourse during the electoral campaign concentrates on. The author makes the assumption that voters will vote for the candidate who has the best record in dealing with the issue which is more salient to the voters. In this framework media are the ones deciding which issue is salient and which is not. During the electoral campaign media send information (or pieces of news) to voters about the problems which are happening before the electoral contest. In doing so media increase the salience of some problems rather than others in voter’s minds and ultimately decide the election agenda. This is possible as the space that every media can devote to political issues is limited, so a choice among the many issues which are at stake in an election has to be made. A political party will have the incentive to have news published on the issues they have a comparative advantage on. Consequently every political party will manipulate and try to influence media published stories. The question is whether parties’ effort will offset each other. In this paper this is not the case: if the incumbent party has a better relationship with the media, it will be more able to “spin” the news in its favour. In turn, this will increase the incumbent’s probability of being reelected. Developing this framework, Puglisi obtains results showing that if there is spin, the (negative) effect on votes of a negative story about the incumbent is larger than the (positive) effect of a
positive story; if only two problems occur, ex post it is always optimal for the incumbent to spin and to have published the story on the issue it has a comparative advantage on. Regarding the incentives ex-ante, if all voters are informed, it is optimal to spin for sure the newspaper. If there is a fraction of uninformed voters, then if these uninformed voters are not ideological, spin is again an optimal strategy. If the uninformed voters are partisans, ex ante it is better to commit not to spin. However, as already noted, ex post it is an optimal strategy to spin. The article allows for some testable implications. For instance, if two problems are equally likely to arise, and there is absence of spin, the amount of news stories for any of the two problems should be equal; if there is spin, the issue the incumbent has a comparative advantage on will have more pieces of news published; finally voters will elect only candidates whose stories they have a comparative advantage on are published.

Puglisi (2004a) tests the previous findings on a dataset of news from the New York Times from 1946 to 1994. He finds that when the US incumbent president is a Republican, the NYT gives more emphasis during the electoral campaign to issues which Democrats have a comparative advantage on, i.e. civil rights, health, welfare state. In this case, the NYT performs well its watchdog role, as it reports pieces of news representing problems for the public which the incumbent President is supposed to be less able to solve. On the other hand, when the incumbent president is a Democrat the NYT publishes few stories about problems of law and order, where Republican are strong. In this case, it is the partisan effect which shows up: even if stories about Republican issues get published, the proportion of them does not change the favour accorded by the NYT towards the Democratic agenda. Moreover, outside election campaigns, when the incumbent president is a Democrat, the NYT reports a lot of news about typically Democratic issues and few about Republican ones. So the author finds that there is no difference in the number of stories about Democratic issues between off and on-the-election campaign, when the incumbent belongs to the Democratic party.

So he concludes that the NYT has a Democratic partisanship with some watchdog
effect which is obviously stronger when the Presidency is held by the Republican Party. Moreover, he notes also that the Democratic partisanship of the NYT has increased in the years from 1964 onwards, coherently with a view largely held in US which sees media having a strong liberal bias.

From a technical viewpoint Puglisi’s (2004a) framework (and Puglisi (2004a) as its empirical counterpart) is quite similar to Chan and Suen (2009): there is an asymmetry between politicians and voters regarding the knowledge of the issues which are more urgent for the collectivity to tackle. Media act as an informed supervisor because they will communicate to the public those issues. Having this role, media can distort the view of the electorate if they report as important issues which are not. So, as in Besley and Prat (2006), collusion between media and incumbent politician also represents a problem. In my opinion, this paper has the limitation of considering “salience” as the only driving force behind the voting decision of the citizen. Voters preferences are not considered, so it could be that an issue which is highly valued by the voters is not made salient by the media and vice versa. It would be interesting then to see how salience and voters preferences would interact in a more general model.

2.4 Media Bias

Finally, I want to conclude this survey by reviewing some recent works about the issue of media bias and how this phenomenon affects public life in general and political competition in particular. This matter has been receiving huge attention especially in US politics, where some conservatives have stressed the presence of a liberal bias in media due to the (supposedly) existence of a liberal hegemony in the media industry. Of course, if much of the political information is conveyed through mass media, the existence of a bias could alter seriously the fairness of electoral competition. Stimulated by the popular press and the public opinion, recently some scientific articles have started to analyse the existence,

\footnote{Quite remarkably, exactly the opposite argument of a conservative hegemony in mass media has been brought forward by liberal-leaning people.}
the direction and the extent of ideological bias in media. This research has been carried out by political science scholars mainly but recently it is starting to be analysed with the tools of economics science as well.

An important paper by Groseclose and Milyo (2005) tries to answer to the question if there is a liberal bias in the major US media. In order to do so they conduct an empirical study to relate the ideological position of any media to the known ideological position of the median US Representative. They first build a measure computing which think-tanks are cited by any US elected official (both US Senate and US House of Representatives) in support of their positions on a wide range of policy issues. In this way they are able to derive the ideological leaning of twenty of the most prominent US think-tanks. Having done that, they compute a measure of the number of times a major media outlet quotes these think-tanks in support of its views in the political debate. They find that Fox News, Drudge Report and ABC News Tonight have roughly the same ideological position as the median US Representative. On the contrary The New York Times, The Los Angeles Times, USA Today and the news programme by CBS and NBC are (very) liberal leaning. The authors argue that their results show that journalists are one of the most liberal groups in the US society. So, if every branch of the government needs to be representative of the citizens at large, media, given their left leaning, are not representative at all. Finally they say that their results represent a challenge for the economic theorist: if a bias in the media market exists, economic theory would conclude that entry by a non-biased outlet would attract a considerable share of moderate citizens, and that would be profitable. Notwithstanding this, the bias seems to persist and this seems to question some of the tenets of the competitive market model which do not seem to apply to this particular market.¹⁰

Another paper dealing with the issue of bias in reporting is Ansolabehere, Snowberg

¹⁰One possible answer worthy to be investigated could be that politicians and media go to this particular “market for ideas” represented by think-tanks for two different reasons: while politicians are looking for arguments to support their ideological views, media are seeking advices by experts known for their reliability and reputation. If ideology and quality are somehow correlated, it might be that these results could be explained without resorting to impute an ideological bias to media.
and Snyder (2005). Instead of an ideological and partisan bias, they deal with bias in reporting about specific issues, in their case about political campaign finance. In USA campaign finance is a very sensitive issue and regards, more in general, the problem of having a well functioning democratic society: in fact the more money parties and candidates running for elections raise, the more they will be able to spend to reach and mobilise voters during electoral campaigns. The authors show how the major newspapers run stories about the sheer expensiveness of American politics. In fact, newspapers report almost exclusively about very expensive elections and big donors, that is corporations and money raised through Political Action Committees (PAC) (soft money). They build an index of the number of stories newspapers publish about these two sources of money over the total journalistic news report about funding of politics. Then they compare the percentage of soft and corporate money over the total amount of money for financing politics as recorded in the official documents of the Federal Elections Commission. They found two tendencies in newspapers reporting. First: newspapers cover the most expensive elections; total campaign spending in the average reported campaign was between 4 to 8 times higher than the spending in the average campaign. Second: newspapers coverage of corporation money and soft money receives much more attention and space than what it should get, given the real relevance of these phenomena. By reading these newspapers, then, readers will have an inflated estimate of this phenomenon and could be easily influenced in supporting regulation of financial contribution in political activity. Such a legislative reform could be in line with journalists private agenda. However, the authors acknowledge that the tendency towards creating biased news reporting might be inherent to the characteristics of demand for media news: in fact it seems that reporting about facts that are distant from what the readers expects creates a bigger impact on readers. If this were true, readers would be more willing to buy media that are reporting in a sensationalistic way. However, this will impact negatively on the true knowledge of the issues media are reporting on and could be harmful to their voting decision. In fact when they vote, people do it not only relying upon their ideology, but also upon their
beliefs about the state of the world. If knowledge of the state of the world is biased by media, then aggregation of information through voting might lead to errors. So bias in media reporting about issues of public concern might create errors and wrong collective decisions.

So it seems clear from this cursory review that there are several interesting phenomena in the interaction between media bias and voting decision. However the formal modelling of these phenomena in economics and political economy is just beginning to emerge. To have an economic perspective on these phenomena would mean, in my opinion, to be able to explain, among other things, three crucial points: i) why there is bias in media; ii) whether it is possible that bias gets eliminated in the long run or once competition in media industry is considered; iii) whether media bias influences the decisions of (rational) voters.

Although not in an explicitly political economy framework, in a very important paper Mullainathan and Shleifer (2005), address the second issue. They show how it is not true that media competition “per se” will eliminate bias. They build a simple behavioural model whose results rely on two crucial assumptions: first, readers hold biased beliefs; second, newspapers can frame stories so as to cater towards their readers’ beliefs. The assumptions are consistent with the fact that people prefer to hear or read news that is more in line with their beliefs, rather than bearing the “psychic cost” of facing views which are distant from theirs. To this preference towards conformity, outlets react by supplying readers with what they want to read or hear so to maximise their profits.11 Given the existence of bias in the news production, the authors ask then whether it is possible to have the results that economists would expect, i.e. that competition eliminates bias. They find that this is not the case both for divisive issues and common issues. For common issues, that is issues where readers’ beliefs are biased but the direction of the bias is the same, competition between media will lower the price of the media but will not

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11In this model this is similar to suppress information which is “bad” alike to the type of concealment that can be found in models of supervision with hard information, when collusion is a possibility.
eliminate bias. For divisive issues, that is issues where readers’ beliefs are divergent (for instance political divisive issues), media will segment the market according to readers’ beliefs and slant their news towards each group of readers. Again competition will not result in elimination of bias. However, the presence of a conscientious reader will be beneficial: a reader who gets both sources of information and double checks one with the other will be able to have an unbiased view in equilibrium. So the authors remark how the existence of readers’ heterogeneity and conscientious readers is more important than competition as such. In this paper, however, the authors limit their analysis to only two different organisations of the media industry: monopoly and duopoly. Then in order to have a result about the possibility of efficiency in information aggregation, they postulate the existence of a reader getting both sources of information and cross-checking one with the other. It would be interesting to see whether it would be possible to obtain the same result if entry was allowed in this industry to a, say, third outlet. If a moderate reader could buy news from this outlet, then it would be possible to have the same result, with the reader consuming just one source of information. Moreover it would be important to integrate this framework into a political economy one with voting. In this case divergent beliefs could be thought of priors about an ideological Left/Right dimension, while common beliefs could be thought as priors on some issues which affect positively and in the same common direction the utility of everybody, say the reduction of crime or national safety or a better environment. Then it would be feasible to analyse how the political competition and the resulting aggregation of information would be modified by the presence of (biased) media and by different media industry structures.

Some authors (see Sutter (2001)) have argued that it is not possible for media bias to persist, if consumers are rational and they anticipate the direction and the extent of the bias. In the long run, given that consumers are interested in reliable information to improve their decisions, both private and public, bias should disappear. However the research in political science has shown that media bias seems to be a phenomenon which shows a strong persistence. Baron (2006) investigates how this is possible. He identifies
the existence of two origins for media bias: a demand side origin and a supply side origin. In the first case, citizens have a demand for news which is consistent with their particular views of the world and biased media supply them with such news. However, another source of media bias could originate from journalists: they act as political activists and slant stories towards their ideological leaning. In exchange for this, they receive a lower salary than they would if they were more objective. This paper is in the realm of private politics rather than public one: citizens are risk averse and they demand information because they want to take a private action which affects their private utility. For instance, they want to know whether to protect themselves from genetically modified food, from electromagnetic waves coming from hi-tech devices or from some sort of pollution (for instance sun rays due to the ozone hole). Moreover they are rational: they discount the existence of bias and correctly anticipate it. The results are that bias reduces the demand for news since citizens are more skeptical of news reports from biased media. As a consequence news organisations with larger bias have to lower the price of the information in order to attract more consumers. When there is competition among like-minded outlets, more risk averse consumers will buy more biased news media: so there is a segmentation of the market and self-selection of the consumers according to their risk-adversity. So competition does not eliminate bias and the total bias can be greater under competition than under monopoly. The same result applies also when competition is between outlets with different biases: also in this case citizens self-select towards the media with views similar to their own. Finally the existence of a bias can have an effect on public policies as well: if the median voter is sufficiently risk averse, the regulation of the risky productive activity chosen by a simple majority will be greater when the bias is present than when it is not.  

Among the reasons why media bias could emerge and persist, the previous papers have identified the existence of a preference for bias on part of citizens and/or journalists.

\footnote{Baron (2005) produces another example of how a biased media can affect the interaction between citizens-consumers, a firm and an activist group when the firm produces a good with a negative externality which consumers have to choose whether to consume and/or regulate.}
Gentzkow and Shapiro (2006) identify a new source of bias different from the previous two. They assume that the main asset media have is their reputation for accuracy. A Bayesian consumer will rationally believe the media has a superior quality when a media report conforms more to her prior and media’s past reports. Since media wants to maintain their reputation for accuracy and high quality, they will slant their news reports in such a way to make them closer to consumers’ prior. In fact, if consumers have strong beliefs about the likelihood of some state of the world and they observe a media report contradicting their beliefs, they will be more likely to infer that the report is false or inaccurate and then not to buy that media anymore.\footnote{This “media inertia” is uniquely due to media incentives to establish their reputation on the market and then to increase their market share and maximise their profit. However, the authors show that this result can be mitigated when consumers have access to independent evidence that can provide ex-post verification of the true state of the world: in this case the media incentive to bias their information is limited by the likelihood that they might be found out to have lied. This is true in two cases: first, in contexts where real outcomes are observable shortly after the media has published its information; second, when competition between media outlets is significant. Regarding the first case, the authors predict that there will be more bias when the outcomes of some current policy decisions lies well ahead in the future, for instance foreign policy, or environmental policy, or policies affecting important welfare programmes (health or pensions programmes). The conclusion that competition decreases the bias is opposite to Puglisi’s (2004a) findings and less surprising in a sense. So an empirical analysis could be conducted to verify whether or not the existence of a more competitive media industry is prone to a polarisation or convergence of beliefs.} Among the very few empirical papers which have started analysing the relation between the amount of news information available, competitiveness of the media industry, and correct evolution of beliefs, Gentzkow and Shapiro (2004) reaches a rather skeptical
conclusion. They investigate whether the increase in the exposure to media for citizens in Muslim countries leads to greater accuracy in knowledge of political facts. They discover that this is generally true when the facts are politically neutral. However, when citizens are asked about facts which are politically charged or controversial, then consumption of more news information leads to a stronger divergence between beliefs and objective truth. For instance Muslim citizens who watch Al-Jazeera tend to disagree on the fact that the September 11th attacks were carried out by Islamic terrorists more than Muslim citizens who do not watch that channel do. On the other hand, those who listen more to Western sources of information tend to agree more. The authors take this as evidence that it is not true that an increase in the amount of information (or a decrease in the cost of it) tends per se to induce convergence of beliefs. Instead, it is crucial to analyse the functioning of persuasion from suppliers of information to consumers of information.

Moreover, it is fundamental to understand if an increase in the number of outlets leads to a greater market segmentation and to a more marked differentiation of viewpoints: if this is so, then beliefs might end up being more polarised. What seems to be crucial is how individuals process information distant from their priors: if they are rational, exposure to different sources of information will lead to convergence of beliefs. However, if they suffer from confirmatory bias, they will reinterpret the divergent information in order to accommodate the new evidence with the old priors. The prevalence of one or the other effect is fundamental also for any policy recommendation towards regulation of the media industry.\[^{14}\]

Finally Della Vigna and Kaplan (2007) tackle directly the fundamental question: do media affect voting? Given the entry in the USA media market of more partisan news companies, they want to investigate whether this has affected the voting decisions of those exposed to the information supplied by these media. The authors estimate the impact of the penetration of Fox News in the local USA cable market on the voting

\[^{14}\]For a first view of how mergers between news outlets ideologically oriented could impact on the total amount of persuasion among the citizens see Balan, DeGraba and Wickelgren (2004).
decision of the 2000 Presidential election as compared to the 1996 one, when Fox News was not present. Fox News is perceived to be a strongly conservative news media. If there was some sort of persuasion effect of media on voting, the effect is likely to have been in the direction of convincing Fox’s viewers to change their voting decision between the two elections and to vote for the Republican Party. It is possible to test this persuasion effect as the penetration of Fox News into the local cable market seems to have been quite random. Using this natural experiment and a difference-in-difference estimate, the authors are able to conclude that there was no significant effect of the introduction of Fox News on the voting decision between those two Presidential elections. Furthermore Fox News did not convince its viewers to turn out more to the voting poll station on election day. Overall Della Vigna and Kaplan estimate that Fox News convinced between 0 and 1.5% of its viewers to vote Republican.

They advance a whole array of arguments to make some sense of this inefficacy result. In particular, they argue that viewers are rational: they manage to recognise and filter out the media bias and then to neutralise the impact of biased information on their beliefs and voting decision. Alternatively viewers were subject to a sort of confirmatory bias: both Republican and Democratic were confirmed in their beliefs, or better they manage to accommodo the new (biased) evidence supplied by Fox News with their priors. The final outcome is that they took the same voting decision they would have taken if they had not watched the news. Quite interestingly the authors quote figures excluding that there was some self-selection of the audience along lines of political affiliation. In fact in year 2000 roughy slightly more than one third of the regular viewers of Fox News self-identify themselves as Republican and one third as Democratic. However they report figures saying that the share of Fox News audience self-identifying itself as Republican has increased after 2000. It would be interesting and crucial to see whether this increase in Republicans watching Fox News is due to more Republican electors subscribing to Fox News or old Fox News viewers turning Republican from Democrat or Independent. It might be that the effect of media exposure on political beliefs (and on voting decision)
takes some time to develop and this study fails to recognise and catch this. So a more
correct approach would be to study the political and voting evolution of a panel data of
Fox News viewers. This could help to recognise whether the so called “cumulative effect”
of media has some bite also on the citizen voting behaviour.

In all the previous reviewed articles voters bias is somehow imposed in the model
and it is not well explained how such a bias could emerge and be “rationally” sustained.
DeMarzo, Vayanos and Zwiebel (2003) is a first attempt to derive the existence of bias
from more basic assumption about individual rationality. If people know that the source
of their information (say a newspaper) is biased and know the direction of this bias, given
full rationality they will not be influenced by this: formally, individual opinion will follow
a martingale. However, this will not be true if people suffer from bounded rationality
and they fail to adjust properly for possible repetitions of the information they receive. If
they do not adjust for duplications in information they already know, people’s views will
be induced to change towards the biased view. In this way persuasion will be possible
and persuasion bias (as authors call it) will arise. This persuasion bias will persist also
when the same piece of information comes from different sources at the same time. If
people are part of well connected networks of communication and they fail to recognise
that the very same news reaches them two or more times from several different sources,
then they will suffer again from persuasion bias.

This model features rational and Bayesian updating individuals who are boundedly
rational in the sense that they do not take into account whether the information they
receive is genuinely new or is repetition. Checking for this is not possible because doing
this for every piece of information would imply that individual A should verify who was
the source of information of individual B he is listening to, say individual C. Having done
this he should redo this for individual C and find out who was C’s source of information.
And so on. Given this would be too costly to be performed, any individual will simply
take every received information at its “face value” as being new.

The phenomenon of persuasion bias is consistent with the existence of other phenom-
ena which have been known for sometime in political psychology like salience, familiarity (as a cue for validity), and limited memory. Repeating the same argument many times helps to increase the validity of that argument. This could be a rational justification for the reason why advertising is such a pervasive occurrence in many markets (like political and product markets). The authors find also another very interesting result. They derive the conditions under which beliefs converge to a unidimensional pattern. In political term this could be interpreted as a Left-Right dimension. They find that convergence to such a pattern and polarisation along this line is greater for issues which are frequently discussed. They also give a possible interpretation in term of political discourse and media: for issues on which the media coverage is higher a more marked polarisation on a Left-Right dimension should be observed than for issues which are less debated.

This is a conclusion which could be tested and which could help distinguish this paper theoretical findings from the conclusions held by Mullainathan and Shleifer's (2005) and Gentzkow and Shapiro (2006). In the first paper beliefs polarisation is independent from political discourse and is somehow proper to the issues. On some issues there is wide disagreement, while on others the beliefs are more common among individuals. In Gentzkow and Shapiro (2006) the existence of many media discussing the same issue leads to the reducing of bias and to convergence of beliefs. Contrary to this, in DeMarzo, Vayanos and Zwiebel (2003) polarisation of beliefs is an increasing function of the amount of political discussion.

2.5 Conclusion

In this Chapter I have surveyed some of the recent articles in political economy which have extended the formal analysis of politics to the role mass media have in the political arena, believing that this is crucial to understand some of the features of modern politics. I have assumed that mass media act as an intermediary between politicians and citizens in the flow of political information. Next I have introduced a categorisation of the
literature depending on the direction of the flow of the political information passing through mass media. I have identified three directions: the Top-Down, where media act as “megaphone” of the incumbent politician; the Bottom-Up, where media collect the dispersed views of many citizens and report them to the government; the Supervising, where media take the first move to inquire into the activity or some characteristics of the government and then report to the public at large. Finally, I have highlighted how the phenomenon of media bias has received a recent surge of attention in public opinion and is started to be investigated by research in economics as well. I have presented this research which tries to explain the origin of the bias in media, to assess whether competition reduces media bias and to estimate empirically if and how much bias influences voting decision.

The review has emphasized that the research is still in its infancy and a lot of work needs to be done to improve our knowledge of the role and the impact of mass media into the realm of politics. In particular I believe that it is necessary to increase our understanding of how media shape the public agenda and set the political discourse.\textsuperscript{15} The use of media on part of lobbies, political parties and the public at large to “voice” their views to the government is complementary to the role of media as watchdog and it has just started to be investigated. Finally, the extent and the importance of media bias needs to be assessed taking a longer perspective than what the research has done until now. Research in communication studies has suggested that the persuasive effect of media on citizens might take some time to develop. More empirical studies with a longer time perspective could shed some light on this and answer to the question of how the media sector should be regulated in order to improve the political decisions of a well informed and aware citizenry.

\textsuperscript{15} For an intriguing analysis of how the use of mass media in politics has changed “the rules of the game” see Zaller (Forthcoming).
Chapter 3

Political Economy of Mass Media: Public Good, News and Voting Behaviour

3.1 Introduction

One actor in politics whose analysis has been relatively neglected by political economy is mass media. While the literature is extensive in political science, cultural studies or sociology, in political economy there have been very few attempts to model the role of mass media. Outside economics, the role of media has been interpreted broadly in two different ways. The first sees media as shaping the public opinion, either by setting the agenda in the public discourse or by “persuading” or “brainwashing” the public who watch TV or read newspapers. While this view is held by many sociologists and/or political scientists it lacks substantial microfoundation and it is difficult to reconcile with the paradigm of the self-interested and rational economic agent. The second view regards the media as the “watchdogs” of the citizens. Citizens are seen as largely uninformed about

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1 Not to quote the late Sir Karl Popper, who calls for a control over TV programs and for censorship, although for different reasons than political ones.
the quality and/or the performance of politicians. Media (and especially political journalists) think of themselves as acting on behalf of these citizens in order to control public officers and check their performance and quality. In the system of checks and balances which constitutes politics mass media is the Fourth Estate, together with Parliament, Executive and Judiciary.

This last approach can easily fit into a political economy framework. Provided that there is a principal-agent relationship between politicians and polity and that the citizens are less informed than the politicians, the former have an interest in evaluating the performance and/or the quality of the latter. By assessing it, the citizens will be able to make an effective choice when deciding whether to re-elect or vote out the current incumbents. However, verifying the government quality can be too costly for the single citizen. Moreover the public good characteristic of the supervising activity would lead to a free-rider problem: the information on the ability and/or performance of the politician will be costly to collect for a single citizen, but valuable only if disseminated so that everybody will know and use it in the electoral process. As a result the relevant information could never be produced and released. To overcome this possible failure, a supervisor could appear assuming the role of collecting and spreading this information. This role of an informed supervisor is performed by mass media. Of course, to carry out this task mass media need the right incentives. If media spread informative news on the ability of politicians and/or their performance the audience will increase. If more citizens buy the newspapers or watch the news, media revenues increase both directly and indirectly (through revenues from advertising, for example).

The need for supervising activity in this context is quite clear. The job performed by politicians is highly discretionary; moreover it is hard if not impossible to link the performance of a politician to a monetary reward scheme like the ones available for private sector managers. For these reasons politicians may be largely unconstrained and may take advantage of this unaccountability by committing acts of corruption.² They, for in-

²Among many definitions of corruption, we choose the IMF one: “the diversion by public officials of
stance, could deliver policies favourable to special interests or companies in exchange of several kind of favours: financing their own electoral campaign, bribes, supplying business to firms where politicians have a financial interest, and promising future employment in private sector. Examples abound: among many others, the case of Enron or the diversion of IMF funds in Russia under the previous Yeltsin’s presidency spoke for themselves.\textsuperscript{3} In the Enron’s case, along with the company’s many failures to assure good business conduct, there was also an example of a typical regulatory capture between the firm and the USA government. Enron was one of the biggest power companies in USA and it is believed the national energy plan to reform the power market was heavily influenced by Enron’s consultants in order to favour the company’s market position.\textsuperscript{4} Another case of politicians’ misbehaviour was the scandal of the financial contributions to Clinton’s second presidential campaign. During the reelection campaign several Chinese businessmen gave non-registered electoral funds to Clinton in exchange for a stronger support for China joining the WTO. In all the cases above, the case for media as watchdogs is clear: the media inquire, supervise and discover the cases of possible corruption or bribery. If they are successful, they spread their findings and, given their reliability and success, they will have more citizens buying newspapers or watching the news on TV and being informed on the quality of their politicians. Several media compete for this role and for the revenues generated in the media market and the adjacent advertising one. In support of this view of the role of media, notice how some of the cases reported above regard examples of media successfully acting as watchdogs: the case of Enron was brought to public attention by The Wall Street Journal, while The New York Times and Corriere della Sera discovered the Russia scandals.\textsuperscript{5}

\textsuperscript{3}To be more precise, in the Enron case there was a lack of control on managerial conduct on part of shareholders, board of directors and auditing firms.
\textsuperscript{4}To make clear the extent of connections of politics and business, the former Vice-President of USA was previously in the Board of Directors of Enron.
\textsuperscript{5}The Washington Post in the Watergate scandal is another famous example of journalism as watchdog of citizens. In that case the scandal did not regard financial corruption, but illegal behaviour in the electoral competition.
In this Chapter I focus on the the role of media as a “watchdog”. In a formal agency relationship between politicians and citizens, media perform the function of an informed supervisor. Since a three tier hierarchy is configured, the possibility of collusion between supervisor and supervisee (agent), i.e. the incumbent politician, cannot be ruled out.

Previous works (among the others Besley and Prat (2006)) have already analysed the role of mass media as an informed supervisor. These works have assumed that all the information available to citizens about the incumbent politician is channelled uniquely through mass media. However, another strand of literature has examined how the quality and quantity of public good supplied by the incumbent could be informative of his ability or honesty and can help the citizens to decide whether to reelect the incumbent or not (see, among the many others, Besley and Smart (2007)).

This work investigates how citizen’s voting decision and collusion between media and politicians change if two pieces of information about politician’s type are available: media information and public good.

In order to do so I combine elements of the two papers already cited, that is Besley and Smart (2007) and Besley and Prat (2006). More precisely, I employ the fundamental model of interaction between citizens and government as devised in Besley and Smart (2007), enriching it with the presence of Mass Media as informed supervisor, subject to possible collusion. In this way I can test whether the conclusions reached by the seminal paper by Besley and Prat (2006) are robust to a different way of specifying the politico-economic environment where politicians and citizens interact, with the presence of mass media and good publicly supplied.

The analysis reveals that, by not relying exclusively on the media, citizens may be able to infer with more precision a politician’s type without being subjected to manipulation or the concealing of information through media capture on the part of politician. My findings are that by employing both the signals available, citizens manage to sort honest politicians from dishonest ones more often than if they were relying on media information only. Moreover, the existence of both signals makes collusion harder to take place than
in the case of one signal only.

In addition, this Chapter constitutes one of the first attempts at endogenising the acquisition of information on the part of citizens through mass media. In previous works voters have quite a passive role towards information: they might receive and use information even when this might cause a decrease in expected welfare. In this work this is not the case. I show that, by using media in an active and strategic way, the voter might decide whether to use information if and only if this would cause her expected utility to increase. I prove that this decision on the part of the citizen depends critically on the time discount factor between the two periods the game consists of: when the time discount factor is larger than a certain threshold, it is optimal for her to recur to media as this maximises her expected utility. When the time discount factor is lower than the threshold, her optimal decision is to commit not to getting information.

Finally, it is a well known result in these voting games that there is a tension between optimality ex-ante and optimality ex-post. Even though for the voter it may be optimal ex-ante to commit not to use any information, once the new information is available, it is optimal for her to use it. This argument might break the equilibria where the voter commits ex-ante to a sort of “rational and strategic ignorance”. However, if collusion is possible and as a result informative signals are concealed, I show that there is a certain range of parameters where collusion makes this “ignorance strategy” credible. In this case, making collusion easier is optimal from the voter’s utility viewpoint. This is a surprising result which contradicts most of the literature in this field which sees decreasing collusion between media and government as a positive measure of public policy. The conclusion is that sometimes easying collusion via a decreasing of the transaction cost of corruption or through a shrinking in the media market may be welfare enhancing for the citizen.

My work relates to different strands of the literature on political economy, and in particular, political economy of mass media. The seminal paper in the latter field is Besley and Prat (2006). They employ a simple model of supervision activity in a context
of hard information, where several media outlets compete in order to provide informative news to citizens. Given that news can only be hidden, the possible form of collusion between incumbent politician and media is such that the latter could conceal the bad news regarding the former, in exchange for monetary bribes. In this way media can influence voter’s beliefs on the incumbent’s ability: as a result media could help him to disguise his type and to be reelected. The authors find that collusion between media and politicians is more difficult when the number of competing media is large and when the market for news is big.

Another important contribution is Stromberg (2004a). In his model mass media has the role of informing citizens about the policies delivered by the government. If media supply most of the information citizens use in voting decisions and there are several groups of voters to compete for, politicians will find optimal to deliver policies to the largest groups of citizens that can be reached by media, with the lowest unit cost. In presence of a media industry technology with decreasing average costs the model predicts that there will be a bias in the type of policies implemented: large and unorganized groups of voters will be favoured more. Stromberg (2004b) finds empirical support for this theoretical prediction.

The previous research sees media as an institutional player which supervises politician’s activity or which communicates and spreads information from the government to the citizens (top - bottom role). Another strand of literature thinks of media as a player which insures that important social and political issues from the public reach the politicians (bottom - up role). Two important works here are Besley and Burgess (2001) and Besley and Burgess (2002). They show that the existence of free and widespread media is central in raising the salience of policy issues and the sensitivity of politicians to those issues. They test this theoretical conclusion using a panel data of Indian states and they find strong support for their hypothesis: the most responsive states to economic shocks like drought, flood and famine are the ones where the newspaper circulation is higher.

This work refers also to the literature on incentives in organisation in presence of
career concerns. Classical references in this field are Dewatripont, Jewitt and Tirole (1999a) and Dewatripont, Jewitt and Tirole (1999b). Their setting is quite similar to mine, since they analyse how an outside organization (called the market) can exploit two sources of independent information on agent’s type, who is carrying out a task which is not contractible upon. They derive a number of propositions on the comparative statics of different information structures and test their robustness by considering several statistical distribution of signals. However, this work differs from theirs since I consider an institutional (and political) setting and I introduce the “player” offering one of the two pieces of information, modelling its incentives and the possibility of collusion. Moreover, in this model one of the two signals the principal receives is valuable for him per se and not only as a source of information on agent’s type. This work is also related to the literature on the role of elections as a screening and disciplining device. Classical references in this field are Coate and Morris (1995) and Persson and Tabellini (2000, Ch. 4). However in these previous works, no mention of the role of media in politics is done. Finally Kotsogiannis and Schwager (2006) present a model relating policy innovation on part of politicians to information available to voters on those policies. In their setting several jurisdictions are present where politicians might experiment with new policies or not. They show that when the information increases, voters are more able to select the honest politicians; nevertheless the incentive to innovate decreases. This may result in the voter’s welfare being reduced. The setting of the present Chapter is different from theirs: in their paper the information to voters about policies comes from other jurisdictions and it comes for free. In this model the information comes from media and I explicitly model media incentives. Finally, another important work building on the career concerns literature in the context of political economy is the one by Le Borgne and Lockwood (2006). They check whether the existence of career concerns in the sense of reelection prospect is sufficient in promoting effort on part of politicians. They show how a modification in the way politician’s effort and ability interact in the production of public good changes the incentives for the politician and might make election not always
the optimal institution as compared to appointment.

The remainder of the Chapter is organized as follows. In the following Section I introduce the model and the strategic situation at hand when only citizens and government interact with each other. In Section 3 I solve this game and highlight the existence of two effects that elections have on incumbent’s behaviour: disciplining and selecting effect. In Section 4 I conduct the welfare analysis of this model and I highlight the existence of a conflict of interest between citizens and politicians depending on the time discount parameter. In Section 5 I introduce media in the framework and I derive the new equilibrium of the game when collusion is possible: in particular I find that the disciplining effect decreases when media is active, while the sorting increases. As a special case I also derive the equilibrium when collusion is not available to the players. In Section 6 I conduct the welfare analysis of the game with media and stress how the conflict of interest previously highlighted can be resolved when citizens demand information endogenously, depending on whether or not this increases their expected utility. Moreover, contrary to most of the findings of the literature, I find a condition such that making collusion easier between media and government increases citizen’s expected utility. Finally Section 7 concludes.

3.2 The Model

I employ a model of political agency between the government and the citizens, where the former is the agent and the latter is the principal. This modelling approach was pioneered by Barro (1973) and Ferejohn (1986). However this first generation of political agency models features moral hazard only: in equilibrium citizens are indifferent among competing politicians. In particular, they are indifferent between reelecting the incumbent or not. As a result these models are unable to highlight the fact that politicians may differ among themselves in some characteristic which is relevant to voters and upon which voters may cast their vote.

\[ \text{In order to avoid confusion, from now on the politician, either incumbent (i.e. government) or challenger, will be referred to with the pronoun “he”, the citizen with “she”, while media with “it”} \]

58
In order to be able to model this, a very recent literature in political economy has started to construct models with both moral hazard and adverse selection. This new modelling option was first proposed by Austen Smith and Banks (1989) and Coate and Morris (1995) and more recently Persson and Tabellini (2000) and Besley and Smart (2007). In this class of models politicians vary among themselves along some characteristic which is relevant but unobservable directly to voters; moreover the politicians can take some action in order to disguise this trait. Finally, citizens try to infer this characteristic and make their voting behaviour contingent on it.

This model follows rather strictly the one devised by Besley and Smart (2007). The model has two periods \( t \in \{1, 2\} \). In each period the task of the elected politician is to produce a public good \( g_t \) valuable for the citizens. In order to produce the public good the government uses fiscal resources collected from the citizens. I make the hypothesis that there is a maximum \( T \) of tax revenues that the government can raise in both periods. So, \( \tau_t \in F \equiv [0, T] \).

The citizens form the polity in this simple model of politics. Given both the impossibility of politician commitment (or the non-enforceability of electoral promises) and the non-contractibility of the output produced by the politician, the politician’s reward cannot be made contingent on the output level: in words, politicians are not rewarded financially for their successes, as managers are in a private firm. Instead, citizens offer a simple implicit incentive scheme to the politician in the form of career concerns: if he reveals himself as a good quality official, the incumbent is rewarded by reelection; otherwise he is punished by being voted out and replaced by a challenger. In this way elections perform the double task of both sorting and disciplining politicians out. Citizens vote in a retrospective way based on past government performance. The citizens have only one information source to rely on to decide whether to reappoint or not the government: the quantity of public good produced by the government. Later on I will allow for another signal coming from media to affect the voting decision.
3.2.1 The Government

Politicians come into two types: they can either be “honest” (h) or “dishonest” (d). \( j \) is the random variable for the politicians’s type assuming values in \( J \equiv \{h, d\} \), with \( Pr(j = h) = \eta \in (0, 1) \). I assume that a politician’s type represents his preferences: an honest politician does not like to take any money out of the collected fiscal revenues \( \tau_t \). As a consequence he always maximises citizens’ welfare. On the other hand, a dishonest politician maximises the discounted sum of the funds \( r_t \) diverted from the fiscal resources. This means that a dishonest incumbent maximises the following utility function:

\[
u_d = r_1 + \sigma_c \delta r_2
\]  

(3.1)

where \( \delta \in (0, 1) \) is the time discount factor between period 1 and 2 and \( \sigma_c \) is the rationally anticipated probability that the incumbent is reelected. In other words \( \sigma_c \) is the probability that the citizens are going to reelect the incumbent, with \( \sigma^*_c \) as the equilibrium probability.\(^7\) As is clear from above, the dishonest politician is completely self-interested and derives his utility uniquely from grabbing rents when in charge of government. It is not surprising how this is going to influence citizens’ behaviour: given politicians’ preferences it is intuitive that citizens would like to have an honest politician as the incumbent government rather than a dishonest one.

3.2.2 The Citizens

There is a continuum of voters of measure 1 in every period \( t \). Citizens derive their utility uniquely from the consumption of public good \( g_t \).\(^8\) They all have the same preferences,

\(^7\)We choose to consider only the monetary rents \( r_t \) in the government’s utility function. However most of the literature (see (Persson and Tabellini, 2000)) allows for an additional term \( R \), the so called “ego-rent”. This is interpreted as the utility the politician derives from simply being in charge of the government. We choose not to include this ego-rent and focus on politician’s decision regarding monetary rents \( r_t \). Nevertheless having this additional term would not affect our main results.

\(^8\)In the remaining of the paper we are going to use interchangeably the two words “citizen(s)” and “voter(s)” to refer to the same player(s) in the game.
represented by the following utility function:

\[ u_{c,t} = H(g_t) - \tau_t \]  

(3.2)

where \( H_g(g_t) > 0, H_{gg}(g_t) < 0 \) and \( H(g_t) \) satisfies the usual Inada conditions, i.e. 
\[ \lim_{g_t \to -\infty} H_g(g_t) = 0 \quad \text{and} \quad \lim_{g_t \to 0} H_g(g_t) = \infty. \]  

As already said, citizens also act as the principal in this agency relationship: they form the polity that is going to re-elect or vote out the incumbent at the end of the first period. Based upon the available information, i.e. common knowledge of the p.d.f. of politician's type and the observation of the public good supplied in period \( t = 1 \) (alternatively of the utility enjoyed), citizens will decide whether to reelect or not the incumbent.

This represents one of the differences between this Chapter and the model devised in Besley and Prat (2006): in their paper all the information accruing to the citizen comes from the media only and the public good is not observable by citizen. Moreover in their paper they do not allow for different cost/quality in the production of the public good. Here instead, I allow for the public good cost parameter to be randomly chosen by the Nature and observed by the politician first but not by the citizen. Finally, I introduce the time discount parameter \( \delta \in (0, 1) \) which allows to analyse how the players' equilibrium strategies depend upon the relative weight of the future with respect to the present.

Since all citizens are alike, as they have the same preferences represented by the utility function in eq.(3.2) and the same available information, the voting decision can be treated as exactly the same for everyone. I will then restrict my analysis to the representative citizen knowing that everyone in the polity votes in the same way as she does. In terms

\[^9\text{In our notation, the subscript in a function indicates the argument with respect to which the derivative of the function is taken. So, for instance } \frac{\partial H(g_t)}{\partial g_t} \equiv H_g(g_t).\]

\[^{10}\text{Notice that Besley and Prat (2006) allow for a number } n \text{ of media to compete on the market for news, with } n > 1. \text{ Since we want to analyse the effect of having another source of information (the public good } g) \text{ independent from the media, we limit ourselves to the case of one media only.}\]

\[^{11}\text{The other differences are the introduction of the time discount } \delta \in (0, 1) \text{ and the fact that the monitoring activity of the media takes place ex-ante and not ex-post.}\]

\[^{12}\text{Of course this is an extreme case far from reality and would lead us to draw the conclusion that the}\]
of the political economy literature, this is a model of pure political agency, where any partisan consideration is absent. In particular, the citizens and the politicians do not have any ideological motivation influencing their behaviour.

3.2.3 The Public Good Production Technology

In every period I assume that a single public good $g_t$ is produced, supplied by the government and consumed by the citizens. Of course this single $g_t$ can be thought as a bunch or amalgamate of public goods. The public good production function is the same in both periods and it is:

$$g_t = \frac{1}{\theta} (\tau_t - r_t)$$

(3.3)

Since no borrowing or lending is allowed between the two periods, from the above it is possible to recover the budget constraint that the government has to balance in each of the two periods:

$$\tau_t = \theta g_t + r_t$$

(3.4)

The parameter $\theta$ is the cost of producing the public good $g_t$. $\theta$ is a random variable assuming values in $\Theta \equiv \{\bar{\theta}, \theta\}$, where $\bar{\theta} > \theta > 0$, with probability $Pr(\theta = \bar{\theta}) = \rho$. Obviously the public good quantity $g_t$ is larger when the cost $\theta$ is low, when the rents diverted are smaller, and when the tax revenues are larger. The set $G$ is the set of feasible public good quantities $g_t$. When the incumbent grabs all the rents (i.e. $r_t = \tau_t$) then $g_t = 0$. When $r_t = 0$, then $g_t = \frac{\tau_t}{\theta}$. So the set $G \equiv [0, \frac{\tau_t}{\theta}].$

government is reelected or sent away with percentage close to 100%. Moreover, here there is not any strategic consideration on part of any voter on the electoral outcome; in particular the probability of being pivotal. However we choose to adopt this shortcut hoping to enlighten the role of media in the political system, leaving aside other considerations.
3.2.4 The Game and the Definition of Equilibrium

This two-period model consists of a game of incomplete information among three players: incumbent politician, challenger politician, and citizen.\(^{13}\) In the first period there are five stages. At \(t = 1.0\), Nature selects the government’s type \(j\) with a random draw from the set \(J \equiv \{h, d\}\) with \(Pr(j = h) = \eta\) and likewise the public good cost parameter from the set \(\Theta \equiv \{\theta, \overline{\theta}\}\), with \(Pr(\theta = \overline{\theta}) = \rho \in (0, 1)\). At \(t = 1.1\), the government observes his own type and the cost parameter \(\theta\). At \(t = 1.2\) the incumbent politician decides the amount of tax revenues \(\tau_1\) to collect and how to allocate them between production of public good \(g_1\) and rents appropriated \(r_1\). The observation of tax collected and of public good by citizen (or the flow of utility coming from it) takes place at \(t = 1.3\). At \(t = 1.4\) an election is held, where the incumbent is confronted by a challenger politician whose type is unknown, but drawn independently by the Nature from the same set \(J\) and according to the same probability distribution as the incumbent’s one. The challenger observes his own type. Knowing the politician’s type probability distribution and having observed the public good produced, the citizen has to decide whether to reelect the incumbent or to vote him off in favour of the challenger. The second period comprises two stages only. At \(t = 2.1\) the elected politician observes a new cost parameter \(\theta\) which is i.i.d. with the probability distribution of the first period cost parameter and then has to decide again the amount of fiscal resources \(\tau_2\) to collect and how to allocate them between public good \(g_2\) and rents \(r_2\). At \(t = 2.2\) the game ends.

Formally in every period, having collected the level of resources \(\tau_t\), the incumbent takes a (possibly mixed) strategy over \(r_t \in A \equiv [0, \tau_t]\). However the citizen does not observe directly the level of rents appropriated: she observes instead the level of tax collected and of public good supplied. So I can describe equivalently the incumbent’s strategy in terms of \((\tau_t, g_t) \in F \times G\) rather than \((\tau_t, r_t) \in F \times A\). A strategy for the incumbent has two components: the first describes a tax collection and public good production decision in the first period given the incumbent’s type \(j \in J\) and public good

\(^{13}\)The first period of the game goes from \(t = 1.0\) to \(t = 1.4\). The second period starts at \(t = 2.1\).
cost \( \theta \in \Theta \). The second component specifies a tax collection and public good decision in the second period, should the incumbent gets re-elected. Again this choice depends uniquely on \((j, \theta)\). A strategy for the challenger is a rule mapping from his type and public good cost to the second period level of taxation and production of public good: it determines a rent grabbing rule, should the challenger get elected and replace the incumbent in running the government.

Following the definition of a signaling game, I define the probability distribution function:

\[
\sigma_p : J \times \Theta \rightarrow F \times G
\]  

(3.5)

I define \( \sigma_p(g, \tau|j, \theta) \in [0, 1] \) as the probability that the type \( j \), given the cost parameter \( \theta \), collects the amount of tax \( \tau \) and produces the quantity \( g \). To simplify notation I write \( \sigma_p(g, \tau|j, \theta) = \sigma_{j, \theta}(g, \tau) \). With \( \sigma_p(g, \tau) \) I indicate the mixed strategy profile taken by both types of politician, irrespective of the public good cost parameter.

A strategy for the citizen is defined to be a function mapping from the information the citizen has to the probability with which she will vote for the incumbent. The information the citizen has consists of her prior on the incumbent’s type, the incumbent’s first period record, and the prior on challenger’s type.\(^{14}\) So regarding the citizen’s strategy, I define the following function:

\[
\sigma_c : F \times G \rightarrow \{V, NV\}
\]  

(3.6)

where \( \{V(ote), N(ot)V(ote)\} \) is the action space of the citizen, with \( V \) standing for “voting for the incumbent”, and \( NV \) standing for “not voting for the incumbent”, which is equivalent to voting for the challenger. The citizen conditions her action on the strategy

---

\(^{14}\)To economize on notation, the priors about incumbent and challenger types have been dropped in the definition of eq. (3.6).
taken by the government i.e. \((\tau_1, g_1)\), the first period tax collected and quantity of public good. Eq.(3.6) defines the probability density function \(\sigma_c(V|\tau_1, g_1) \in [0, 1]\) which maps from the first period taxation and public good quantity carried out by the incumbent government to the probability the citizen is going to reelect him. Again to simplify notation, I rewrite \(\sigma_c(V|\tau_1, g_1)\) as \(\sigma_c(\tau_1, g_1)\). When there is no fear of generating confusion, I will write simply \(\sigma_c\).

To solve this game I employ the solution concept of Perfect Bayesian Equilibrium. It consists of a strategy for the incumbent politician, a strategy for the challenger and a strategy and beliefs for the citizen satisfying a number of properties. First, given the incumbent’s strategy, citizen’s beliefs are consistent with it and are generated by Bayesian updating where possible, i.e. along the equilibrium path. Second, the citizen’s strategy is consistent with her beliefs, and optimal given the strategies of the incumbent and of the challenger. Third, the incumbent’s strategy is optimal given citizen’s strategy and beliefs and challenger’s strategy. Fourth, the challenger’s strategy is optimal, given citizen’s strategy and beliefs and incumbent’s strategy.

### 3.3 Solving the Model

#### 3.3.1 Second Period Behaviour of Politicians

In the second period, the only player called upon to move is the government, whether the old one or the newly elected. Since there is no continuation game and no need to signal (or disguise) his own type to be reelected, the second period dishonest incumbent has no incentive to restrain himself: he will collect the maximum quantity of fiscal resources \(\tau_2 = T\), grab the maximum amount of rents \(r_2 = T\) and produce no public good at all, i.e. \(g_2 = 0\). As a result citizen’s utility in the second period is \(u_c = -T < 0\), when a dishonest incumbent in in charge.

On the other hand the honest incumbent will produce the optimal amount \(g_2^*(\theta)\) depending on the cost parameter \(\theta\). More formally, the honest incumbent fully internalises
the citizen’s decision problem: the honest politician’s interest is completely aligned with voter’s one. Given his preferences, he will take the same decision the voter would if she could carry out the public good production by herself.

The programme the honest incumbent is solving is the following:

\[ g^* \in \text{ArgMax } H(g_2) - \tau_2 \]
\[\text{s.t. } \tau_2 = \theta g_2 \]

To solve the programme, substitute \( \tau_2 \) accordingly in the expression to be maximised, take the first derivative with respect to \( g_2 \) and equate it to zero: the solution to the problem is that \( g_2^*(\theta) = H_{g_2}^{-1}(\theta) \). Given the strict concavity of \( H(g) \), from the theorem of the derivative of the inverse function, it follows that \( g_2^*(\theta) > g_2^*(\overline{\theta}) \). From the budget constraint \( \tau_2^*(\theta) = g_2^*(\theta)\theta \) is the optimal amount of tax collection, contingent on public good cost \( \theta \in \{ \theta, \overline{\theta} \} \).

I write that \( \tau^* = \tau_t^*(\theta) = g_t^*(\theta)\theta \) and \( \tau^* = \tau_t^*(\overline{\theta}) = g_t^*(\overline{\theta})\overline{\theta} \), for any \( t \in \{1, 2\} \). Notice that it is not possible to decide whether \( \tau^* \preceq \overline{\tau}^* \). To economise on notation it is useful to define the following: \( g^* \equiv g_t^*(\theta) \); \( \overline{g}^* \equiv g_t^*(\overline{\theta}) \) and \( H^* \equiv H(g_t^*(\theta)) \); \( \overline{H}^* \equiv H(g_t^*(\overline{\theta})) \). Also notice that I assume \( T \geq \max\{ \tau^*, \overline{\tau}^* \} \). An important remark is that from the Envelope Theorem it follows that \( \overline{H}^* - \overline{\tau}^* < H^* - \tau^* \). Obviously, I assume that \( \overline{H}^* - \overline{\tau}^* \geq 0 \). So, conditional on having an honest government, the citizen prefers to have a low cost to a high cost public good environment, since the former gives her a larger net utility.

Finally it is clear that the citizen prefers to have an honest incumbent in the second period. In fact, in the second period the honest incumbent will give the citizen a non-negative utility, while the dishonest will give her a negative utility equal to \(-T\).

\[15\text{If not there would not be any reason to carry out tax collection and public good production on part of government.}\]
3.3.2 Citizen’s First Period Strategy

Since citizen’s second period utility depends exclusively upon incumbent’s type, her optimal strategy in the first period is uniquely determined by her beliefs on politician’s type. As already said, the only way for the citizen to infer the politician’s type is to observe the first period incumbent’s strategy \((\tau_1, g_1)\) and update her prior beliefs on the politician being honest. I denote with \(\mu(j = h | (\tau_1, g_1)) = \mu_h(\tau_1, g_1)\) the citizen’s updated beliefs. Remember that Nature draws an honest type with probability \(Pr(j = h) = \eta\); consequently this represents citizen’s prior on the type being honest.

I already said that the voter prefers to have an honest incumbent to a dishonest one in the second period. So if she finds out in the first period that the incumbent is honest, she will reelect him for the following term. However, if she realizes that the first period incumbent is dishonest, her optimal strategy is to vote him off and replace him with a challenger of unknown type. To see this, let us compute the citizen’s expected utility given by a challenger of unknown type in period \(t\), which I indicate with \(u^c_{c,t} = \eta u_c(h) + (1 - \eta) u_c(d)\), where \(u_c(h) = \left[ \rho(\overline{H} - \overline{\tau}) + (1 - \rho)(\overline{H}^* - \overline{\tau}^*) \right]\) is the welfare accruing to the citizen in period \(t\) when the incumbent is honest and \(u_c(d) = [\rho H(0) + (1- \rho) H(0) - T] = -T\) is citizen’s welfare with a dishonest incumbent. In particular:

\[
u^c_{c,2} = \eta u_{c,2}(h) + (1 - \eta) u_{c,2}(d) \\
= \eta \left[ \rho(\overline{H} - \overline{\tau}) + (1 - \rho)(\overline{H}^* - \overline{\tau}^*) \right] + (1 - \eta) \left[ \rho H(0) + (1 - \rho) H(0) - T \right] \\
= \eta \left[ \rho(\overline{H} - \overline{\tau}) + (1 - \rho)(\overline{H}^* - \overline{\tau}^*) \right] - (1 - \eta) T
\]

Obviously this is larger than the utility \(u_{c,2}(d) = -T < 0\) which the voter would receive in the second period by reelecting a dishonest incumbent. In fact:

\[
u^c_{c,2} = \eta \left[ \rho(\overline{H} - \overline{\tau}) + (1 - \rho)(\overline{H}^* - \overline{\tau}^*) \right] - (1 - \eta) T > -T = u_{c,2}(d).
\]
By simplifying the expression, I obtain that:

\[
\left[ \rho(H^* - \tau^*) + (1 - \rho)(H^* - \tau^*) \right] > -T
\]

which is true since for any \( \theta \in \Theta : H^* - \tau^* \geq 0 \) and \(-T < 0\).

Finally when the posterior beliefs are equal to the prior, i.e. \( \mu_h(\tau_1, g_1) = \eta \), the citizen has not learnt anything new about the incumbent: her posterior belief regarding the probability of the incumbent being honest are equal to her prior, i.e. equal to \( \eta \). If she has to appoint the challenger politician, she knows that the new politician would have an expected honesty equal to \( \eta \); as a conclusion, in this case the voter is indifferent between reelecting the incumbent and appointing the challenger politician. Since she is indifferent, the citizen will randomise with probability \( \sigma_c^* \) and \( 1 - \sigma_c^* \) between electing the incumbent or not.

For clarity I can sum up citizen’s optimal strategy in the following table:

\[
\begin{align*}
\text{if } \mu_h(\tau_1, g_1) &> \eta : \sigma_c^* = 1 \\
\text{if } \mu_h(\tau_1, g_1) &< \eta : \sigma_c^* = 0 \\
\text{if } \mu_h(\tau_1, g_1) &= \eta : \sigma_c^* \in [0,1]
\end{align*}
\]

(3.7) (3.8) (3.9)

3.3.3 The Incumbent’s First Period Behaviour

The honest incumbent’s equilibrium strategy in the first period is the same as in the second. Again, contingent on the true public good cost, he produces the optimal public good quantity from the citizen’s viewpoint. Formally: \( g^* \equiv g^*(\theta) \), for any \( \theta \in \Theta \). Obviously the optimal amount of tax collection is equal to \( \tau^* = g^*(\theta)\theta \).

Since the honest incumbent plays in equilibrium only the strategies \( (\tau^*, \overline{g}^*) \) or \( (\tau^*, \underline{g}^*) \) with probability one and this is common knowledge among the players in the game, then the citizen can rationally attach a probability equal to zero to the honest type playing any strategy \( (\overline{\tau}, \overline{g}) \) different from the two above. In particular \( \mu_h(T, 0) = 0 \). From this it
follows that the dishonest type never plays any strategy \((\tilde{\tau}, \tilde{g}) \notin \{(T, 0), (\tau^*, \bar{g}^*), (\bar{\tau}^*, \bar{g}^*)\}\). In fact such a strategy \((\tilde{\tau}, \tilde{g})\) will give him a probability of reelection equal to zero, as playing the strategy \((T, 0)\) does, and a utility equal (at the most) to the entire tax revenues \(\tilde{\tau} < T\). This means that any strategy \((\tilde{\tau}, \tilde{g})\) will be strictly dominated by \((T, 0)\) and a rational player will never take it.

The interesting case is with the dishonest incumbent, whose interest is opposed to the citizen’s one. While in the second period the bad incumbent takes the unrestricted amount of rents \(r_2 = T\), in the first period he has to take into account the effect of his strategy on citizen’s beliefs and equilibrium strategy. Therefore the dishonest incumbent faces a trade-off between two objectives: on one hand acting myopically, taking all the resources and being voted out; on the other hand, forgoing part of the rents so to signal himself as an honest type and being reelected in the second period.

Suppose the cost of public good is equal to \(\bar{\theta}\). The bad incumbent has to decide between two strategies: i) act myopically, take the maximum amount of rent in the first period \(r_1 = T\) and not be reelected; ii) raise \(\tau^*\), take zero rents in the first period, produce the quantity \(\bar{g}^*\) and get reelected in the second period with probability \(\sigma_c^*(\tau^*, \bar{g}^*)\). Given \(\delta \in (0, 1), \ T + 0 \cdot \delta T > 0 + \sigma_c^*(\tau^*, \bar{g}^*) \delta T\) for any \(\sigma_c^*(\tau^*, \bar{g}^*)\): it follows that the bad incumbent will always act myopically and play the strategy \((T, 0)\) with probability one when the cost of public good is high. In fact a rational player will never play with some positive probability a strictly dominated action. Notice that the bad incumbent cannot produce a quantity \(\bar{g}^*\) when the cost is \(\bar{\theta}\): collecting \(\bar{\tau}^*\) (which amounts to announcing that the cost is \(\bar{\theta}\)) is insufficient to produce \(\bar{g}^*\) when the cost is \(\bar{\theta}\), as \(\bar{\tau}^* = g^* \bar{\theta} < g^* \bar{\theta}\). I can sum up the above findings in the following:

**Lemma 1** When the cost of public good is high, the honest incumbent raises the amount of taxes \(\tau^*\) and delivers \(\bar{g}^*\). The dishonest incumbent always plays the myopic strategy.

From the previous Lemma it follows immediately that:

**Corollary 2** When the cost of public good is high the dishonest incumbent never plays \((\bar{\tau}^*, \bar{g}^*)\) or \((\tau^*, \bar{g}^*)\).
Now suppose that the cost of public good is $\theta$. In this case recall that the honest incumbent raises $\tau^*$ and produces the optimal amount $\overline{q}^*$. The bad incumbent has three strategies he can take: i) take zero rents in the first period, produce the quantity $\overline{q}^*$ and be reelected in the second period with probability $\sigma_1^*(\tau^*, \overline{q}^*)$, where he will take the maximum amount of rents $r_2 = T$; ii) act myopically, take the maximum amount of rent in the first period $r_1 = T$ and not be reelected; iii) collect $\tau^*$ and produce a quantity of public good $\overline{q}^*$, which allows him to be reelected in the second period with probability $\sigma_2^*(\tau^*, \overline{q}^*)$, and then grab $r_2 = T$. Notice that with this last strategy the bad politician in the first period grabs $r_1 = \overline{\pi}_1(\overline{\theta} - \overline{\theta}) = \overline{\pi}_1 \Delta \theta$.

Comparing the first and the second strategy, it is straightforward to see that given $\delta \in (0, 1)$, $0 + \sigma_1^*(\tau^*, \overline{q}^*) \delta T < T + 0 \cdot \delta T$ for any $\sigma_1^*(\tau^*, \overline{q}^*)$. From this it follows immediately that the first strategy is strictly dominated by the second and a rational player will never take it. So the bad incumbent decision is restricted to the second and the third strategy. I can then establish the following Lemma:

**Lemma 3** When the cost of public good is low, the honest incumbent raises the amount of taxes $\tau^*$ and delivers $\overline{q}^*$. The dishonest incumbent plays the myopic strategy with some positive probability iff the following condition holds:

\[
T \geq \overline{q}^* \Delta \theta + \sigma_1^*(\tau^*, \overline{q}^*) \delta T \quad \text{for any } \sigma_1^*(\tau^*, \overline{q}^*)
\]

\[
\overline{q}^* \Delta \theta \leq (1 - \delta \sigma_2^*(\tau^*, \overline{q}^*))T
\]

(3.10)

If the above does not hold he will raise the quantity $\tau^*$ and produce the amount $\overline{q}^*$, while grabbing rents equal to $\overline{q}^* \Delta \theta$. In particular if the eq.(3.10) holds with strict inequality, then $\sigma_{d,\theta}^*(T, 0) = 1$.

Again it is useful to state the following finding which is a direct consequence of the above Lemma:

**Corollary 4** When the cost of public good is low the dishonest incumbent never plays $(\tau^*, \overline{q}^*)$.
Finally the following follows directly from the honest incumbent preferences:

**Lemma 5** The honest incumbent never grabs any collected fiscal resources as rents. Formally $\sigma_h^*(T, 0) = 0$.

### 3.3.4 Citizen’s Equilibrium Strategy

Given the incumbent’s equilibrium strategy I can now compute citizen’s equilibrium beliefs. Since the honest incumbent always delivers the optimal quantity of public good once he has collected resources, from Lemma 5 it is easy to establish that $\mu_h(T, 0) = 0$. Moreover from Corollary 2 and Corollary 4 I can conclude that $\mu_h(\tau^*, \phi^*) = 1$. The interesting case is when the strategy $(\tau^*, \phi^*)$ is observed in equilibrium. Let us compute the citizen’s equilibrium beliefs in this case:

$$
\mu_h(\tau^*, \phi^*) = \frac{\sigma_{h,\theta}^*(\tau^*, \phi^*)Pr(h)Pr(\theta)}{\sigma_{h,\theta}^*(\tau^*, \phi^*)Pr(h)Pr(\theta) + \sigma_{d,\theta}^*(\tau^*, \phi^*)Pr(d)Pr(\theta) + \sigma_{d,\theta}^*(\tau^*, \phi^*)Pr(d)Pr(\theta)}
$$

$$
= \frac{\eta \rho}{\eta \rho + 0 + \sigma_{d,\theta}^*(1 - \eta)(1 - \rho)}
$$

In order for the incumbent to be reelected with some probability, the posterior has to be larger than the prior, i.e. the following condition has to hold:

$$
\mu_h(\tau^*, \phi^*) = \frac{\eta \rho}{\eta \rho + \sigma_{d,\theta}^*(1 - \eta)(1 - \rho)} \geq \eta
$$

Building on all the previous results, I can now state and prove the following Lemmata:

**Lemma 6** Upon receiving a low public good cost, the dishonest incumbent always plays the myopic strategy with certainty iff $\delta < \delta^* = \frac{T - \eta \Delta \delta}{\eta}$.

**Proof.** The Proof follows immediately from Lemma 3 when eq. (3.10) holds with strict inequality.

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Lemma 7 Upon receiving a low public good cost, the dishonest incumbent collects $\tau^*$, delivers the public good $\overline{g}^*$ and is reelected with some positive probability $\sigma^*_c$ iff $\rho > 1/2$ and $\delta > \delta^* = \frac{T - \overline{g}^* \Delta \theta}{\delta T}$.

Proof. First consider the case with $\rho > 1/2$. In order to show that $\sigma^*_d(\tau^*, \overline{g}^*) = 1, \sigma^*_c(\tau^*, \overline{g}^*) > \eta$ is an equilibrium, I proceed in the usual way. Fix the equilibrium beliefs $\mu_h(\tau^*, \overline{g}^*) > \eta$ and derive the equilibrium strategy consistent with them. Given $\mu_h(\tau^*, \overline{g}^*) > \eta$, from eq. (3.7) I know that $\sigma^*_c(\tau^*, \overline{g}^*) = 1$. From Lemma 3 I know that when $\overline{g}^* \Delta \theta > (1 - \delta)T$, then $\sigma^*_d(\tau^*, \overline{g}^*) = 1$. So $\sigma^*_d(\tau^*, \overline{g}^*) = 1$ is an equilibrium strategy for the incumbent given $\sigma^*_c(\tau^*, \overline{g}^*) = 1$. Notice that this is true if and only if $\delta > 1 - \frac{T - \overline{g}^* \Delta \theta}{\delta T}$. Moreover given the equilibrium strategies, from 3.11 it is easy to establish that $\mu_h(\tau^*, \overline{g}^*) > \eta$ iff $\rho > 1/2$.

Next consider the case with $\rho = 1/2$. I want to show the existence of a continuum of equilibria $\sigma^*_d(\tau^*, \overline{g}^*) = 1, \sigma^*_c(\tau^*, \overline{g}^*) \geq \frac{T - \overline{g}^* \Delta \theta}{\delta T}, \mu_h(\tau^*, \overline{g}^*) = \eta$. Given the equilibrium beliefs $\mu_h(\tau^*, \overline{g}^*) = \eta$, then $\sigma^*_d(\tau^*, \overline{g}^*) = 1$ iff $\rho = 1/2$. Given equilibrium beliefs and incumbent equilibrium strategy, the citizen randomizes between reelected and not reelected the incumbent with such a probability that: $\overline{g}^* \Delta \theta + \sigma^*_c \delta T \geq T$, i.e. $\sigma^*_c(\tau^*, \overline{g}^*) \geq \frac{T - \overline{g}^* \Delta \theta}{\delta T}$. Notice that this is true if and only if $\delta \geq \delta^*$.

Finally given the equilibrium strategies, from (3.11) it is easy to establish that $\mu_h(\tau^*, \overline{g}^*) = \eta$ iff $\rho = 1/2$. ■

So in the previous equilibrium strategy, upon receiving a public good cost $\theta = \hat{\theta}$, the dishonest incumbent acts as an honest one: he taxes the citizens with the tax $\tau^*$, delivers the public good $\overline{g}^*$ and is reelected with some positive probability when both $\delta$ and $\rho$ are large enough. In particular when $\rho = 1/2$ the citizen, conditional on observing the strategy $(\tau^*, \overline{g}^*)$, reelected the incumbent with (a continuum of) probability $\sigma^*_c(\tau^*, \overline{g}^*) \geq \frac{T - \overline{g}^* \Delta \theta}{\delta T}$.

Together with the previous equilibrium strategy, it is also possible to construct an equilibrium in mixed strategies, where the bad incumbent randomises between $(\tau^*, \overline{g}^*)$ and $(T, 0)$ with probability respectively $\sigma^*_d$ and $1 - \sigma^*_d$ and, conditional on observing
(\(\tau^*, g^*\)), the citizen randomises between voting and not voting with probability \(\sigma_c^*\) and 1 - \(\sigma_c^*\).

**Lemma 8** Upon receiving a low public good cost, the dishonest incumbent mixes with probability \(\sigma_{d, g}^* (\tau^*, g^*) = \frac{\rho}{1-\rho} < 1\) and 1 - \(\sigma_{d, g}^* = \frac{1-2\rho}{1-\rho}\) between collecting \(\tau^*\) and delivering the public good \(g^*\), and collecting \(T\) and delivering no public good, iff \(\rho < 1/2\) and \(\delta > \delta^* = 1 - \frac{\theta^*}{\theta}\); conditional on producing a positive amount of public good, the dishonest incumbent is reflected with probability \(\sigma_c^* = \frac{T - \theta^*}{\delta T} < 1\). There exists also a continuum of equilibrium strategies with \(\sigma_{d, g}^* (\tau^*, g^*) \in [0, \min\{\frac{\rho}{1-\rho}, 1\}]\) and the citizen reflecting the incumbent with certainty if and only if \(\delta = \delta^*\) for any value of \(\rho \in (0, 1)\).

**Proof.** First consider the case \(\delta > \delta^* = 1 - \frac{\theta^*}{\theta}\). I want to show the existence of a unique equilibrium in strictly mixed strategies \(\sigma_{d, g}^* = \frac{\rho}{1-\rho} \in (0, 1), \sigma_c^* (\tau^*, g^*) = \frac{T - \theta^*}{\delta T} \in (0, 1), \mu_h(\tau^*, g^*) = \eta\). From eq. (3.9) I know that the citizen randomises between the two actions when \(\mu_h(\tau^*, g^*) = \eta\). It turns out that \(\mu_h(\tau^*, g^*) = \eta\) if and only if \(\sigma_{d, g}^* = \frac{\rho}{1-\rho}\), where 0 < \(\frac{\rho}{1-\rho}\) < 1 iff \(\rho \in (0, 1/2)\). In order for the dishonest incumbent to mix between myopic and not-myopic I know that eq. (3.10) has to hold with equality, i.e. \(g^* \Delta \theta = T - \delta \sigma_c^* (\tau^*, g^*) T\), which is true iff \(\sigma_c^* (\tau^*, g^*) = \frac{T - \theta^*}{\delta T}\). Finally notice that \(\frac{T - \theta^*}{\delta T} < 1\) iff \(\delta > \delta^* = 1 - \frac{\theta^*}{\theta}\).

Now consider the case when \(\delta = \delta^*\). I want to show the existence of a continuum of equilibrium strategies with \(\sigma_{d, g}^* (\tau^*, g^*) \in [0, \min\{\frac{\rho}{1-\rho}, 1\}], \sigma_c^* (\tau^*, g^*) = 1, \mu_h(\tau^*, g^*) \geq \eta\). Since \(\mu_h(\tau^*, g^*) \geq \eta\), then it has to be that \(\sigma_{d, g}^* (\tau^*, g^*) \leq \min\{\frac{\rho}{1-\rho}, 1\}\), for any value of \(\rho \in (0, 1)\). Finally for the dishonest incumbent to play a mixed strategy it has to be that \(g^* \Delta \theta = T - \delta \sigma_c^* (\tau^*, g^*) T\), which is true, given that \(\sigma_c^* (\tau^*, g^*) = 1\), iff \(\delta = \delta^*\). Notice that given equilibrium beliefs \(\mu_h(\tau^*, g^*) \geq \eta\), then equilibrium strategy \(\sigma_c^* (\tau^*, g^*) = 1\) is consistent with them. \(\blacksquare\)

Before enunciating the proposition stating the PBE of this political game, I need to define what I mean with separating, pooling and hybrid equilibria of this game. I define a separating equilibrium in pure strategies when the two politician types take two
different strategies \((\tau, g)\) and reveal themselves in equilibrium to the voter; observing the two strategies, the voter will be certain with probability equal to one that each strategy is taken by only one of the two types, \(h\) or \(d\). In turn she will reelect the honest type and vote-off the dishonest incumbent. It is useful to repeat that the honest type never takes the strategy \((T, 0)\), from Lemma 5 and the dishonest type never takes \((\tau^*, g^*)\) from 4.

I define a pooling equilibrium, when the two politician types take the same strategy \((\tau, g)\) and so do not reveal their types in equilibrium to the voter. Observing the only strategy along the equilibrium path and updating her beliefs, the citizen will vote according to the rules specified in eqq. (3.7) - (3.9). Again let us stress that \((\tau^*, g^*)\) is the only common strategy the two politicians \(h\) and \(d\) can take.

Finally a hybrid equilibrium is an equilibrium where one type takes an action with probability one and the other randomises between two actions, one of which similar to the other type. After updating her beliefs, conditional on observing the similar action, the citizen randomises between reelecting and not the politician taking this action. Due to (3.9) this is true iff \(\mu_h(\tau^*, g^*) = \eta\). Following the discussion above, it is obvious that in this hybrid equilibrium the action \((\tau^*, g^*)\) taken by both types will be \((\tau^*, g^*)\), while the other action will be \((T, 0)\).

I am ready now to state the following Proposition:

**Proposition 9** The honest incumbent always produces and taxes optimally, for any cost of the public good. When the dishonest incumbent receives a high cost parameter a unique separating equilibrium exists with the dishonest incumbent tazing the citizen with an amount \(T\) and taking maximal rents, and the citizen voting off the dishonest incumbent. When the dishonest incumbent receives a low cost parameter a unique separating equilibrium \(\sigma_{d,q}^*(T, 0) = 1\) and \(\sigma_{h,p}^*(\tau^*, g^*) = 1\) exists iff \(\delta < 1 - \frac{T - \Delta_0}{\tau}\); a unique pooling equilibrium \(\sigma_{d,q}^*(\tau^*, g^*) = \sigma_{h,p}^*(\tau^*, g^*) = 1\) and \(\sigma_c^*(\tau^*, g^*) = 1\) exists iff \(\delta > 1 - \frac{T - \Delta_0}{\tau}\) and \(\rho > 1/2\); a continuum of pooling equilibria \(\sigma_{d,q}^*(\tau^*, g^*) = 1, \sigma_c^*(\tau^*, g^*) > \frac{T - \Delta_0}{\tau}\) exists iff \(\delta > 1 - \frac{T - \Delta_0}{\tau}\) and \(\rho = 1/2\). Finally a unique hybrid equilibrium \(\sigma_{h,p}^*(\tau^*, g^*) = 1\) and \(\sigma_{d,q}^*(\tau^*, g^*) + \sigma_{d,q}^*(T, 0) = 1, \sigma_{d,q}^*(\tau^*, g^*) = \frac{\rho}{1 - \rho}\) and the citizen reelecting the incumbent
with probability $\sigma^*_c(\tau^*, \gamma^*) = \frac{T - \tau^* \Delta^q}{\delta_t}$ exists iff $\delta > 1 - \frac{\tau^* \Delta^q}{\theta}$ and $\rho < 1/2$. Moreover there exists a continuum of hybrid equilibria with the dishonest incumbent mixing between not myopic action and myopic one with probability $\sigma^*_d(\tau^*, \gamma^*) = \min\{\frac{\rho}{1-\rho}, 1\}$ and the citizen reflect for sure $\sigma^*_c(\tau^*, \gamma^*) = 1$ iff $\delta = 1 - \frac{\tau^* \Delta^q}{\theta}$.

**Proof.** First I establish the first part of the Proposition. From Lemma 1 when the cost of the public good is high for the dishonest incumbent, he plays the myopic strategy $(T, 0)$. From Lemma 5 we know that the honest politician never plays this strategy. So a separating PBE is the outcome. The same happens when the honest incumbent receives a low public good cost $\bar{\theta}$. His equilibrium strategy is to play $(\tau^*, \gamma^*)$ with probability one. On the other hand from Corollaries 2 and 4 we know that the dishonest incumbent never plays this strategy, for any cost parameter $\theta$. So again a separating equilibrium is the outcome. The only possibility left is with the types $h$ with cost $\bar{\theta}$ and the type $d$ with cost $\theta$. We know that upon receiving the cost parameter $\bar{\theta}$, the honest type plays the strategy $(\tau^*, \gamma^*)$. From Lemma 3 the type $d$ with cost $\theta$ plays the myopic strategy iff $\delta < 1 - \frac{\tau^* \Delta^q}{\theta}$. So in this case a separating PBE is the outcome. On the other hand from Lemma 7 we know that the type $d$ with cost $\theta$ plays the strategy $(\tau^*, \gamma^*)$ with probability one and is reflected with certainty iff $\rho > 1/2$ and $\delta > 1 - \frac{\tau^* \Delta^q}{\theta}$. So in this case the outcome is a pooling PBE. Moreover from the proof of the same Lemma 7 we know that the type $d$ with low cost plays with certainty the strategy $(\tau^*, \gamma^*)$ and the citizen mixes between reflecting and not reflecting the incumbent with a continuum of probability $\sigma^*_c(\tau^*, \gamma^*) \geq \frac{T - \tau^* \Delta^q}{\delta_t}$ iff $\delta > 1 - \frac{\tau^* \Delta^q}{\theta}$ and $\rho = 1/2$. So for this set of parameters a continuum of pooling equilibrium exists.

To establish the part relative to the hybrid equilibrium, see that from Lemma 8 we know that iff $\rho < 1/2$ and $\delta > 1 - \frac{\tau^* \Delta^q}{\theta}$ the type $d$ with cost $\theta$ mixes between the actions $(\tau^*, \gamma^*)$ and $(T, 0)$ and is reflected with probability equal to $\sigma^*_c = \frac{T - \tau^* \Delta^q}{\delta_t}$. Given that the honest type with large cost plays the strategy $(\tau^*, \gamma^*)$ with certainty, we have a hybrid equilibrium. Finally from the same Lemma 8 we can see given that the honest plays the strategy $(\tau^*, \gamma^*)$ a continuum of hybrid equilibria exists with the
dishonest mixing between strategy \((\tau^*, \bar{\gamma}')\) and myopic with a continuum of probability \(\sigma_{d, \hat{\theta}}(\tau^*, \bar{\gamma}') \leq \min\left\{ \frac{\hat{\theta}}{1 - \hat{\theta}}, 1 \right\}\) and the citizen reelecting the incumbent with certainty. ■

From the Proposition above it is possible to see that the existence of elections works as an incentive device for the dishonest incumbent. While the honest politician always acts in the (optimal) interest of the citizen, the dishonest incumbent can be induced to not fully appropriate fiscal resources thanks to the existence of career concerns in the form of the possibility of reelection. In fact, in order to persuade the citizen he is honest, he might end up producing the quantity \(\bar{\gamma}'\) when the true cost of production is \(\hat{\theta}\). This happens when two conditions are given: first, the dishonest politician values the future highly enough. In this case he is willing to forgo part of the approicable rents in the first period in order to grab all the maximum rents \(T\) in the following one. This equilibrium strategy is more likely to be the outcome when the ratio \(\frac{\bar{\gamma}' \Delta \theta}{T}\) is large, that is when the rents taken in the present are a large fraction of the total amount of rents available for grabbing. In turn this is true when the difference \(\Delta \theta\) between the public good cost parameters is large. The second condition for a pooling equilibrium in pure strategy to be the PBE is if and only if the probability that the cost of public good is large is greater or equal to 1/2. In fact, if this is common knowledge and the dishonest incumbent’s equilibrium strategy is \((\bar{\gamma}', \tau^*)\), then it is more likely, from the voter’s point of view, that the incumbent is of type \(h\). In this case mimicking the honest’s behaviour is an optimal strategy for the dishonest type.

Moreover, when the time discount is still large enough, but the probability that the public good cost is large is exactly equal to 1/2, then a continuum of pooling equilibria exists, with the dishonest incumbent not distinguishing himself from the honest one and taking the strategy \((\bar{\gamma}', \tau^*)\) with certainty. Interestingly, not withstanding the pure strategy on part of both incumbent’s type, the citizen mixes between reelection and not reelection with a continuum of probability \(\sigma_{c}^*(\tau^*, \bar{\gamma}') \geq \frac{T - \bar{\gamma}' \Delta \theta}{\hat{\gamma}}\).

On the other hand when the probability that the cost of public good is large is less than 1/2, a unique hybrid PBE is the equilibrium outcome. Knowing that the probability
of a high public good cost is less than half, upon observing a \((y^*, \tau^*)\) strategy the citizen will find it optimal to randomize between reelecting the incumbent and not. In fact she will be less sure of facing an honest incumbent. In turn, the dishonest incumbent will find optimal to mix between the \((y^*, \tau^*)\) action and the myopic one.

Continuing the analysis, when the time discount parameter is exactly \(\delta = 1 - \frac{\tau^* \Delta \theta}{T}\) a continuum of hybrid equilibria exists. In this case the dishonest incumbent mixes between \((y^*, \tau^*)\) action and the myopic one with a continuum of probabilities \(\sigma_{\Delta \theta} \in [0, \min\{\frac{\tau^*}{1 - \rho}, 1\}]\) if \(\rho \leq \frac{1}{2}\) and \(\sigma_{\Delta \theta} \in [0, 1]\) if \(\rho > \frac{1}{2}\). Interestingly, whatever is the mixing probability between not-myopic and myopic action, the citizen is willing to reelect the incumbent with certainty given that her posterior beliefs are strictly larger or at the most equal to her prior on the incumbent’s type. Notice that even though the equilibrium outcome is not unique for this space of parameters, all the outcomes belong to the same class of equilibria.

Finally a separating equilibrium is the only outcome when the present is more important than the future for the dishonest incumbent. This happens when only a small proportion of the total rents can be grabbed by the dishonest incumbent to mimic the honest one; in turn this is true when the difference \(\Delta \theta\) is small. If one interprets the uncertainty of the economic environment as synthesized through the difference in the public good costs, then one can notice that the different politician’s quality emerges more promptly when the “economic” environment does not show a large difference. It is when the conditions in the underlying economy are very different that the dishonest politician has the possibility of fooling the citizen and be relected.

As a conclusion we have seen that the prospect of reelection can act as a “carrot” for the dishonest politician i.e. as a disciplining device: by giving him some rents now and the possibility of grabbing more rents in the future should he be reelected, elections work in such a way to improve citizen’s welfare with respect to a situation when they are not available. In this latter case, in fact, the dishonest incumbent would misbehave and take all the available rents in any period, in the current as in the next one. So one can
conclude that the existence of career concerns contributes to improving citizen’s welfare. Of course this works only if there is some differentiation in the politicians’ quality: in particular, it is necessary that together with the dishonest politicians, honest politicians also exist.

However elections work also as a “stick”, i.e. as a selecting device: when the dishonest politician reveals himself as such, then it is optimal for the citizen not to reelect him and replace him with a challenger of expected honesty equal to \( \eta \).

In the next section I derive the citizen’s welfare for the equilibria of the game above. This will enable us to highlight the effect on citizen’s welfare of the existence of career concerns for politicians. Moreover I will be able to emphasize the existence of a conflict of interest between citizen and dishonest incumbent which cannot be resolved unless another player in this political game is introduced: media.

### 3.4 Welfare Analysis of the Game

#### 3.4.1 Citizen’s Welfare and the Conflict between Politician and Citizen

In the previous Section I highlighted that there exists a trade off between selecting politicians and disciplining them. When the disciplining effect is at work, the dishonest incumbent does not separate from the honest politician but mimics him by producing a quantity of public good equal to \( \overline{y}^* \). Obviously this represents a first-period improvement with respect to the case of the dishonest politician revealing himself: in fact thanks to the disciplining effect the citizen enjoys a positive utility in the first period. However, the drawback of this it is that by retaining a bad incumbent in charge of the office, the citizen will experience a negative utility in the second period.

If the dishonest incumbent reveals himself as such in the first period it is better for the citizen to send him off, substitute with the challenger of unknown type and enjoy a positive expected utility in the second period. This diverse mechanism functions when
the *selecting effect* is in play: in the first period the citizen loses out since she receives a negative utility; however she gains in the second, thanks to the replacement of the dishonest incumbent with a challenger delivering a higher expected utility.\footnote{Of course when a hybrid equilibrium is the equilibrium outcome of the game described in the previous section, there is also a mixed effect, i.e. a convex combination between selecting and disciplining effect, given that the dishonest incumbent with a low cost randomizes between producing a positive quantity $\gamma$ and reaping all the fiscal resources.}

To assess the balance between these two effects, I perform now a welfare analysis of the equilibria of the game in Proposition 9.

In this scenario if she wants to decide her voting strategy, the citizen can rely on the observed policies only. Remember that I have defined the expected utility the citizen enjoys in every period as $u^c_{c,t}$. Since the citizen’s utility does not depend on the time period, but only on the parameters $j$ and $\theta$, I simply replace $u^c_{c,t}$ with $u^c_{c} = \eta u_c(h) + (1 - \eta) u_c(d)$.

The expected welfare of the individual is the following:

$$EU(\sigma_{d,\theta}^*, \sigma^*) = \eta (1 - \rho) [(H^* - \tau^*) + \delta u_c(h)] +$$

$$+ \rho \delta \left( H^* - \tau^* \right) + \delta (\sigma^* u_c(h) + (1 - \sigma^*) (\eta u_c(h) + (1 - \eta) u_c(d))] +$$

$$+ (1 - \eta) \rho [u_c(d) + \delta (\eta u_c(h) + (1 - \eta) u_c(d))] +$$

$$+ (1 - \eta) (1 - \rho) \sigma_{d,\theta}^* \left[ \left( H^* - \tau^* \right) + \sigma^* u_c(d) + \delta (1 - \sigma^*) (\eta u_c(h) + (1 - \eta) u_c(d))] +$$

$$+ (1 - \eta) (1 - \rho) (1 - \sigma_{d,\theta}^*) [u_c(d) + \delta (\eta u_c(h) + (1 - \eta) u_c(d))]$$

(3.12)

It is possible to rewrite the above expression in the following and more compact way:

$$EU(\sigma_{d,\theta}^*, \sigma^*) = (1 + \delta) [\eta u_c(h) + (1 - \eta) u_c(d)] +$$

$$+ (1 - \eta) (1 - \rho) \sigma_{d,\theta}^* [H^* - \tau^* - u_c(d)] +$$

$$+ \eta (1 - \eta) \delta (1 - (1 - \rho) \sigma_{d,\theta}^* - \rho (1 - \sigma^*)) [u_c(h) - u_c(d)]$$

(3.13)

Following Besley and Smart (2007) it is useful to distinguish in eq. (3.13) the following
three terms to highlight the different effects that elections have on politician’s equilibrium strategy and then on citizen’s expected utility:

1. The term \((1 + \delta)[\eta u_c(h) + (1 - \eta)u_c(d)]\) is the welfare that would accrue to the citizen if elections were not an available institutional device and politicians were replaced with certainty at the end of each term;

2. The term \((1 - \eta)(1 - \rho)\sigma_d^\star[\tau^\star - \tau^\star - u_c(d)]\) is the disciplining term, i.e. the term indicating the increased welfare the citizen receives when the dishonest politician mimics the honest type’s behaviour and produces the optimal amount of public good \(\bar{y}^\star\) while reaping rents equal to \(\bar{y}^\star \Delta \theta\);

3. Finally the term \(\eta(1 - \eta)\delta(1 - \rho)\sigma_d^\star \sigma_c^\star - \rho (1 - \sigma_c^\star))[u_c(h) - u_c(d)]\) represents the selecting term, i.e. the term denoting the additional welfare the citizen gets when the dishonest type is discovered, voted off and replaced with a challenger of unknown honesty.

From the expression for the expected welfare, it is interesting to notice in the selecting term the expression \(\eta(1 - \eta)\delta(1 - \rho)\sigma_d^\star \sigma_c^\star [u_c(h) - u_c(d)]\). This represents the cost that the citizen bears when in a hybrid equilibrium she randomizes between reelecting and not reelecting the honest incumbent who has received the cost \(\theta = \bar{\theta}\) and plays the strategy \((\bar{y}, \tau)\) with certainty. In this case the citizen makes a “mistake” as she is not reelecting the incumbent she would like to: the welfare “cost” of this error is exactly equal to \(\eta(1 - \eta)\delta(1 - \rho)\sigma_d^\star \sigma_c^\star [u_c(h) - u_c(d)]\). The cost of another “mistake” in the selection of the right incumbent is expressed by the term \(\eta(1 - \eta)\delta(1 - \rho)\sigma_d^\star \sigma_c^\star [u_c(h) - u_c(d)]\): this represents the reduction in expected utility the citizen suffers when she reelects with probability \(\sigma_c^\star\) the dishonest incumbent who has received the cost \(\theta = \bar{\theta}\) with probability \((1 - \rho)\) and plays the strategy \((\bar{y}, \tau)\) with probability \(\sigma_d^\star\).

In order to evaluate which is the best strategic situation from the citizen’s point of view, one needs to compare the welfare accruing to citizen in the different equilibrium
situations described in Proposition 9. When a pooling equilibrium in pure strategy
\( \sigma^*_\beta (\mathcal{g}, \mathbf{\tau}) = \sigma^*_{\delta \beta} (\mathcal{g}, \mathbf{\tau}) = 1 \) and \( \sigma^*_c = 1 \) is the outcome then citizen’s welfare is equal to:

\[
EU^{Pool} = EU(\sigma^*_{\delta \beta} = 1, \sigma^*_c = 1) = (1 + \delta)[\eta u_c(h) + (1 - \eta)u_c(d)] + \\
+ (1 - \eta)(1 - \rho)[\mathbb{T}^* \mathbf{\tau} - \mathbf{\tau}^* - u_c(d)] + \eta(1 - \eta)\delta \rho [u_c(h) - u_c(d)]
\]

On the other hand, when a separating equilibrium is the outcome, the citizen’s utility is equal to:

\[
EU^{Sep} = EU(\sigma^*_{\delta \beta} = 0, \sigma^*_c = 1) = \\
= (1 + \delta)[\eta u_c(h) + (1 - \eta)u_c(d)] + \eta(1 - \eta)\delta [u_c(h) - u_c(d)]
\]

Finally, when a hybrid equilibrium \( \sigma^*_\beta (\mathcal{g}, \mathbf{\tau}) = 1 , \sigma^*_{\delta \beta} (\mathcal{g}, \mathbf{\tau}) = \frac{\rho}{1 - \rho} \) and \( \sigma^*_c = \frac{T - \mathbf{\tau}^* \Delta \theta}{\delta T} \) is the equilibrium outcome, then the expected welfare is equal to:

\[
EU^{Hybr} = \\
= EU(\sigma^*_{\delta \beta} = \frac{\rho}{1 - \rho}; \sigma^*_c = \frac{T - \mathbf{\tau}^* \Delta \theta}{\delta T}) = \\
= (1 + \delta)[\eta u_c(h) + (1 - \eta)u_c(d)] + (1 - \eta)\rho[\mathbb{T}^* \mathbf{\tau} - \mathbf{\tau}^* - u_c(d)] + \eta(1 - \eta)\delta(1 - \rho)[u_c(h) - u_c(d)]
\]

I can now continue my analysis and rank the different levels of expected utility the citizen receives depending on the various equilibrium outcomes situation.

With some simple algebra it is easy to verify that \( EU^{Sep} \geq EU^{Pool} \), iff \( \eta(1 - \eta)\delta [u_c(h) - u_c(d)] \geq (1 - \eta)(1 - \rho)[\mathbb{T}^* \mathbf{\tau} - \mathbf{\tau}^* - u_c(d)] + \eta(1 - \eta)\delta \rho [u_c(h) - u_c(d)] \). This is true if and only if the following condition holds:

\[
\delta \geq \delta^{\text{citizen}} = \frac{1}{\eta} \frac{\mathbb{T}^* \mathbf{\tau} - \mathbf{\tau}^* - u_c(d)}{u_c(h) - u_c(d)} \quad (3.14)
\]
On the other hand, \( EU^{Hybr} \geq EU^{Pool} \) iff 
\[
(1 - \eta) \rho [H^* - \tau^* - u_c(d)] + \delta \eta (1 - \rho) [u_c(h) - u_c(d)] \geq (1 - \eta) (1 - \rho) [H^* - \tau^* - u_c(d)] + \delta \eta (1 - \rho) [u_c(h) - u_c(d)]
\]
This holds true when \( \delta \eta (1 - 2 \rho) [u_c(h) - u_c(d)] \geq (1 - 2 \rho) [H^* - \tau^* - u_c(d)] \). From this, depending on the parameter value of \( \rho \), it is possible to distinguish two cases:

\[
\begin{align*}
\text{when } \rho & \geq \frac{1}{2} : \text{ } EU^{Hybr} \geq EU^{Pool} \text{ iff } \delta \leq \delta_{\text{citizen}} = \frac{1}{\eta} \frac{H^* - \tau^* - u_c(d)}{u_c(h) - u_c(d)} \quad (3.15) \\
\text{when } \rho & < \frac{1}{2} : \text{ } EU^{Hybr} \geq EU^{Pool} \text{ iff } \delta \geq \delta_{\text{citizen}} = \frac{1}{\eta} \frac{H^* - \tau^* - u_c(d)}{u_c(h) - u_c(d)} \quad (3.16)
\end{align*}
\]

Finally it is straightforward to compare the expression for \( EU^{Hybr} \) and \( EU^{Sep} \) and determine the condition(s) such that \( EU^{Hybr} \geq EU^{Sep} \). The previous is true iff 
\[
(1 - \eta) \rho [H^* - \tau^* - u_c(d)] + \delta \eta (1 - \eta) (1 - \rho) [u_c(h) - u_c(d)] \geq \delta \eta (1 - \eta) [u_c(h) - u_c(d)]
\]
i.e. iff 
\[
(1 - \rho) [H^* - \tau^* - u_c(d)] \geq \delta \eta (1 - \eta) (1 - 1 + \rho) [u_c(h) - u_c(d)],
\]
which is true iff the following condition holds:

\[
\delta \leq \delta_{\text{citizen}} = \frac{1}{\eta} \frac{H^* - \tau^* - u_c(d)}{u_c(h) - u_c(d)}
\]

The last part of the welfare analysis involves computing the citizen’s expected utility when the value of the parameters are \( \delta = \delta^* \) or \( \rho = \frac{1}{2} \) and the equilibrium outcome are the continuum of equilibria listed in Proposition 9.

When \( \rho = \frac{1}{2} \) and \( \delta > \delta^* \), from Lemma 7 a continuum of equilibria \( \sigma_{\delta^*, \delta}^* (\tau^*, \gamma^*) = 1, \sigma_c^* (\tau^*, \gamma^*) \geq \frac{T - \tau^* \Delta \theta}{\delta T} \) exists. By substituting these values in the eq. (3.13), the expression for the Expected Utility is the following:

\[
EU(\sigma_{\delta^*}^* = 1, \sigma_c^* \geq \frac{T - \gamma^* \Delta \theta}{\delta T}) = \\
= (1 + \delta)[\eta u_c(h) + (1 - \eta) u_c(d)] + \frac{1}{2}(1 - \eta)[H^* - \tau^* - u_c(d)] + \frac{1}{2}\eta(1 - \eta)\delta[u_c(h) - u_c(d)]
\]
When $\delta = \delta^*$, from Lemma 8 a continuum of equilibria $\sigma_d^*(\tau^*, \bar{y}^*) \in (0, \min\{\frac{\rho}{1-\rho}, 1\})$, $\sigma^* (\tau^*, \bar{y}^*) = 1$ exists. Moreover there exists also a unique equilibrium where $\sigma_d^*(\tau^*, \bar{y}^*) = \min\{\frac{\rho}{1-\rho}, 1\}$, $\sigma_c^* (\tau^*, \bar{y}^*) = 1$. By substituting these values in the eq. (3.13), and distinguishing for the value of $\rho$, the expression for the expected utility is the following:

If $\rho < \frac{1}{2}$: $EU(\sigma_d^* \in (0, \frac{\rho}{1-\rho})), \sigma_c^* = 1) =$

$= (1 + \delta^*)(\eta u_c(h) + (1 - \eta)u_c(d)) + (1 - \eta)(1 - \rho)\sigma_d^*[\bar{H}^* - \tau^* - u_c(d)] +$

$+ \eta(1 - \eta)\delta^* (1 - \rho) \sigma_d^*[u_c(h) - u_c(d)]$

If $\rho < \frac{1}{2}$: $EU(\sigma_d^* = \frac{\rho}{1-\rho}, \sigma_c^* = 1) =$

$= (1 + \delta^*)(\eta u_c(h) + (1 - \eta)u_c(d)) + (1 - \eta)\rho[\bar{H}^* - \tau^* - u_c(d)] +$

$+ \eta(1 - \eta)\delta^* (1 - \rho) [u_c(h) - u_c(d)]$

If $\rho \geq \frac{1}{2}$: $EU(\sigma_d^* \in (0, 1), \sigma_c^* = 1) =$

$= (1 + \delta)[\eta u_c(h) + (1 - \eta)u_c(d)] + (1 - \eta)(1 - \rho)\sigma_d^*[\bar{H}^* - \tau^* - u_c(d)] +$

$+ \eta(1 - \eta)\delta(1 - \rho) \sigma_d^*[u_c(h) - u_c(d)]$

If $\rho \geq \frac{1}{2}$: $EU(\sigma_d^* = 1, \sigma_c^* = 1) = EU^{Pool} =$

$= (1 + \delta)[\eta u_c(h) + (1 - \eta)u_c(d)] + (1 - \eta)(1 - \rho)[\bar{H}^* - \tau^* - u_c(d)] +$

$+ \eta(1 - \eta)\delta \rho [u_c(h) - u_c(d)]$

It is interesting to highlight the existence of a conflict of interest between the citizen and the dishonest incumbent with cost $\bar{y}$ depending on the space of parameters and in particular on the time discount parameter $\delta$. For instance, notice that while the

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politician plays a pooling equilibrium only if he weighs the future highly enough compared to the present \( \delta \geq \delta^* = 1 - \frac{p\Delta^\theta}{\rho} \), the optimal decision from the citizen’s viewpoint is the opposite. In fact for the citizen disciplining the incumbent is optimal if and only if the future is not important with respect to the present \( \delta \leq \delta_{\text{citizen}} \).

Quite intuitively if the citizen weighs the present more than the future, then disciplining the incumbent and having him to deliver the optimal amount of public good now is more important than deselecting and replacing him. On the other hand, when the citizen has a long-term perspective and weighs the future more than the present, then a separating equilibrium is welfare improving for her. However this contrasts with the dishonest incumbent’s incentives: when \( \delta \) is large enough, the dishonest politician’s optimal strategy is to pool with the honest one.

One can find this type of conflict of interest between the citizen and the dishonest incumbent when comparing the expected utility the citizen enjoys when a hybrid equilibrium is the outcome with her utility when separating and pooling equilibria are the outcome.\(^{18}\) For instance, the (unique) hybrid equilibrium exists only if \( \delta \geq \delta^* \) that is only if the time discount is large enough. However, from the citizen’s viewpoint, having the incumbent dishonest politician mixing between revealing his type and not is better than pooling when the time discount is small enough that is if and only if \( \delta \leq \delta_{\text{citizen}} \) and \( \rho \geq \frac{1}{2} \).

In the examples I have described so far, the citizen’s welfare is lower than it could be if a different amount of information information was available: however the equilibrium of the game does not allow there to be more (less) selecting than would be optimal from citizen’s expected utility viewpoint. Nevertheless, things would change if there was another player whom she could resort to in order to receive information and see whether the incumbent is honest or just pretending to be so. In the next section I am going to introduce this additional player: media will have the role of the informed supervisor

\(^{18}\)In this welfare analysis for simplicity I do not consider the multiple equilibria.
supplying information to the citizen. Moreover, I will derive the conditions such that its presence is useful for her.

3.5 Introducing Media

Having derived the equilibria of the game in Proposition 9, I now introduce a new player in this stripped down model of politics: media. To keep things simple, I will concentrate on the role that one single media has in the political arena. I study the general case when collusion between media and incumbent is possible. As a special case I derive the strategic situation when collusion between media and politician is not available.

I think of media as an informed supervisor, that is a player (having the role of) receiving a signal about the politico-economic environment and sending it to the citizens. At least two modelling options are available: either the media receives and sends a signal about the politician’s type or it informs the citizens about the true cost of the public good. Both options can be justified with anecdotal evidence. However, for the sake of the argument, I decide for the modelling choice where the media publishes news about the cost of the public good. Given the present setting, this amounts to the media publishing news about wasteful and rent-seeking activity of the government. It is easy to show that the results derived in this Section hold also when the media publishes news about the incumbent’s type.

I will show how the presence of media brings about more sorting and less disciplining of politicians with respect to a situation where media is absent. Moreover, I will highlight

\[\text{Note:}\]

\[\text{(Footnotes):}\]

\[\text{Footnote 19:}\] For an interesting discussion about how the size of the media market and the number of outlets influence the relationship between media and government in terms of capture and collusion, see the seminal article by Besley and Prat (2006).

\[\text{Footnote 20:}\] This signal could be seen as received by media as the product of some sort of costly activity, for instance journalistic inquiry about government’s ability. Of course this inquiry should be financed out of the revenue and then we could conduce an exercise of comparative statics on cost and revenue structure. However as the objective of the paper is to show how to make collusion and capture between media and government harder, I normalize the cost of getting news to zero.

\[\text{Footnote 21:}\] Also, politicians’ preferences are more likely to be politicians’ private information for any signal received by media. As such preferences are harder to detect for media than the true cost of public good.
the conditions that make collusion between media and incumbent harder to take place.

I assume that the setting of the supervising activity is one of hard information: signals (information about public good cost) cannot be made up but, once received, can be concealed. This modelling of the supervising activity is natural to assume in the case that the supervisor is a Mass Media. In fact think of the Mass Media that observes an important piece of information about the honesty of the politician. After learning this, the Mass Media can decide to hide this information, maybe destroying the support of this piece of evidence (think of some documents proving that the incumbent politician is corrupt). However, if the Mass Media decides to reveal the learned information, the evidence supplied must be verifiable by a third party, i.e. it must be possible to assess whether it is true or not. In the context of this Chapter, this means that, for instance, other Media, or a Court of Justice, or simply the “public” must be able to decide whether the information shown by the Mass Media is true or false. In the jargon of the theory of incentives, signals are verifiable but concealable. The information structure available for the supervising activity is the following:

\[
\begin{align*}
Pr(s = \emptyset | j, \theta = \emptyset) &= \xi \\
Pr(s = \emptyset | j, \theta = \emptyset) &= 1 - \xi \\
Pr(s = \emptyset | j, \theta = \emptyset) &= 1
\end{align*}
\]

The interpretation of the above information structure is the following. When the cost of the public good is high, the media learns nothing with probability equal to one. If the cost of the public good is low the media receives a message saying that the cost is low with some probability \(\xi \in (0, 1)\). With probability \(1 - \xi\), the media does not learn anything about the (low) public good cost.

This assumption can be justified by the fact that, in Proposition 9, I have shown that, when the cost of public good is high, both politicians reveal their type in equilibrium.
So in this case media would not provide any additional information at all with respect to when it was not performing its task. There is another justification for employing the above information structure in the media supervising activity.\textsuperscript{22} In fact such a structure creates an incentive for the dishonest type with low cost only to collude with the supervisor and conceal the signal.

I define the media’s strategy as a function mapping from the information set the media receives to the information it releases to the public. Formally:

\[
\sigma_m : S \equiv \{\emptyset, \theta\} \rightarrow \{\emptyset, \theta\}
\]

where \(\sigma_m(s'|s) \in [0, 1]\) is the probability that, having received the signal \(s \in S\), the media reveals to the public the signal \(s' \in S\).\textsuperscript{23} Given the above information structure for supervising activity, the media’s payoff has the following structure: when the signal the media is receiving and printing is blank, it will have a fixed revenue from selling the news; this can be normalized to zero without any loss of generality.\textsuperscript{24} In this case the news printed or broadcast will be the usual “political chat” and it will not convey any new knowledge about government’s type or economic environment.\textsuperscript{25} On the other hand, when the media receives \(s = \theta\) and reports it to the voter, this signal will be more informative on the economic environment than the blank signal. As a consequence it will be more valuable for the citizens in their voting decision. In fact when observing such a signal, citizens can be sure with probability one that the cost of public good is low. Therefore if they observe a public good quantity different from \(\theta^*\), they can conclude

\textsuperscript{22}The above information structure is the most widely employed in the strand of literature dealing with supervision and collusion in three-tiers hierarchy Tirole (1995).

\textsuperscript{23}As a remark, remember that when \(s = \emptyset\), \(s' \in \{\emptyset, \theta\}\). However when \(s = \emptyset\), \(s' \in \{\emptyset\}\).

\textsuperscript{24}An alternative explanation for this could be that the media prints (and sells) several news other than politics: e.g. business news, sport, show business information, celebrity gossip, books, movies and music review and so on. From printing/broadcasting these non-political news media will get its normalized payoff of zero.

\textsuperscript{25}Bayes’s rule shows that a blank signal does not add any knowledge to incumbent’s type. In fact:

\[
Pr(i = h|s = \emptyset) = \frac{Pr(s = \emptyset|h, \emptyset)Pr(h|\emptyset) + Pr(s = \emptyset|h, \theta)Pr(h|\theta)}{Pr(s = \emptyset|h, \emptyset)Pr(h|\emptyset) + Pr(s = \emptyset|h, \theta)Pr(h|\theta) + Pr(s = \emptyset|d, \emptyset)Pr(d|\emptyset) + Pr(s = \emptyset|d, \theta)Pr(d|\theta)}
\]

\[
= \frac{1 + \rho(1 - \rho)(1 - \xi)\eta}{1 + \rho((1 - \rho)(1 - \xi)\eta + (1 - \rho)(1 - \xi)\eta)} = \eta = Pr(i = h)
\]

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that the incumbent politician is a dishonest one. Given this greater informativeness of the signal, citizens will be willing to pay more for this information.

To model in a simple way this increased value of information for citizens, I can think that the revenues (or the market profit) of the media jumps from the normalized value of zero to $M > 0$ when news about the low cost of public good is published. In this Chapter I do not think of media as newspaper or pay-per-view TV and have companies offering an excludable information good. Rather, I think of free internet or broadcast TV, which are media the citizens receive for free: in this case media profit comes from advertising revenues which increases when a “scoop” is made.

Then the media’s payoff function in expected terms is:

$$u_m = (1 - \eta)(1 - \rho)\xi M + \eta(1 - \rho)\xi M = (1 - \rho)\xi M$$

Media has a payoff of $M$ with probability $(1 - \rho)\xi$ and a payoff of 0 with probability $1 - (1 - \rho)\xi$. In order for media to have an incentive to perform its role, this payoff has to be greater than the cost of information acquisition which I have put equal to zero.\(^26\)

The new timing of the game after the introduction of media is the following: at $t = 1.1.5$ the media receives the signal on public good cost $s$ and shows it to the incumbent first. Subsequently the incumbent makes a take-or-leave-it offer to the media to conceal the signal and the collusive side contract is signed and executed. At $t = 1.2$ the incumbent decides $\tau$ and the public good $g$. At $t = 1.3$, both signals $(g^*, \tau^*)$ and $s'$) reach the citizen contemporaneously. At $t = 1.4$, the reelection decision is taken. Thereafter the game is the same as in the case of no media.

Some comments on the chosen timing of the game are needed: I have assumed the media shows the signal received to the incumbent first and then to the citizens. Knowing the signal that media has received, the incumbent is going to propose a side contract to the media and then carry out his production decision. From the point of view of realism

\(^26\)See Note 19.
of the modeling choice, the above timing represents a simplification of a more complex situation: in order to discover the cost of public good, media has to collect information on this parameter. This process implies that the media and the incumbent interact with each other and that the latter gets to know the information the former managed to discover, i.e. the signal \( s \in \{ \emptyset, \theta \} \). For instance this may be so because the dishonest incumbent is aware of the journalistic activity the media is conducting and because this activity had the media interviewing the politician or going on site to discover the (possibly) wasteful activity of the public production.\(^{27}\)

After receiving the two signals, the citizen’s modified beliefs on government’s type are: \( \mu_h = Pr(j = h| (\tau^*, g^*(\theta); s' \in \{ \emptyset, \theta \}) \). Moreover the incumbent’s strategy has now three components: together with the tax and public good production, there is the bribe \( f \), i.e. the “fee” the incumbent is paying to the media in order to conceal the signal. I indicate the incumbent’s strategy with \( \tilde{\sigma}_{d,\theta}|(\tau, g)|f \), and I put the superscript “\(^\sim\)” in order to distinguish the dishonest incumbent strategy when collusion is a possibility \( (\tilde{\sigma}_{d,\theta}) \) from his strategy when collusion is not a possibility \( (\sigma_{d,\theta}) \).

In modelling the collusive activity, the existence of transaction cost has to be considered. When a side-payment between government and media takes place, what the payer is giving is greater than what the receiver is getting: the difference is in the transaction cost \( \kappa = \frac{1}{1-\alpha}, \alpha \in (0,1) \), where \( \kappa \in (1,\infty) \).\(^{28}\) When \( \alpha = 0 \), this means that the transaction cost is zero and the media is getting exactly what the incumbent is paying, i.e. \( \kappa = 1 \); when \( \alpha \rightarrow 1, \kappa \rightarrow \infty \), i.e. the transaction cost is infinite: then the side payment does not take place. The parameter \( \kappa \) models the difficulties involved in “breaking the law” and performing corruption successfully: a high \( \kappa \) could mean that the probability of getting

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\(^{27}\)A good example in this respect could be the many reports about the NHS made by the BBC1 programme “Panorama”. Another excellent example of journalistic inquiry is a programme on the Italian TV RAI3, called “Report” which has run several stories about wasteful and falsely highly costly public good produced, carried out by the Italian officials in the public sector.

For a discussion of this assumption see Tirole (1995).

\(^{28}\)In Besley and Prat (2006) this transaction cost \( \kappa \) is interpreted as the parameter measuring the “media independence”.

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caught is high as the judicial system is efficient or that the transaction takes place in kind instead of money and so it is harder to perform. The crucial point is that the transaction does not take place frictionlessly and the costs associated with it are larger than if the same transaction took place through the market or lawfully (see Tirole (1995)). I can now state the following proposition when collusion between media and incumbent is possible:

Proposition 10 With probability \( 1 - (1 - \rho) \xi \) the signal \( s = \emptyset \) arrives and the PBE of the game are the same as in Proposition 9. When the signal \( s = \emptyset \) arrives, a unique separating equilibrium exists with \( \hat{\sigma}^*_d(T, 0) = 1 \) and \( \sigma^*_m(\emptyset) = 1 \) the media playing \( \sigma^*_m(\emptyset) = 1 \) and the citizen not reelecting the dishonest incumbent if \( \delta < 1 - \frac{\gamma \Delta \theta}{\tau} + \frac{\kappa M}{\tau} \); a unique pooling equilibrium exists with \( \hat{\sigma}^*_d(\tau^*, \emptyset^* | \kappa M) = \sigma^*_m(\emptyset^*) = 1 \), the media playing \( \sigma^*_m(\emptyset) = 1 \) and the citizen reelecting the incumbent for sure if \( \delta > 1 - \frac{\gamma \Delta \theta}{\tau} + \frac{\kappa M}{\tau} \) and \( \rho > 1/2 \); a unique hybrid equilibrium exists with \( \sigma^*_h, \emptyset(\tau^*, \emptyset^*) = 1 \) and \( \sigma^*_d, \emptyset(\tau^*, \emptyset^*) = \frac{\rho M}{1 - \rho} \) and the citizen reelecting the incumbent with probability \( \sigma^*_c(\tau^*, \emptyset^*) = \frac{T - \gamma \Delta \theta + \kappa M}{\delta \tau} \) exists if \( \delta > 1 - \frac{\gamma \Delta \theta}{\tau} + \frac{\kappa M}{\tau} \) and \( \rho < 1/2 \). Furthermore a continuum of pooling equilibrium \( \hat{\sigma}^*_d, \emptyset(\tau^*, \emptyset^* | \kappa M) = \sigma^*_h, \emptyset(\tau^*, \emptyset^*) = 1 \), the media playing \( \sigma^*_m(\emptyset) = 1 \) and the citizen reelecting the incumbent with probability \( \sigma^*_c = \frac{T - \gamma \Delta \theta + \kappa M}{\delta \tau} \) exists if \( \delta > 1 - \frac{\gamma \Delta \theta}{\tau} + \frac{\kappa M}{\tau} \) and \( \rho = 1/2 \). Finally a continuum of hybrid equilibrium \( \hat{\sigma}^*_d, \emptyset(\tau^*, \emptyset^* | \kappa M) < 1 \), the citizen reelecting the incumbent with probability \( \sigma^*_c = \frac{T - \gamma \Delta \theta + \kappa M}{\delta \tau} \) exists if \( \delta = 1 - \frac{\gamma \Delta \theta}{\tau} + \frac{\kappa M}{\tau} \) and \( \rho = 1/2 \).

Proof. Remember that I have already shown that the honest incumbent never wants to conceal the signal and corrupt the media. So if the signal \( s = \emptyset \) arrives the honest incumbent never offers a bribing contract to the media and this one reveals the signal \( s' = s = \emptyset \). Moreover, if the signal \( s = \emptyset \) arrives, the collusive activity cannot take place, since there is no signal to hide and signals cannot be constructed. Therefore when no new information is available \( (s = \emptyset) \) thanks to media, the equilibria of the game are the same as in Proposition 9, since players’ strategies and incentives remain unchanged with respect to the no media case.
Now contingent on \((d, \theta)\) suppose the media has received and shown to the incumbent the signal \(s = \theta\). I am going to solve the game by backward induction. So having solved the reelection game at stage \(t = 1.4\), I am solving the bargaining-collusion game between \((d, \theta)\) and the media taking place at \(t = 1.1.5\). In this game if the bargaining breaks down and the collusion does not happen, the media reveals the signal to the citizens and the dishonest incumbent plays the myopic strategy. So the players’ utility in the disagreement point \((d, \theta) = (T, M)\). With indexes \(\gamma\) and \(\gamma - 1, \gamma \in [0, 1]\) I represent the bargaining power of the politician and the media respectively. I define the bargaining frontier \(u_{d, \theta}^{BF}(u_m)\) as the maximum utility the \((d, \theta)\) type receives, given the utility the media achieves if collusion is successful.

Obviously the frontier depends on the PBE that is reached at a later stage. So I am going to distinguish three cases, depending on the equilibrium at a later stage being separating, pooling, hybrid.

**Case 11 PBE is separating**

Suppose that at \(t = 1.4\) the PBE is a separating one, then the bargaining frontier is equal to \(u_{d, \theta}^{BF}(u_m) = T - \kappa u_m\). If collusion happens, for any strictly positive utility the media receives, the dishonest type utility is less than his utility in the disagreement point. So in this case there is no collusion.

**Case 12 PBE is pooling**

Now suppose that at \(t = 1.4\) a pooling equilibrium is the outcome and the incumbent is reelected with probability one. In this case \(u_{d, \theta}^{BF}(u_m) = g^* \Delta \theta + \delta T - \kappa u_m\). If the players collude in equilibrium, the gain from the agreement is equal to \(g^* \Delta \theta + \delta T - T - \kappa M\). Of course if collusion does not happen, then Incumbent’s utility is equal to \(T\). In order for the collusion to be feasible then it has to be \(g^* \Delta \theta + \delta T - \kappa M \geq T\), which is true iff \(\delta \geq 1 - \frac{g^* \Delta \theta + \kappa M}{T}\).

Having characterised the elements of this bargaining game, the Asymmetric Nash Bargaining Solution (ANBS) to the bargaining problem is given by the vector of payoff

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\((u_{d_{2}}^{ANBS}; u_{m}^{ANBS}) = (T + \gamma (\bar{\sigma}^{*} \Delta \theta + \delta T - T - \kappa M); M + \frac{1}{\kappa}(1 - \gamma)(\bar{\sigma}^{*} \Delta \theta + \delta T - T - \kappa M))\).\(^{29}\)

If all the bargaining power is given to the incumbent (i.e. \(\gamma = 1\)), \((u_{d_{2}}^{ANBS}; u_{m}^{ANBS}) = (\bar{\sigma}^{*} \Delta \theta + \delta T - \kappa M - \varepsilon, M + \varepsilon)\) with \(\varepsilon > 0\) and “small”, i.e. \(\varepsilon \rightarrow 0\), which establishes the Proposition statement.

To conclude this part it remains to show that if collusion is successfully agreed upon, then a pooling equilibrium is the outcome. This is true iff \(\delta \geq 1 - \frac{\bar{\sigma}^{*} \Delta \theta}{\frac{T}{4}} + \frac{\kappa M}{\frac{T}{4}}\) and \(\rho \geq 1/2\). In fact, given \(\delta \geq 1 - \frac{\bar{\sigma}^{*} \Delta \theta}{\frac{T}{4}} + \frac{\kappa M}{\frac{T}{4}}\), the collusion occurs in equilibrium, the media conceals the signal to the public and the dishonest type \(d\) with cost \(\bar{\theta}\) takes the strategy \((\bar{\sigma}^{*}, \bar{\sigma}^{*})\) with probability one, since the payoff from this is greater than the payoff from the myopic strategy. This follows trivially from the fact that \(\bar{\sigma}^{*} \Delta \theta + \delta T - \kappa M > T\) iff \(\delta > 1 - \frac{\bar{\sigma}^{*} \Delta \theta}{\frac{T}{4}} + \frac{\kappa M}{\frac{T}{4}}\) and \(\sigma_{c}^{*}(\bar{\sigma}^{*}, \bar{\sigma}^{*}) = 1\).

Let us stress how the existence of collusion does not depend on the distribution of the gains from collusion between the parties but on their existence, i.e. on \(\bar{\sigma}^{*} \Delta \theta + \delta T - T - \kappa M > 0\). Finally, it remains to verify that the equilibrium beliefs are such that \(\mu_{h}((\bar{\sigma}^{*}, \bar{\sigma}^{*}); \varnothing) \geq \eta\) and then as a consequence \(\sigma_{c}^{*}(\bar{\sigma}^{*}, \bar{\sigma}^{*}) = 1\).

In fact \(\mu_{g}((\bar{\sigma}^{*}, \bar{\sigma}^{*}); \varnothing) = \frac{\eta}{\eta \rho + (1-\eta)(1-\rho)(1+\xi)+(1-\eta)(1-\rho)\xi} \geq \eta\), which is true iff \(\rho \geq 1/2\).

Obviously when \(\delta < 1 - \frac{\bar{\sigma}^{*} \Delta \theta}{\frac{T}{4}} + \frac{\kappa M}{\frac{T}{4}}\) or \(\rho < 1/2\), the collusion is not feasible in equilibrium, the signal \(s = \bar{\theta}\) reaches the public and the only PBE at the stage \(t = 1.4\) is a separating one.

**Case 13 PBE is hybrid**

Finally suppose that at \(t = 1.4\) the PBE is hybrid. From the definition of hybrid equilibrium, it follows that the dishonest type with cost \(\bar{\theta}\) is indifferent between his payoff from pooling with the honest type who produces and taxes \((\bar{\sigma}^{*}, \bar{\sigma}^{*})\) and the separating equilibrium.

Then the bargaining frontier is equal to \(u_{d_{2}}^{BFE}(u_{m}) = \bar{\sigma}^{*} \Delta \theta + \sigma_{c}^{*}(\bar{\sigma}^{*}, \bar{\sigma}^{*}) \delta T - \kappa u_{m}\).

Assuming that all the bargaining power belongs to the Incumbent, from the definition

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\(^{29}\)See for instance Muthoo (1999, Ch. 2.8).
of hybrid equilibrium, the Incumbent’s utility when he corrupts the Media and produces $(\bar{\tau}^*, \bar{g}^*)$ has to be equal to the utility accruing to the Incumbent when he separates and does not corrupt the Media, that is $T$. In turn, this is equal to the disagreement point utility the dishonest type obtains. Therefore in order to have a hybrid equilibrium it has to be that $ar{g}^* \Delta \theta + \sigma_e^*(\bar{\tau}^*, \bar{g}^*) \delta T - \kappa u_m = T$, which is true iff $\sigma_e^*(\bar{\tau}^*, \bar{g}^*) = \frac{T - \bar{\tau}^* \Delta \theta + \kappa M}{\delta T}$ and $\delta \geq \frac{T - \bar{\tau}^* \Delta \theta + \kappa M}{T}$, with the assumption that all the bargaining power belongs to the Incumbent. Furthermore, in order to have a hybrid equilibrium, then $\mu_g((\bar{\tau}^*, \bar{g}^*); \emptyset) = \frac{\eta \rho + \sigma_d^*(1 - \eta)(1 - \rho)(1 - \xi)}{\eta \rho + \sigma_d^*(1 - \eta)(1 - \rho)(1 - \xi) + \sigma_d^*(1 - \eta)(1 - \rho)\xi} = \eta$, which is true iff $\sigma_d^*(1 - \eta)(1 - \rho)(1 - \xi) = \eta$. In case $\rho = 1/2$, it is easy to verify that a continuum of hybrid equilibria is the game outcome, with $\sigma_d^*(1 - \eta)(1 - \rho)(1 - \xi) = \frac{T - \bar{\tau}^* \Delta \theta + \kappa M}{\delta T}$

$\mu_g((\bar{\tau}^*, \bar{g}^*); \emptyset) = \frac{\eta \rho}{\eta \rho + \sigma_d^*(1 - \eta)(1 - \rho)(1 - \xi) + \sigma_d^*(1 - \eta)(1 - \rho)\xi} > \eta$

As a special case of the most general result derived in the above Proposition, I state the Proposition when collusion between media and supervisor is not possible. There could be several reasons for this: the supervisor is honest and it does not value the side-payment received from the incumbent; the principal (i.e. the citizens) perfectly controls the communication between the other two players; the external enforcer, say a Court of Justice, is preventing the collusion; the transaction cost of colluding are very large (at the limit going to infinite), making capture of media impossible. I can formalise all this by putting $\kappa = \infty$. The following result is obtained immediately:

**Proposition 14** With probability $1 - (1 - \rho)\xi$ the signal $s = \emptyset$ arrives and the Perfect Bayesian Equilibria of the game is the same as in Proposition 9. With probability $(1 - \rho)\xi$ the signal $s = \emptyset$ arrives and then for any $\rho$ and for any $\delta \in (0,1)$ the only equilibrium strategy is a separating equilibrium with the dishonest incumbent taking the myopic strategy, the media reporting truthfully the information and the citizen receiving the information and not reselecting the dishonest incumbent.
Proof. The proof is trivial once one examines what happens when $\kappa = \infty$. Again consider the only relevant case, that is when at $t = 1.4$ the equilibrium of the reelection game is a pooling one. From the Proof of Proposition 10 we know that in this case, in order for the collusion to be feasible, then $\overline{\theta}^* \Delta \theta + \delta T - T - \kappa M > 0$. However as $\kappa \to \infty$, this means that for the collusion to exist it has to be $\lim_{\kappa \to \infty} \overline{\theta}^* \Delta \theta + \delta T - T - \kappa M > 0$, which is impossible for any finite $M > 0$. Since this is a contradiction, then collusion never happens in equilibrium. As a result, the signal $s \equiv \overline{\theta}$ is revealed in equilibrium by the media to the citizen. Observing it, the citizen is going to vote off the incumbent. Rationally anticipating this, the incumbent plays the myopic strategy $(T, 0)$ which reveals himself in equilibrium. ■

From Proposition 9 we know that when no media is around, producing a positive and large enough quantity of public good could be sufficient for the dishonest incumbent to “fool” the citizen and be reelected. On the contrary, in this new strategic situation with media, the media helps the voter avoid being deceived. Following the terminology introduced earlier, the presence of media increases the sorting effect of elections, while the disciplining effect decreases. Proposition 10 above shows how the presence of media together with the possibility of media capture on part of the incumbent changes the equilibria as compared to the scenario when media is not around. This effect of media on the game equilibria is more striking when collusion is not possible, i.e. when $\kappa = \infty$. In this new setting with media and no collusion, with some probability $(1 - \rho)\xi$, the cost of public good will be found to be low and the incumbent, if dishonest, will reveal himself as such. The citizen’s optimal strategy will be then to send-off the incumbent politician and elect the challenger, whose expected honesty is higher than the dishonest incumbent. Anticipating all this, the best the dishonest government could do is to “take the money and run”: he will act myopically and grab the maximum amount of fiscal resources available as rents. It is important to stress that the incumbent politician will do so no matter what the value of the time discount factor is. In fact, contrary to the no media scenario, there is no incentive in terms of highly-valued future rewards that
could induce the incumbent to produce a positive quantity of public good, once he knows
the signal $s = \tilde{\theta}$ will be shown to voters and collusion is not available. In turn this is
true because once the citizen observes the signal $s = \tilde{\theta}$ she knows that the cost is low.
Contrary to Proposition 9, there is no other way the incumbent could persuade the voter
that the public good cost is different from low. In terms of the trade off between effects,
the *sorting effect* is maximised, while the *disciplining effect* disappears.

What it is at work here is a sort of cross-checking strategy on the part of voters: if
the citizen observes that the quantity of public good corresponds to high cost, then she
will look at the media. If no informative news is reported, then she will reelects the
incumbent. However if the news headlines contradict the situation she is observing, then
she will vote the incumbent out.

While in the no-collusion scenario the only possible optimal strategy for the dishonest
incumbent is to reap all the rents and reveal himself in equilibrium, now in the media
collusion scenario he has another option: he can bribe the media and deliver the optimal
quantity of public good which the citizen expects in a high cost public good environ-
ment. If he does this, he knows the citizen will reelect him for sure, given that there
is no hybrid equilibrium in this case. As regarding the *sorting vs disciplining effect*,
here this trade-off is partially restored. When the collusion between the media and the
incumbent takes place, then the dishonest incumbent delivers a quantity of public good
larger than he would have done if there was no collusion. Again this is good in the first
period as the citizen’s utility is higher than it would have been if separation was the
outcome. Nevertheless, retaining the dishonest incumbent decreases the citizen’s welfare
in the second period. In the next section I am going to assess the welfare effect of this
trade off between the disciplining and the sorting effect of media.

Once media capture is a possibility, it is useful to focus on the determinants which
make it harder for collusion to take place. First, the existence of transaction costs. It
is obvious that the larger are the transaction costs, the harder it will be to perform
collusion successfully. High transaction costs could be due to the existence and the
effective enforcement of a legislation against the corruption; to an efficient judiciary system which is ready to go after any wrongdoing; and to social values and culture that make corruption a practice difficult to be carried out. So a winning strategy to avoid media capture on part of the government is to raise the transaction costs, for instance by empowering the judiciary system.

The other determinant of a low level of collusion between media and politician is the size of the market for media. Remember that in order to prevent the signal being transmitted to the public at large, the incumbent has to pay the media at least $\kappa M$, that is the whole value of the market for media when an informative signal has arrived. For the incumbent politician colluding with the media will be harder the larger the market for media is. In fact for the politician it will be difficult to bribe the media when the amount of money that he needs to transfer in order to conceal the signal is large. So an active and informed citizenship, one which consumes a large amount of information channeled through mass media, makes media capture on part of government more difficult. At the limit, collusion will be impossible when $\kappa M > g^*(\theta)\Delta \theta - T + \delta T$, which is more likely when $\kappa M$ is large and when the RHS is small. Notice that this happens when each of the addenda of the RHS is small: in particular when there are few rents available for grabbing now $(g^*(\theta)\Delta \theta)$, when the resources available for grabbing are very large ($T$ large) and when the future resources available to pocket are largely discounted ($\delta$ small).

### 3.6 Welfare Analysis

#### 3.6.1 No Collusion between Media and Government

In Section 3.4.1 I have characterised a conflict of interest between a dishonest incumbent and the citizen: given a certain time discount factor $\delta$, the citizen might find optimal a certain politician’s strategy, different from his equilibrium one. I have stressed how in that scenario the citizen had to accept the incumbent’s equilibrium strategy. However thanks to the presence of media, now she can now make good use of it in order to receive useful
information about the incumbent’s type. By comparing Proposition 9 and the condition expressed in eq. (3.14) it is possible to clarify when it is optimal to resort to media for the citizen, i.e. when more information increases the citizen’s expected utility. Remember that we have established in Proposition 9 that a separating equilibrium exists only if \( \delta \) is small enough and in particular smaller than \( \delta^* = 1 - \frac{\bar{\pi} \Delta \theta}{\bar{\pi}} \). Moreover in the welfare analysis of this strategic situation we have seen that more selecting increases the citizen’s expected welfare iff \( \delta \) is large enough and in particular larger than \( \delta^{\text{citizen}} = \frac{1}{\bar{\eta}} \frac{\bar{\pi} - \bar{\tau} - u_c(d)}{u_i(h) - u_c(d)} \).

The following pictures will help to explain:

![Diagram](image)

Figure 3-1: Figure 1: Collusion is not Possible (case a.)

In the first picture, \( \delta^* = 1 - \frac{\bar{\pi} \Delta \theta}{\bar{\pi}} \leq \frac{1}{\bar{\eta}} \frac{\bar{\pi} - \bar{\tau} - u_c(d)}{u_i(h) - u_c(d)} = \delta^{\text{citizen}} \), while in the second \( \delta^* = 1 - \frac{\bar{\pi} \Delta \theta}{\bar{\pi}} \geq \frac{1}{\bar{\eta}} \frac{\bar{\pi} - \bar{\tau} - u_c(d)}{u_i(h) - u_c(d)} = \delta^{\text{citizen}} \). When \( \delta \in [0, \min \{\delta^*, \delta^{\text{citizen}}\} \), there is no alignment of interests between citizen and politician. Since the future is not so important relative to the present, the citizen would like the dishonest incumbent to mimic the honest one and to deliver the optimal quantity of public good \( \bar{\pi}^* \). However the dishonest
incumbent does not have such an incentive to do so: since he discounts the future rents highly, he prefers to grab the present rents and reveal himself in equilibrium. Given the constraints on the instruments available to the citizen and in particular the unavailability of contracts, there is no way she can induce the politician to pool rather than to separate.

When $\delta \in [\min \{\delta^*, \delta_{\text{citizen}}\}, \max \{\delta^*, \delta_{\text{citizen}}\})$, there is an alignment of interest between the incumbent and the citizen. When $\delta^* < \delta_{\text{citizen}}$, then for any $\delta \in [\delta^*, \delta_{\text{citizen}})$ both players find a pooling equilibrium optimal. On the contrary when $\delta^* > \delta_{\text{citizen}}$, then for any $\delta \in [\delta_{\text{citizen}}, \delta^*)$ both the dishonest incumbent with low public cost and the citizen find it optimal to have a separating equilibrium. In this intermediate range of parameters both players agree on what is the best course of action. As a consequence there is no need for the citizen to act in order to change politician’s equilibrium strategy.

Finally, when $\delta \in (\max \{\delta^*, \delta_{\text{citizen}}\}, 1]$ the dishonest incumbent with low public good cost has an incentive to mimic the good one. On the other hand citizen’s interest

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**Figure 3-2: Figure 2: Collusion is not Possible (case b.)**
is the opposite to the incumbent’s one: the citizen would like to sort out the honest politician from the dishonest one. In fact now that the future is very important, having in place a honest politician will assure her a higher expected utility. While in the range of parameters $\delta \in \left[0, \min\{\delta^*, \delta_{\text{citizen}}\}\right]$ there was nothing she could do to align the incumbent politician’s one to her interest, now the citizen could resort to the introduction and the use of media. Thanks to its presence, with some positive probability she will find out the true cost of the good publicly provided and the politician quality will be revealed. Let us recall that the media is there because citizens enjoy other news than political informative ones: however when scoops break the headlines citizens enjoy the informative content of these media. This means that the citizen will be able to sort out the honest from the dishonest politician and in this way increase her expected welfare. The existence of another institutional player, i.e. the media, and the fact that the citizen finds it optimal to receive informative news to sort politicians out, manages to improve her expected utility with respect to a situation where media is absent. It is also possible to derive the expression for the expected utility of the citizen when the mass media is present. Modifying the expression in eq. (3.12) this is equal to:

\[
EU(\sigma^*_d; \sigma^*_c; \xi) = \eta(1 - \rho)\left[\left(H^* - \tau^* \right) + \delta u_c(h)\right] + \eta \rho \left[\left(\Omega^* - \tau^* \right) + \sigma^*_c \delta u_c(h)\right] + \\
+ (1 - \sigma^*_c) \delta (\eta u_c(h) + (1 - \eta) u_c(d)) + \\
+ (1 - \eta) \rho [u_c(d) + \delta(\eta u_c(h) + (1 - \eta) u_c(d))] + \\
+ (1 - \eta) (1 - \rho) \xi [u_c(d) + \delta(\eta u_c(h) + (1 - \eta) u_c(d))] + \\
+ (1 - \eta) (1 - \rho) (1 - \xi) \sigma^*_d \left[\left(\Omega^* - \tau^* \right) + \sigma^*_d \delta u_c(d) + \delta (1 - \sigma^*_c) (\eta u_c(h) + (1 - \eta) u_c(d))\right] + \\
+ (1 - \eta) (1 - \rho) (1 - \xi) (1 - \sigma^*_d) [u_c(d) + \delta (\eta u_c(h) + (1 - \eta) u_c(d))] \quad (3.17)
\]

By comparing the expression in eq. (3.17) with the expression in eq. (3.12) one can derive the condition such that the citizen’s utility when there media is larger than the citizen’s utility when there is no additional information coming from media.

Tedious algebra shows that $EU(\sigma^*_d; \sigma^*_c; \xi) \geq EU(\sigma^*_d; \sigma^*_c)$, after cancelling out the
common terms, amounts to the following:

\[
EU(\sigma^*_d; \sigma^*_c; \xi) \geq EU(\sigma^*_d; \sigma^*_c) \\
(1 - \eta) (1 - \xi) u_c(d) + \delta(\eta u_c(h) + (1 - \eta) u_c(d))] + \\
+ (1 - \eta) (1 - \xi) \sigma^*_d \left[ (\overline{H}^* - \tau^*) + \sigma^*_c \delta u_c(d) + \delta (1 - \sigma^*_c) (\eta u_c(h) + (1 - \eta) u_c(d))] \right] + \\
+ (1 - \eta) (1 - \xi) \sigma^*_d \left[ (\overline{H}^* - \tau^*) + \sigma^*_c \delta u_c(d) + \delta (1 - \sigma^*_c) (\eta u_c(h) + (1 - \eta) u_c(d))] \right]
\]

Simplifying the common terms \((1 - \eta) (1 - \rho)\) and factoring out, one obtains that:

\[
EU(\sigma^*_d; \sigma^*_c; \xi) \geq EU(\sigma^*_d; \sigma^*_c) \\
u_c(d) + \delta(\eta u_c(h) + (1 - \eta) u_c(d))] + \\
\geq (\overline{H}^* - \tau^*) + \delta[\sigma^*_c u_c(d) + (1 - \sigma^*_c) (\eta u_c(h) + (1 - \eta) u_c(d))] \\
(3.18)
\]

In the expression above (eq. 3.18) the LHS represents the welfare accruing to the citizen once he has received the information that the incumbent is dishonest (or better that the public good cost is \(\overline{\theta}\) and therefore the dishonest incumbent cannot produce the minimum public good quantity \(\overline{H}^*\)) and that he is voting out him and appointing a new incumbent of unknown quality. On the other hand, the RHS represents the total citizen’s utility when he observes a public good quantity \(\overline{H}^*\) and therefore mixes between reelecting and not the incumbent with any probability \(\sigma^*_c\). Therefore, while the LHS represents the citizen’s utility of selecting the incumbent, the RHS shows the citizen’s welfare of disciplining him. It is straightforward to see that it is not obvious that one effect dominates the other, what I have already found above.

To see this better, following Besley and Smart (2007)\(^{30}\), and rearranging the above

\(^{30}\)Proposition n.4, page 765.
expression one obtains that \( EU(\sigma_{d,\bar{y}}^*;\sigma_c^*;\xi) \geq EU(\sigma_{d,\bar{y}}^*;\sigma_c^*) \) iff

\[
\begin{align*}
  u_c(d) + \delta(\eta u_c(h) + (1 - \eta) u_c(d)) & \geq \left( \overline{H}^* - \overline{\tau}^* \right) + \delta[\sigma_c^* u_c(d) + (1 - \sigma_c^*) (\eta u_c(h) + (1 - \eta) u_c(d))] \\
  \delta \sigma_c^*[\eta u_c(h) + (1 - \eta) u_c(d) - u_c(d)] & \geq \left( \overline{H}^* - \overline{\tau}^* \right) - u_c(d) \\
  \delta \eta \sigma_c^*[u_c(h) - u_c(d)] & \geq \left( \overline{H}^* - \overline{\tau}^* \right) - u_c(d)
\end{align*}
\] (3.19)

Therefore one can see that the effect on the citizen’s utility coming from selecting the incumbent dominates the effect on the citizen’s utility coming from disciplining him when the time discount is large (the future is discounted less heavily with respect to the present), the probability of having honest incumbents is large (there is more chance of drawing a honest incumbent when appointing a new one, after deselecting the old) and the probability of reelecting the incumbent is large.

It is worth highlighting the differences with the previous literature: while in previous works about mass media and political economy the supervising role of mass media is always deemed and shown to be welfare improving, here I derive a first attempt in making precise the conditions such that the offer and the demand for political news is optimal for the polity. Crucially, I show that the utility of information for citizens depends on the time discount factor \( \delta \). So media are useful if and only if the time discount factor of the polity is large enough, i.e. if and only if citizens value the future highly. Citizens know that only when the time discount factor is large enough, the supervising activity of media is optimal in order to have more information and to sort incumbents out according to their honesty trait. In other cases either politicians separate without recurring to media or they pool but this is optimal ex-ante for citizens as well. Therefore I want to stress that by allowing media to operate in some circumstances rather than others, citizens can decide when receiving information and when not to. Indeed in some cases it is optimal for citizens to avoid to have too much information in order to increase their expected utility.
However, in circumstances such as these it is crucial that the citizen can credibly commit ex-ante not to receive any information. Take the case when the parameters are such that \( \delta \in [\delta^*, \delta_{\text{citizen}}] \). In this environment it would be optimal ex-ante for both incumbent and citizens that the dishonest politician pooled with the honest one. However ex-post (i.e. after the incumbent has made his public good production decision) it is optimal for the citizen to receive information. If the media anticipates this, it would be optimal for this player to release the information and then for the incumbent to receive it. In turn, if the dishonest politician correctly conjectures this, it would be optimal for him not to pool and to reveal himself in equilibrium. This would cause a shift from a pooling equilibrium (in the scenario without media or with media and commitment) to a separating equilibrium (in the scenario with media and no commitment): a Pareto inferior equilibrium for both players with respect to the first one.

While I cannot claim to have endogenised the news exchange since this would require a fully fledged theory of information acquisition which would have to consider the public good element of this decision, I can say that my analysis sheds some light on the necessary conditions that such a theory would require. In fact rational agents would have to acquire information only if it was optimal to do so and I have shown this would require the time discount factor between the two periods to be large enough.

Another alternative interpretation of the above discussion is that I have devised the conditions that at the “constitutional” level have to be satisfied in order for the media to operate optimally in the citizens’ interest. Following the approach of, among others Laffont (2000), the benevolent Founding Fathers which draw up any Constitution know and have to consider the danger that subsequent generations of politicians are not as honest as they are. One of the checks and balances they might want to introduce is the presence of mass media. However, contrary to conventional wisdom, my analysis has shown that the Founding Fathers would have to do so if and only if the temporal horizon of the society was large enough.

This finding could also shed some light on the fact that some countries have enjoyed
considerable economic performance lately, although their political and media freedom was not as strong as conventional wisdom thought it should have been.

In this Section I have shown that the existence of an institutional player with the role of releasing information does not improve citizens’ welfare in general. I have stressed that this depends crucially on the media exercising its supervising role only when it is optimal to do so. In fact I have shown that there are cases when having more information might cause a decrease in both players’ welfare with respect to the case when media is not available. Of course this situation would not happen if citizens were able to commit ex-ante not to have too much information. Similarly, scenarios when too much information is harmful would not be an issue if the Constitution allowed media to operate if and only if this would be optimal. However, if such a commitment strategy is not possible or the Constitution fails to distinguish cases where media are optimal from cases where they are not, a viable alternative is to make corruption easier to happen and as a consequence the information easier to be concealed. In the next section I am going to show this.

3.6.2 Media is available and collusion is a possibility

In the previous section I have seen that, thanks to the presence of media, citizens can improve their welfare with respect to a situation where no media is available. However I have warned that this relies on either i) the citizen being able to refrain from using the media when its use might be welfare increasing ex-post, but not ex-ante; or ii) the Constitution optimally distinguishing among environments when media are welfare improving and when they are not.

I have stressed how this second assumption depends critically on the citizen being able to commit not to use the media when using the media is optimal ex-post but not ex-ante. I have also highlighted the difficulties that this commitment strategy implies.

In this section I want to extend the welfare analysis made previously to the scenario where collusion between media and politician is possible. The findings are similar to the ones in the previous section. In addition I reach a surprising result: sometimes allowing
corruption between media and politician solves the issue of citizen’s commitment not to use the media and as a consequence improves citizen’s welfare with respect to a situation when no collusion is possible.

Summing up the results in Proposition 10, regarding politician’s equilibrium strategy, I know that when $\delta \in [0, \delta^* = 1 - \frac{\pi(M)}{T}]$, the dishonest incumbent does not find it optimal to mimic the behaviour of the honest one. So a separating equilibrium is the outcome. When $\delta \in [\delta^*, \delta^* + \frac{\kappa M}{T}]$, given the not optimality on part of the dishonest incumbent to bribe the media and mimic the honest politician with this intermediate valuation of time, a separating equilibrium is the outcome with probability $(1 - \rho)\xi$, i.e. the probability with which a signal $s = 0$ arrives. Finally when $\delta \in [\delta^* + \frac{\kappa M}{T}, 1]$ and $\rho \geq 1/2$ the equilibrium outcome is a pooling equilibrium with media and politician colluding and the citizen reelecting the incumbent with some positive probability. As before the citizen finds it optimal to have a pooling equilibrium when $\delta \leq \delta^{\text{citizen}} = \frac{1}{\eta} \frac{\pi(h) - \pi(d)}{u_c(h) - u_c(d)}$

As I did in the previous section, in every region of parameters $\delta$ I want to compare incumbent’s equilibrium strategy to what would be the optimal one with respect to the citizen’s expected utility.

Figure 3 refers to the case when $\frac{1}{\eta} \frac{\pi(h) - \pi(d)}{u_c(h) - u_c(d)} = \delta^{\text{citizen}} < \delta^*$. Here when $\delta < \delta^{\text{citizen}}$, there is no alignment between politician and citizen: the former reveals himself in equilibrium, while from the citizen’s viewpoint, the incumbent’s optimal strategy would be the one resulting in a pooling equilibrium. When $\delta \in [\delta^{\text{citizen}}, \delta^*)$ the politician takes the separating strategy which is optimal for the citizen as well: there is no need on the introduction of media. On the other hand, when $\delta \in [\delta^*, \delta^* + \frac{\kappa M}{T}]$ the introduction of media and the use of its information is in the citizen’s interest, as media transmitting information on incumbent politician increases the citizen’s welfare. Finally when $\delta \in [\delta^* + \frac{\kappa M}{T}, 1]$ the dishonest politician finds it optimal to mimic the honest one and to buy off the silence of media by paying it the whole amount $\kappa M$. In this case there the existence of collusion represents a loss in welfare for citizens with respect to the case where no collusion was possible.
A similar discussion can be made when $\delta^* \leq \delta^{\text{citizen}} \leq \delta^* + \frac{\kappa M}{\tau}$ (see Figure 4). The only difference in this environment is that there exists an intermediate range of parameters $\delta \in [\delta^*, \delta^{\text{citizen}}]$ where the use of media could be possible in such a way that citizens could get more information and induce the dishonest politician to separate. However in this case doing so would be harmful ex-ante: the optimal strategy for the citizen is to let the dishonest politician mimic the honest one and deliver a pooling strategy equilibrium. However in this circumstance the issue of citizen’s commitment not to resort to media and/or of media not to enter the market arises. That is the reason why benevolent and rational Founding Fathers would have to prevent or limit the role of media in such circumstances.

Finally let us analyse the case where $\delta^* + \frac{\kappa M}{\tau} < \delta^{\text{citizen}}$ (see Figure 5). When $\delta < \delta^*$, there is no alignment between bad incumbent and voter, since the voter would like the incumbent to pool, while politicians optimal strategy is to reveal themselves in equilib-
Figure 3-4: Figure 4: Collusion is Possible (case b.)

rium. When \( \delta \in [\delta^*, \delta^* + \frac{\kappa M}{\tau}] \), although it would be possible to induce more separation through the use of media, it is optimal for citizens to have politicians pool on the strategy \((\overline{\pi}, \overline{\eta})\): therefore also in this case the introduction of media or having media to transmit political news is not optimal for citizens’ expected welfare. Moreover, when \( \delta \in [\delta^{\text{citizen}}, 1] \), though optimal for her, again it is not possible to induce politicians to separate through use of the media: given the incentive he is facing, for the dishonest incumbent it is optimal to mimic the honest one. Furthermore, should the signal arrive, the dishonest incumbent finds it optimal to buy the silence of the media.

The interesting case is when \( \delta \in [\delta^* + \frac{\kappa M}{\tau}, \delta^{\text{citizen}}] \): here the dishonest politician’s optimal strategy is to collude with the media and to mimic the honest politician behaviour. However, this is optimal from the citizen’s viewpoint as well: in this case, allowing the collusion maximises citizen’s welfare. As a conclusion, in this case, decreasing \( \kappa \) and/or \( M \) is the optimal choice to adopt.

As I have said before it is a well known phenomenon in this class of reelection games
that citizen’s equilibrium strategies might suffer from not being sub-game perfect: it is optimal for the citizen ex-ante to commit not to acquire new information, as in this case in the range of parameters \( \delta \in \left[ \delta^*, \delta^* + \frac{2M}{\tau} \right] \). However, once the information has been received by the media, it is optimal for the citizen to know it. Should the media anticipate this, then it could be possible for them to release the information they received and there could be a shift from a pooling equilibrium to a non-optimal separating equilibrium. So in this case the optimal constitution should be written in such a way as to not allow the media to transmit information about political incumbents. Alternatively citizens should have to credibly commit not to use any information the media would release. However if the constitution is not written in an optimal way and/or the citizen is unable to commit not to use any information, the existence of collusion functions as a substitute for these failures.

In fact quite interestingly in the space of parameters \( \delta \in \left[ \delta^* + \frac{2M}{\tau}, \delta_{\text{citizen}} \right] \) the citizen can credibly commit not to acquire new information. If the information gets produced the
citizen knows that it will not reach her, as the politician would act in order to conceal it. Since for the citizen it is optimal that the politicians pool, then allowing more collusion is optimal. In this case, making the collusion easier by decreasing \( \kappa \) and/or \( M \), is optimal, contrary to the conclusions of the literature in this field. In fact decreasing \( \kappa \) and/or \( M \) will increase the range of parameters \( \delta \) where a pooling equilibrium is optimal for both players and where the citizen can credibly commit not to recur to media. Moreover decreasing \( \kappa \) and/or \( M \) will shrink the complementary region \([\delta^*, \delta^* + \frac{\kappa M}{\rho}]\), where a pooling equilibrium is again optimal but citizen’s commitment not to use the media is not credible and collusion as a substitute device to both an imperfect Constitution and an imperfect citizens commitment does not work.

Again it is possible to derive the expression for the expected utility of the citizen when the mass media is present and collusion is a possibility. Modifying the expression in eq.(3.12) this is equal to:

\[
EU(\sigma^*_d, \sigma_c^*; \xi; \sigma_m) = \eta (1 - \rho) [H^* - \varepsilon^* + \delta u_c(h)] + \\
+ \eta \rho [H^* - \tau^* + \sigma_c^* \delta u_c(h) + (1 - \sigma_c^*) \delta(\eta u_c(h) + (1 - \eta) u_c(d))] + \\
+ (1 - \eta) \rho[u_c(d) + \delta(\eta u_c(h) + (1 - \eta) u_c(d))] + \\
+ (1 - \eta) (1 - \rho) [\xi((\sigma_m u_c(d) + \delta(\eta u_c(h) + (1 - \eta) u_c(d)))] + \\
+ (1 - \sigma_m) [H^* - \tau^* + \sigma_c^* \delta u_c(h) + (1 - \sigma_c^*) \delta(\eta u_c(h) + (1 - \eta) u_c(d))] + \\
+ (1 - \xi)(\sigma^*_{d, \theta} [H^* - \tau^* + \delta(\sigma_c^* u_c(d) + (1 - \sigma_c^*) (\eta u_c(h) + (1 - \eta) u_c(d)))] + \\
+ (1 - \sigma^*_{d, \theta}) (u_c(d) + \delta (\eta u_c(h) + (1 - \eta) u_c(d)))]
\] (3.20)

where \( \sigma_m \) is the probability that, having received the signal \( s \in \{\emptyset, \emptyset\} \) the media reveals the truth, while \( 1 - \sigma_m \) is the probability that the media suppresses the signal. Since the relevant case is when \( s = \emptyset \), in the expression above I consider only that case, since when \( s = \emptyset \), the probability that the Incumbent reveals that signal, i.e. \( \sigma_m(\emptyset | \emptyset) = 1 \).

By comparing the expression above (3.20) with the expression in eq. (3.12) one can
derive the condition such that the citizen’s utility when there is media and the possibility of corruption is larger than the citizen’s utility when there is no additional information coming from media.

After simplifying the common factors $EU(\sigma^*_d; \sigma^*_c; \xi; \sigma_m) \geqslant EU(\sigma^*_d; \sigma^*_c)$ can be rewritten like the following:

$$EU(\sigma^*_d; \sigma^*_c; \xi; \sigma_m) \geqslant EU(\sigma^*_d; \sigma^*_c)$$

$$(1 - \eta) \xi \sigma_m [u_c (d) + \delta (\eta u_c (h) + (1 - \eta) u_e (d))] +$$

$$(1 - \eta) \xi (1 - \sigma_m) [(1 - \sigma^*_d) u_c (d) + \delta (\eta u_c (h) + (1 - \eta) u_e (d))] +$$

$$(1 - \eta) (1 - \rho) (1 - \xi) (1 - \sigma^*_d) \left[ \frac{H^* - \tau^*}{\delta} + \sigma^*_c u_c (d) + \delta (1 - \sigma^*_c) (\eta u_c (h) + (1 - \eta) u_e (d)) \right] +$$

$$(1 - \eta) (1 - \rho) (1 - \xi) \left[ \frac{H^* - \tau^*}{\delta} + \sigma^*_c u_c (d) + \delta (1 - \sigma^*_c) (\eta u_c (h) + (1 - \eta) u_e (d)) \right] +$$

Simplifying the common terms $(1 - \eta) (1 - \rho)$ and factoring out, one obtains that:

$$EU(\sigma^*_d; \sigma^*_c; \xi; \sigma_m) \geqslant EU(\sigma^*_d; \sigma^*_c)$$

$$u_c (d) + \delta (\eta u_c (h) + (1 - \eta) u_e (d)) \geqslant$$

$$\geqslant \left( \frac{H^* - \tau^*}{\delta} + \delta [\sigma^*_c u_c (d) + (1 - \sigma^*_c) (\eta u_c (h) + (1 - \eta) u_e (d))] \right) \quad (3.21a)$$

In the expression (3.21a) the LHS represents the citizen’s utility when the information is available, although there is some chance that it is concealed. The RHS, instead, represents the total citizen’s utility when there is not any information available through media. It is easy to notice that the expression above in eq. (3.21a) is the same as the
one found in eq. (3.18).

This means that what really matters is the difference between the utility accruing to the citizen when there is selecting of politicians compared with the utility the citizen receives when there is politician disciplining. It is interesting to notice that the relative advantage of having media with respect to a situation when media are not present it is the same, no matter whether there is or not the possibility of collusion between media and dishonest politician. In fact, although in the case of collusion the signal that the politician is dishonest will be hidden more often than in the case when there is no collusion, in both the two cases the presence of media assures more selecting of politician than in the case of no media at all. Therefore, in both the two scenarios, it is the difference between the citizen’s welfare coming from selecting and the welfare coming from disciplining which is crucial in determining when having media is better than not having them.

Finally, it is easy to verify that the same algebraic manipulation leads to conclude that the citizens’ utility when mass media is around and collusion is a possibility is larger than citizens’ utility when there is no possibility of collusion if and only the welfare coming from disciplining the incumbent is larger than the welfare accruing to the citizen from selecting the politician. In formal terms:

\[
EU(\sigma^*_d, \sigma^*_c; \xi; \sigma_m) \geq EU(\sigma^*_d, \sigma^*_c; \xi) \\
-H^\tau - \tau^\ast + \delta(\sigma^*_c u_c(d) + (1 - \sigma^*_c) (\eta u_c(h) + (1 - \eta) u_c(d))] \geq u_c(d) + \delta(\eta u_c(h) + (1 - \eta) u_c(d))
\]

(3.22)

3.7 Conclusion

In this Chapter I have extended the previous literature about the political economy of mass media by analysing how a citizen’s voting decision and collusion between the media and politicians change when two pieces of information about politician’s type are available: a media signal and observation of the public good. By using both the two signals, I have shown that citizens manage to sort an honest politician from a dishonest
one more often than if they were relying on media information only. Moreover, I have shown that the use of both signals makes collusion harder to take place. Furthermore, in this Chapter I have taken a departure from most of the existing literature. In previous works voters have quite a passive role towards information. In this work I have started endogenising citizens’ information acquisition and I have shown how this decision depends critically on the time discount factor between the two periods. By using media in an active way the citizen can decide whether to use information if and only if this increases her expected utility. I have highlighted that there is a certain region of time discount factor between the two periods where it is optimal ex-ante for the citizen to commit not to acquire information about the incumbent. However, it is a well known result that there is a tension between optimality ex-ante and optimality ex-post. Even though for the voter it may be optimal ex-ante to commit not to use any information, once the new information is available, it is optimal for her to use it. This argument might make for unstable equilibria where the voter commits ex-ante to a sort of “rational and strategic ignorance”. On the other hand I have conjectured that, if the citizen’s commitment not to acquire information is not possible, the existence and easing of collusion might contribute, by concealing informative signals, to increase citizen’s utility ex-ante. I judge this a surprising and novel result which contradicts most of the findings of the literature in this new but very interesting field of the research in political economy.
Chapter 4

Raising the Voice: Active Citizens, Optimal Policy Adoption and the Market for Newspapers

4.1 Introduction

In the literature about the political economy of mass media, the media has been modelled as an institution having either a supervisory role (Besley and Prat, 2006) or acting as a megaphone of the (incumbent) politician (Stromberg, 2004a; Stromberg, 2004b). However, the media might act also as an institutional device reporting useful information to the (incumbent) politician that he might not be aware of, information that the incumbent finds useful when he has to decide on the policy to implement. In fact citizens, in their day to day activities, receive information on the state of the world. Furthermore, some of those citizens might have their preferences that depend on the state of the world and on the information they receive on the state of the world itself. They might be willing to communicate this information and their preferences on the policy to be implemented through their actions, in order to influence the policy to be adopted. However, such an action might be: i) (very) costly; ii) subject to a public good dimension; iii) subject to
a coordination problem/failure. A route to escape all these three potential failures is to model the role of mass media as a sort of intermediary in the communication between citizens and incumbent politician. Moreover, I consider the consumption of mass media itself as a way to overcome the problems of public good and coordination failure between agents. In a way the entire society relies on a (sub-)set of citizens who enjoy reading about politics and participating on the political debate and who are willing to do so also because their utility depends on the adopted policy. In turn this policy will be the more efficient the better is the communication between citizens and the incumbent as mediated through mass media.

There are several examples where one can see the mass media, especially newspapers, performing this role of campaigning outlets. For instance during the last couple of years there have been several newspapers in Italy campaigning for the reduction of the cost of politics, i.e. the cost borne by the taxpayers to finance parties, politicians and political activity in general, perceived to be larger than it needs to be. The major Italian outlets have taken part to this campaign and some of them, in particular “Libero” and “Il Tempo”, have run a campaign to abolish the “Provincie ”, that is the Italian NUTS2 tier of administrative circumscription. These newspapers have also asked their readers to send a postcard to the Government in order to persuade it to take some action on this issue. The campaign has been quite successful so far and the Italian Government has proposed a bill to amend the Constitution to scrap the Provincie from the Italian administrative and political system.

Another important Italian outlet campaigning for the reform of politics is the blog by Beppe Grillo, an Italian stand-up comedian turned political campaigner. In his blog he has been campaigning in the last three years to set a two-terms limit to Italian MP, to cut MP salaries and to induce MPs to resign if they have been put on trials, even if they have not been found guilty. He has a huge numbers of readers (the ranking service Technorati ranks “Beppe Grillo blog” as one of the most read blogs in the world) and thanks to his popularity he has organized several popular petitions to induce the Italian
Parliament to pass a law reforming the politics along the lines he has been campaigning on. Until now his efforts have been unsuccessful, but he has managed to set the agenda of the Italian politics, at least partially.

All these examples, not to forget the one presented in the Introduction to this thesis about Jamie Oliver and his school meal program, show that the Media, be it newspaper, TV or blog, may have the important role of bringing to the attention of the political elite issues they are not informed on or they are unwilling to act upon. Of course, it is hard to think that Mass Media “create” a relevant issue, in a rational choice scenario. However it is easier to model a scenario where the issue exists, it is relevant (i.e. it is important for a large number of citizens) and the citizens are willing to communicate their thinking on it, in terms of preferences, or signals, to the politicians.

This chapter aims at investigating this feature of the media which has not been investigated, at the best of my knowledge, by the existing literature so far. In particular the literature has not considered the role of mass media as a bottom-up way of communicating dispersed information from citizens to the incumbent and has not considered the fact that some of the citizens might enjoy “consuming” politics as others enjoy “consuming” football or arts/literature/cinema. For the sake of concreteness in the following discussion I model the media as being newspapers but the model can be extended to consider the role of other media as well.

Given the fact that the Mass Media can be bought but not directly produced by the citizens, there exists a tension between the benefit of using a newspaper to express citizens’ views and the possibility that this newspaper can actually be produced. I distinguish two possible newspapers that can be produced: Tabloid and Broadsheet, where the former is an uninformative newspaper, while the latter is informative on the state of the world and endorse the implementation of a policy option, of the two available, on part of the incumbent politician. One of these two policy options is optimal, given the state of the world, while the other is not. Results show that the production, and the successive consumption of a Broadsheet, always improves the quality of the policy implementation.
Quite interestingly this results of efficiency does not rely on the production of the Broadsheet supporting the right policy option, but on any Broadsheet being produced, instead of a Tabloid.

In this chapter I first assume that there is just one group of citizens who read newspapers, the Middle Class citizens. Subsequently I analyse how the results change when citizens from the other classes read newspaper as well and they choose between the Broadsheet supporting their views or the Tabloid. Interestingly, results show that the presence of “partisan reader” can make the implementation of optimal policy easier, not harder, contrary to conventional wisdom. Furthermore, in a more polarized society, where the Middle Class shrinks and Poor and/or Rich individuals grow in number, as long as there is a large fraction of partisan readers, a smaller Middle Class can still have the role in the public opinion to transmit useful information to the Incumbent, necessary to implement optimal policy. Finally, there exists a non-empty set of parameters such that if a Broadsheet newspaper is produced, the policy that newspaper supports is implemented more often than the alternative policy, for any state of the world. In such a space of parameters the existence of partisan readers has two roles: i) it allows the preferred policy to be implemented more than if informative newspapers did not exist; ii) it makes it easier for a Broadsheet newspaper to be produced and therefore it increases the probability of optimal policy implementation. Again, these result show that it is not always obvious that a political behaviour which is ideological is at odds with efficiency in the public policy adoption.

This chapter draws on the small literature on the role of media as an institutional player that helps collect and aggregate dispersed information. Most of the literature (Besley and Burgess, 2001; Besley and Burgess, 2002) has dealt with estimating the effectiveness of media in functioning as an institution which communicates useful information on the state of the world to the incumbent. However this literature is mostly empirical. Piketty (1999) surveys most of the literature on aggregating information and on institutions that have this role. The papers closer to the model in this Chapter are
Lohmann (1993) and Lohmann (1994). However, in these papers, the citizens interested in policy who receive information communicate it directly, by voting or protesting or going on strike. In this chapter, instead, citizens transmit useful information thanks to newspapers. However, these newspapers are produced by a third party (a Media Tycoon) that has his own incentives in deciding whether to produce a newspaper that allows the citizens to participate in the public debate (Broadsheet) or does not allow them to do so (Tabloid). This Chapter focuses on the tensions existing between the optimality of producing the informative newspaper for the society as a whole and the optimality for the Media Tycoon.

The structure of the Chapter is the following: the next Section presents the model; Section 3 solves the model and derives the equilibrium of this strategic situation, presenting also some comparative statics exercises. Section 4 analyses the role of ideological citizens/partisan readers in favouring the optimal policy implementation and/or the policy they favour the most. Finally Section 5 concludes.

4.2 The Model

The model I employ builds on a simple two states of the world - two actions framework.\textsuperscript{1} There are two states of the world \( \theta \in \Theta \equiv \{ \bar{\theta}, \bar{\varnothing} \} \) randomly chosen by the Nature with probability \( Pr(\bar{\theta}) = \frac{1}{2} \) and \( Pr(\bar{\varnothing}) = \frac{1}{2} \). The Incumbent politician has to take a decision \( a \in A \equiv \{ \bar{a}, \bar{\varnothing} \} \) based on his priors and on the additional information on the state of the world he receives from citizens, through newspapers. For the sake of concreteness I interpret these decisions \( a \in A \) as policy choices that the Incumbent has to implement.

\textsuperscript{1}The model I use borrows some elements from Lohmann (1993). However my model on one hand simplifies Lohmann’s model by assuming that all the citizens in each group have the same indirect utility from policy. On the other hand, the model employs a multinomial (trinomial) distribution function, instead of a binomial, to describe the pdf of the signals arriving to the citizens. Furthermore it crucial to the model it is the presence of a for-profit-institutional player (Media, i.e. a Newspaper) allowing the citizens to express their signals/preferences/opinion. In Lohmann’s articles instead, citizens express their views by means of actions they take directly, although at some cost.
Although these policy decisions affect different groups of citizens in a different way (see discussion below), they are deemed to be optimal, contingent on the state of the world, in the following sense: given the state of the world $\theta$, the optimal policy choice is $\pi(a)$. Let the Incumbent be interested in implementing the optimal policy choice contingent on $\theta$. This can be because he enjoys ego rents from having done “the right thing” or because he is a benevolent social planner whose objective is to maximise social welfare. Below, once I define the utility of each group of citizen, it will be clear that the Incumbent puts full weight on the utility of the middle class. In order to define formally the Incumbent’s preferences, I assume that the Incumbent receives a positive utility if he adopts the optimal policy choice: $u_i(\pi[\theta]) = u_i(a[\theta]) > 0$; otherwise he receives a utility of zero if he “makes a mistake”, i.e.: $u_i(\pi[\theta]) = u_i(a[\theta]) = 0$.

The polity is made of $N$ citizens and consists of three groups indexed by $k \in \{P, R, M\}$. Group $R$ (rich) has a numerosity of $N_R = \tilde{p}N$. Group $P$ (poor) has a numerosity of $N_P = \tilde{p}N$. Group $M$ (middle class) has a numerosity of $N_M = (1 - \tilde{p} - \tilde{p})N$. All the citizens belonging to each group have the same preferences regarding the policy $a \in A$ to be implemented. However, citizens in different groups have different preferences on that same policy options $a$. In particular: citizens in group $R$ always prefer policy $a$ to policy $\pi$ regardless of the state of the world; citizens in group $P$ always prefer policy $\pi$ to policy $a$ regardless of the state of the world. Finally, citizens belonging to $M$ maximise their utility when the optimal policy is implemented. Therefore their policy preferences are aligned with the Incumbent’s ones and they prefer policy $a$ conditional on the state of the world being $\theta$, while they prefer $\pi$ conditional on the state of the world being $\bar{\theta}$. Formally, without loss of generality, I assume that $u_i(\pi[\theta]) = u_i(a[\theta]) > 0$, for each $i \in M$; instead $u_i(\pi[\theta]) = u_i(a[\theta]) = 0$, for each $i \in M$. Regarding the Poor group, instead, one has that $u_i(\pi[\theta]) > 0 = u_i(a[\theta])$, for each $i \in P$ and for each $\theta \in \Theta$. Finally, $u_i(a[\theta]) > 0 = u_i(\pi[\theta])$, for each $i \in R$ and for each $\theta \in \Theta$.

\footnote{This assumption might be justified also if one thinks in terms of a Downsian model of political competition. In this case the median voter is the Condorcet winner, that is in a unidimensional policy space the Incumbent implements the median voter’s most preferred policy option.}
Thanks to their day-to-day activities (for instance due to their experience as users of public good/goods publicly supplied; or because they are dissatisfied with their experiences as constituents of a first-past-the-post uninominal system and they want to reform it in a proportional way; or alternatively because they see from their experience or the experiences of their acquaintances that “death-taxes” are (not) unjust and they do (not) prevent social mobility) citizens may receive a signal on the state of the world. In the examples introduced above the state of the world could be that NHS new foundation hospitals are (not) working: or the Britain transport system is (not) underfunded; or proportional representation is (not) the best electoral system to mobilise citizens towards politics; or inequality in wealth is (not) a threat to social inequality.

Given a state of the world $\theta$ there are three possible signals $\sigma$ that each citizen can receive: in particular: $\sigma \in \{\overline{\sigma}, \phi, \sigma\}$. The probability of each citizen receiving any of the three signals, given the state of the world, is the following:

\[
Pr(\sigma = \overline{\sigma} | \theta) = q
\]

\[
Pr(\sigma = \phi | \theta) = 1 - q - q'
\]

\[
Pr(\sigma = \sigma | \theta) = q'
\]

\[
Pr(\sigma = \overline{\sigma} | \bar{\theta}) = q'
\]

\[
Pr(\sigma = \phi | \bar{\theta}) = 1 - q - q'
\]

\[
Pr(\sigma = \sigma | \bar{\theta}) = q
\]

with $q \in (0, 1)$ and $q > q'$. Since $q + q' < 1$, then it must be that $q' < \frac{1}{2}$. In fact if not, $q' > \frac{1}{2}$ and, given $q > q' > \frac{1}{2}$, then it would be that $q + q' > 1$ which is impossible.

I assume that all the citizens receive a signal, and these signals are all i.i.d. However,
I first focus my attention on the signals received by the \( M \) citizens, who will be shown to be the only ones always interested in truthful transmission of the signals.

It is easy to show that a citizen observing a private signal \( \tilde{\sigma}(\sigma) \) rationally believes, upon Bayes updating, that the state \( \tilde{\theta}(\theta) \) is more likely than the state \( \theta(\theta) \). On the other hand, upon observing an empty signal \( \phi \), the citizen does not learn anything new about the state of the world. This can be proved in the following Lemma:

**Lemma 15** Based on his private information, upon observing a \( \tilde{\sigma}(\sigma) \) signal, the Middle Class citizen believes the state of the world \( \tilde{\theta}(\theta) \) is more likely than \( \theta(\theta) \). However, when he privately observes the \( \phi \) signal, the citizen learns nothing.

**Proof.** To show this, simply apply Bayes’s rule to the individual citizen’s beliefs. \( \Pr(\tilde{\theta}|\tilde{\sigma}) = \frac{\Pr(\tilde{\sigma}|\tilde{\theta})\Pr(\tilde{\theta})}{\Pr(\tilde{\sigma}|\tilde{\theta})\Pr(\tilde{\theta}) + \Pr(\tilde{\sigma}|\theta)\Pr(\theta)} = \frac{\frac{q}{q+q'}}{\frac{q}{q+q'}} = \frac{q}{q+q'} \). It follows that \( \Pr(\tilde{\theta}|\tilde{\sigma}) > \Pr(\theta) \) if \( \frac{q}{q+q'} > \frac{1}{2} \), i.e. if \( q > \frac{1}{2}(q+q') \). Simple algebra shows that \( q > \frac{1}{2}q + \frac{1}{2}q' \) iff \( \frac{1}{2}q > \frac{1}{2}q' \) if \( q > q' \) which is true given the hypothesis. A similar conclusion can be reached by showing that \( \Pr(\tilde{\theta}|\theta) > \Pr(\theta) = \frac{1}{2} \) if \( q > q' \). Finally it can be showed simply that the following is true: \( \Pr(\phi|\tilde{\theta}) = \frac{\Pr(\phi|\tilde{\theta})\Pr(\tilde{\theta})}{\Pr(\phi|\tilde{\theta})\Pr(\tilde{\theta}) + \Pr(\phi|\theta)\Pr(\theta)} = \frac{(1-q-q')\frac{1}{2}}{(1-q-q')\frac{1}{2} + (1-q-q')\frac{1}{2}} = \frac{1}{2} \).

I identify with \( n_{\sigma}, n_{\phi}, n_{\bar{\sigma}} \) the number of \( M \) citizens receiving (respectively) signals \( \sigma, \phi, \bar{\sigma} \). This means that \( n_{\sigma} + n_{\phi} + n_{\bar{\sigma}} = N_M \). To economise on notation, I rewrite \( N_M = N \). Finally with \( i_\sigma \) I indicate the single citizen \( i \in M \) who has observed the signal \( \sigma \in \{\sigma, \phi, \bar{\sigma}\} \).

It is necessary to spend a few words now in order to justify my modelling of signals, their interpretation and their relation with the state of the world and the implementable policy. For instance let us focus on the state of the world that says “foundation hospitals are working” (say \( \tilde{\theta} \)). In this case each citizen might go to a foundation hospital if available and experience a good treatment (say \( \sigma \)) or a bad one (say \( \bar{\sigma} \)) or, as a third option, he might not get any information on foundation hospitals because they are not available in his area or because the treatment he has received is similar to what he experienced in the past from any other non-foundation hospital (\( \phi \)). Therefore if two
different policies, either of extending foundation hospitals (π) or of scrapping this policy (a), are being brought forward of the citizen, given his experience, might want to take part in the debate, taking a stance towards supporting the extension of this policy or not.

I want to study how citizens take part in this public policy debate when newspapers are available and they might perform the role of “campaigning newspaper” on behalf of one of the two sides in a policy debate. Alternatively the newspapers can choose not to take any stance in the policy debate. If the newspaper j is a “campaigning newspaper” and takes a position in the policy debate, then j ∈ {π, a}. If the newspaper does not take any stance in the policy debate, I denote this with j = φ.3 If the newspaper carries on its front page stories coherent with the signal σ(π), this means, following Lemma 15, that the newspaper believes that the state of the world ω(θ) is more likely than the alternative one. Of course, given that it regards one of the two states of the world to be more likely than the other one, the newspaper campaigns for the optimal policy contingent on the state of the world to be implemented. I will dub this sort of newspaper a Broadsheet: in this context, Broadsheets are newspapers campaigning for one of the policies a ∈ A and printing stories explaining the relative merit of one policy over the other. For instance, in my example about foundation hospitals, if the Broadsheet takes a stance favourable to the extension of foundation hospitals (ω) it will publish stories about the relative merits of foundation hospitals with respect to NHS-run-hospitals, actively supporting the option of extending this policy option.

The other type of newspaper is a Tabloid one, i.e. an uninformative newspaper which does not take any stance in the policy debate.4 This type of newspaper prints stories about celebrity gossip, football, and sports in general or “useful news” (gardening, motor and cars reviews, food recipes, music and movies reviews, etc.). Consuming them gives

3Slightly abusing notation, with the same symbol σ ∈ {π, φ, a} I indicate both the newspaper j ∈ {π, φ, a} and the signal indicative of the state of the world the newspaper has printed on its page.
4An alternative interpretation of this “Tabloid” is the one of a newspaper giving an equal space to each side of the debate, without taking any strong position in support of either side.
some utility to their readers, but does not allow them to take part in the policy debate at large. In the terms of my model a Tabloid carries the signal $\sigma = \phi$.\footnote{Of course I am aware that there exist Tabloids campaigning for some policy issues or Broadsheet that do not perform any campaigning journalism. However I use the names "Broadsheet" and "Tabloid" to fix ideas regarding the existing difference between campaigning newspapers and not campaigning ones.}

Let me now define the Middle Class citizen’s utility function as the following:

$$U_i(l, a, j) = l_i + u_i(a|\theta) + u_i(j|\sigma)$$  \hspace{1cm} (4.1)

for each $j \in \{\overline{\sigma}, \phi, \underline{\sigma}\}$ and for each $i \in M$. The function $U_i(l, a, j)$ is separable in the following arguments: the income $l_i$; the utility the citizen derives from the implementation of the right policy given the state of the world, revealed to the citizen \textbf{after the policy has been implemented}, i.e. $u_i(a|\theta)$; the utility the citizen obtains from reading the newspaper $j$, given the signal he receives $\sigma \in \{\overline{\sigma}, \phi, \underline{\sigma}\}$, i.e. $u_i(j|\sigma)$. I make the assumption that each citizen belonging to the Middle Class has the same income $l_i = \overline{l}$ for each $i \in M$ and this is enough to buy a single copy of the newspaper, if the citizen wishes to do so. I also assume that each citizen derives the same positive utility $\overline{\tau}$ from reading a newspaper $j$ coherent with the signal he has observed $\sigma$. In symbols this means that $u_i(j|\sigma) = \overline{\tau}$, for each $j \in \{\overline{\sigma}, \phi, \underline{\sigma}\}$ and for each $i \in M$ group iff $j = \sigma$. Instead $u_i(j|\sigma) = 0$ for each $j \in \{\overline{\sigma}, \phi, \underline{\sigma}\}$ and for each $i \in M$ group iff $j \neq \sigma$.

From the previous discussion it is clear that the action of buying a newspaper accomplishes two things: first, it gives the citizen-reader some utility coming directly from reading a newspaper reflecting the reader’s view of the world; second, it transmits a signal to the incumbent which supplies him with more information about the state of the world than the incumbent himself would have had otherwise.

The argument that the citizen belonging to the Middle Class enjoys reading a newspaper coherent with his view of the world assumes implicitly that he does not hold any bias in favour of one policy or the other before receiving the signal. However, once he receives it, based on his own private information only, he believes that the state of the

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world coherent with the observed signal is the most likely. This reading behaviour can be justified thanks to the literature on self-serving beliefs and self-serving biases\textsuperscript{6}. This literature has for a long time recognized that people tend to confirm their own beliefs and discount, minimise or, even worse, disregard any information opposed to their beliefs. Once they hold a view on the state of the world and on the policy more suitable to this state of the world, view they have derived from the signal they have received, these citizens buy a Broadsheet coherent with the signal they have received. This might be because these citizens enjoy reading about politics and taking part (or feeling they are taking part) in the debate. Although they have received a signal, they might feel they want to know more. Therefore they desire to read about this and, as a consequence, support the policy option in whose favour they have received a private signal.

Similarly to Middle Class citizens’ utility as defined in eq. (4.1), one can define Rich citizen’s utility as the following:

\[ U_i(r, a, j) = r_i + u_i(a|\theta) + u_i(j|\sigma) \] (4.2)

for each \( j \in \{\sigma, \phi, \varphi\} \) and for each \( i \in R \), with \( r_i = r \) for each \( i \in R \). Likewise Poor citizen’s utility is defined as:

\[ U_i(m, a, j) = m_i + u_i(a|\theta) + u_i(j|\sigma) \] (4.3)

for each \( j \in \{\sigma, \phi, \varphi\} \) and for each \( i \in P \), with \( m_i = m \) for each \( i \in P \). It is worth repeating that I first analyse the strategic situation when only Middle Class citizens buy the newspaper. Then I extend this analysis to all the citizens in Section (4.4). Therefore, in this first section, I analyse the strategic situation as if, although the implemented policy \( a \in A \) affects all the citizens in each one of the three groups, only Middle Class citizens read the newspaper.

\textsuperscript{6}For a recent use in economics of idea borrowed from this literature see Mullainathan and Shleifer (2005). For a critical assessment of this literature and its role in recent economic research see Glaeser (2004).
Finally, I introduce an entrepreneur in the mass media industry i.e. a Media Tycoon (MT). He has the task of producing a single newspaper \( j \) carrying one of the three possible signals \( \sigma \in \{ \pi, \phi, \sigma \} \). MT’s objective function is to maximise his expected profit coming from newspaper production and selling. I make the crucial assumption that the MT does not observe any signal.

This can be rationalized because the MT does not take any interest in the policy the Incumbent will implement, either because he is not affected by the policy, or because the effect on his utility is negligible, compared with the profit coming from his entrepreneurial activity. Also, it might be that the newspaper is owned by a public company and, although the effect of the implementable policy on each shareholder is different depending if they are Poor, Rich or Middle Class, the weighted sum of the welfare effects is equal to zero. Another reason why the MT might not observe any signal is that the MT is a foreigner who does not belong to the polity governed by the incumbent politician and therefore does not observe any signal coming from the environment. Or likewise, it might be that the MT (or the journalists working in the newspaper) observes a plurality of signals but the Bayesian updating is such that he learns nothing on the state of the world.

Following Gentzkow, Glaeser and Goldin (2006) I assume that the cost function of the newspaper production has constant marginal cost and it is the following:

\[
C(y_j) = F_j + c_j y_j
\]  

(4.4)

where \( y_j \) is the number of copies of the newspaper \( j \) the MT produces, \( c_j \) is the variable cost to produce a copy of the newspaper \( j \) and \( F_j \) is the fixed cost. In order not to introduce any asymmetry in the cost function which might drive the results, to make comparisons straightforward and to highlight the main determinants of the model, I assume that \( c_j = \pi \) for each \( j \in \{ \pi, \phi, \sigma \} \) and \( F_j = \pi \) for each \( j \in \{ \pi, \phi, \sigma \} \). The price of the single newspaper copy is labeled with \( p_j \), for each \( j \in \{ \pi, \phi, \sigma \} \).

Finally I assume that the utility each citizen derives from reading a copy of the
newspaper is common knowledge as is the distribution of signals Middle Class citizens receive: every player knows this distribution, but does not know the actual realisation of the signals, apart from the signal he observes, if any. Knowing citizens’ preferences and their utility from reading the newspaper, MT has to decide which newspaper to produce in order to maximise his expected profit $\Pi^E_j$.

### 4.2.1 Timing of the game

At $t = 0$, Nature chooses at random the state of the world $\theta \in \Theta = \{\theta, \overline{\theta}\}$; at $t = 1$, signals are sent; in $t = 2$, citizens observe signals and MT produces a newspaper without knowing any signals about the state of the world and without knowing citizens’ received signals; in $t = 3$, citizens take the buying decision regarding the newspaper; in $t = 4$, the Incumbent observes how many copies of the produced newspaper have been sold, updates his beliefs on the state of the world and implements the policy $a \in A = \{a, \overline{a}\}$ accordingly; in $t = 5$, the state of the world is revealed and payoffs accrue to agents.

### 4.2.2 Solution concept

The solution concept I employ to solve the model is Perfect Bayesian Equilibrium where each player chooses his optimal strategy given other players’ equilibrium strategies and equilibrium beliefs and beliefs are derived along the equilibrium path, whenever possible, given equilibrium strategies.

### 4.3 Solving the Game

I solve the game by backward induction. In $t = 5$ the state of the world is revealed and all the players (citizens and Incumbent politician) receive their payoffs depending on the policy implemented in $t = 4$ and on the state of the world. In $t = 4$ the Incumbent observes which newspaper has been produced and how many copies have been sold. Thanks to this information he updates his beliefs on the state of the world $\theta \in \{\theta, \overline{\theta}\}$, and
implements the policy which he thinks it is more likely to be optimal. Given the beliefs on \( \theta \), that is the ex-post probability of \( \theta \), which is a function of the number of signals the Incumbent observes by looking at which and how many copies of newspapers have been bought, the Incumbent maximises his expected utility according to the following rule:

**Lemma 16** When the two states of the world have the same probability, the incumbent randomises with any probability between the two policies. When the two states of the world have different probabilities, the incumbent implements with certainty the policy which is more likely to be optimal.

**Proof.** To prove the Lemma, assume that \( Pr(\overline{\theta}) = \rho > 0 \) and \( Pr(\theta) = 1 - Pr(\overline{\theta}) = 1 - \rho \). Since \( u_1(\pi|\overline{\theta}) = u_1(a|\overline{\theta}) = 1 \), while \( u_1(\pi|\theta) = u_1(a|\theta) = 0 \) this means that the incumbent taking the strategy \( \overline{\theta} \) obtains an expected utility \( u_1^F(\overline{\theta}|\theta) = u_1(\pi|\overline{\theta})Pr(\overline{\theta}) + u_1(\pi|\theta)Pr(\theta) = u_1(a|\overline{\theta})\rho + u_1(a|\theta)(1 - \rho) = \rho \). On the other hand, when he takes the strategy \( a \), the incumbent obtains an expected utility equal to: \( u_1^F(a|\theta) = u_1(a|\overline{\theta})Pr(\overline{\theta}) + u_1(a|\theta)Pr(\theta) = u_1(a|\overline{\theta})\rho + u_1(a|\theta)(1 - \rho) = 1 - \rho \).

Let us define \( \Gamma(\pi) \) as the probability that the Incumbent implements the policy \( \pi \), while the complementary probability \( \Gamma(a) = 1 - \Gamma(\pi) \) is the probability that the Incumbent implements the policy \( a \). Therefore \( \Gamma^*(\pi) \in \arg\max_{a \in A, \theta \in \Theta} \sum_{a \in A} \sum_{\theta \in \Theta} \Gamma(a)u_1^F(a|\theta)Pr(\theta) = \Gamma(\pi)\rho + (1 - \Gamma(\pi))(1 - \rho) \). Expanding the previous expression, one obtains that:

\[
\sum_{a \in A} \sum_{\theta \in \Theta} \Gamma(a)u_1^F(a|\theta)Pr(\theta) = 1 - \rho - \Gamma(\pi) + 2\Gamma(\pi)\rho = 1 - \rho - \Gamma(\pi)(1 - 2\rho)
\]

Therefore if \( 1 - 2\rho > 0 \) i.e. \( \rho < \frac{1}{2} \) then \( \Gamma^*(\pi) = 0 \). If \( 1 - 2\rho < 0 \) i.e. \( \rho > \frac{1}{2} \) then \( \Gamma^*(\pi) = 1 \). Finally, if \( 1 - 2\rho = 0 \) i.e. \( \rho = \frac{1}{2} \) then \( \Gamma^*(\pi) \in [0, 1] \). In particular, \( \Gamma^*(\pi) = \frac{1}{2} \). Notice that the incumbent always prefers to have \( \rho \neq \frac{1}{2} \) since this gives him a higher expected utility than \( \rho = \frac{1}{2} \). \( \blacksquare \)

From the previous Lemma a simple Corollary follows immediately:

**Corollary 17** When the two states of the world have the same probabilities, the probabil-
ity of optimal policy implementation is equal to $1/2$. If $\rho > 1/2$ ($\rho < 1/2$) the probability of optimal policy implementation is equal to $\rho((1 - \rho))$.

**Proof.** From Lemma 16 one knows that when $\rho = \frac{1}{2}$, $\Gamma^*(\pi) \in [0, 1]$. The probability of optimal decision making is equal to the probability of implementing the policy $a \in A \equiv \{g, \pi\}$, times the probability that that policy is optimal, contingent on the state of the world $\theta \in \Theta$. Therefore the probability of optimal policy implementation is equal to:

$$\Gamma^*(\pi)Pr(\bar{\theta}) + (1 - \Gamma^*(\pi))Pr(\theta) = \Gamma^*(\pi)\frac{1}{2} + \frac{1}{2} - \Gamma^*(\pi)\frac{1}{2} = \frac{1}{2}$$

for each $\Gamma^*(\pi) \in [0, 1]$. Likewise, from Lemma 16 one knows that when $\rho > \frac{1}{2}$ ($\rho < \frac{1}{2}$), $\Gamma^*(\pi) = 1(\Gamma^*(\pi) = 0)$. Then the probability of optimal decision making is equal to the probability of implementing the policy $a \in A \equiv \{g, \pi\}$, times the probability that the same policy is optimal, contingent on the state of the world $\theta \in \Theta$. It is easy to find that the probability of optimal policy implementation is equal to:

$$\Gamma^*(\pi)Pr(\bar{\theta}) = 1 * \rho = \rho > \frac{1}{2}$$

$$(1 - \Gamma^*(\pi))Pr(\theta) = 1 * (1 - \rho) = (1 - \rho) > \frac{1}{2}$$

respectively when $\Gamma^*(\pi) = 1(\Gamma^*(\pi) = 0)$. ■

The information about the state of the world $\theta \in \Theta$ and about which optimal policy to implement is given to the Incumbent thanks to the newspaper readership. Since there is one single newspaper produced by the MT, then the Incumbent has to estimate the probability of the state of the world by looking at the number of signals printed and at which signal is printed on that newspaper, i.e. at the copies of the newspaper sold and bought.

In the analysis of the equilibrium of the game one needs to consider both: a) the utility the citizen derives directly from consuming the newspaper; and b) the effect his buying decision has on the implementable policy and the (expected) utility the citizen could get.
from that same policy, were it the optimal one. However here I derive the equilibrium of the game considering only the utility the citizen derives directly from reading the newspaper. Implicitly I make the assumption that the single citizen is “too small to matter” in the computation of the expected utility and his action will not manage to change the outcome in the policy adoption decision. This is a good approximation of the truth when the number of Middle class citizens is large. Nevertheless In the Appendix I show how the equilibrium of the game changes when one looks at the more comprehensive effect that buying the newspaper has on citizen’s utility.

Given the solution concept I use is PBE, I need to show that equilibrium strategies are optimal given equilibrium beliefs and vice versa. First I focus on the case of the existence and production of the $j = \sigma$ Broadsheet, since the case for $j = \phi$ is similar. The case for Tabloid (i.e. $j = \phi$) is analysed below. The following can be shown:

**Lemma 18** There exists an (separating) equilibrium where Middle Class citizens in $t = 3$ buy the Broadsheet produced if and only if they have received the signal printed on the newspaper and the price of the newspaper is less than the utility the citizens derive from reading it.

**Proof.** Assume that in equilibrium a number of signals $n^*_\sigma$ (to be determined later) is the minimum number of signals sufficient for the Incumbent to believe that $Pr(\overline{\sigma}|n^*_\sigma) > Pr(\overline{\sigma}) = 1/2$. Given the monotonicity of the ex-post probability in the number of signals, this means that $Pr(\overline{\sigma}|\tilde{n}_{\sigma}) > 1/2$ for any $\tilde{n}_{\sigma} \geq n^*_\sigma$, while $Pr(\overline{\sigma}|\tilde{n}_{\sigma}) \leq 1/2$ for any $\tilde{n}_{\sigma} < n^*_\sigma$. Furthermore remember that, given that there is one single newspaper, if in equilibrium $n_{\sigma}$ signals are observed, the Incumbent and the other players have to form expectations on the remaining $N - n_{\sigma}$ signals received by the citizens who have not bought any newspaper.

To prove the Lemma I show first that, given a number of newspaper copies $n_{\sigma}$ observed in equilibrium and the equilibrium beliefs $Pr(\overline{\sigma}|n_{\sigma})$, citizens who have received a $\sigma$ signal $\widehat{t}_{\sigma}$ buy the $j = \sigma$ newspaper while citizens $\widehat{t}_{\sigma \in \{\phi, \sigma\}}$ never do.\(^7\)

\(^7\)Abusing notation, with $\widehat{t}_{\sigma}$ I indicate the signal $\sigma$ received by the individual $i$ also. Of course $\widehat{t}_{\sigma}$ and $\widehat{t}_{\phi}$ have similar meanings.

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First assume that in equilibrium a number of signals $n^*_{\sigma} - 1$ is observed, i.e. there are $n^*_{\sigma} - 1$ copies bought of the newspaper $j = \sigma$ and the citizen $\hat{i}_\sigma$ is pivotal. Given what said above, equilibrium beliefs is $Pr(\overline{\theta}|n^*_{\sigma} - 1) < 1/2$. In this event there are several possible cases for the single citizen $\hat{i}_{\sigma_\in\{\sigma,\phi,\phi^*\}} \in M$ and the Incumbent politician that one needs to analyse.

\textit{i}) \textbf{The number} $n^*_{\sigma} - 1 \textbf{ is such that} $Pr(\overline{\theta}|n^*_{\sigma} - 1) < Pr(\overline{\theta})$ \textbf{and the citizen} $\hat{i}$ \textbf{has privately observed the signal} $\overline{\sigma}$.

The citizen is willing to buy the newspaper $j = \sigma$ as long as the charged price $p_{j=\sigma}$ is less than or equal to the utility $\overline{\tau}$. Again $\hat{i}_{\sigma}$ will not read any other newspaper, for any $p_{j=\{\phi,\phi^*\}} > 0$, given the signal received and his preferences. Conversely, if the citizen buys the newspaper $j = \sigma$, then it must be that the citizen has observed privately the signal $\sigma$ and that $p_{j=\sigma} \leq \overline{\tau}$. In fact if it was not so, then this would mean that the citizen buys a newspaper and bears a positive cost equal to the price although he does not receive any utility from reading the newspaper or enjoys a utility inferior to the price. In this case the citizen would be better off by not buying the newspaper.

\textit{ii} \textbf{The number} $n^*_{\sigma} - 1 \textbf{ is such that} $Pr(\overline{\theta}|n^*_{\sigma} - 1) < Pr(\overline{\theta})$ \textbf{and the citizen} $\hat{i}$ \textbf{has privately observed the signal} $\sigma (\phi)$.

Given the signal $\sigma (\phi)$ he has privately observed, $\hat{i}_{\sigma(\phi)} (\hat{i}_{\phi})$ will not buy the newspaper $j = \sigma$ based on his preferences as long as $p_{j=\sigma} > 0$. On the other hand, if the citizen does not buy the newspaper $j = \sigma$ with $p_{j=\sigma} > 0$, then it must be that he has observed a signal different from $\sigma$ or that he has observed the signal $\sigma$ but $p_{j=\sigma} > \overline{\tau}$.

Now it remains to consider the case when $\hat{i}_{\sigma}$ is not pivotal, that is in equilibrium a number $n_{\sigma}$ is observed such that $n_{\sigma} < n^*_{\sigma} - 1$ (or $n_{\sigma} > n^*_{\sigma}$). Following what said above, equilibrium beliefs will be equal to $Pr(\overline{\theta}|n_{\sigma} < n^*_{\sigma} - 1) < 1/2$ (or $Pr(\overline{\theta}|n_{\sigma} > n^*_{\sigma}) > 1/2$).

\textit{iii} \textbf{The number} $n_{\sigma}$ \textbf{is such that} $n_{\sigma} < n^*_{\sigma} - 1$ \textbf{(or} $n_{\sigma} > n^*_{\sigma}$) \textbf{and the citizen} $\hat{i}$ \textbf{has privately observed the signal} $\sigma$.

The citizen is willing to buy the newspaper $j = \sigma$ as long as the charged price $p_{j=\sigma}$ is less than or equal to the utility $\overline{\tau}$. Again $\hat{i}_{\sigma}$ will not read any other newspaper, for any
\(p_{j \in \{\phi, \sigma\}} > 0\), given the signal received and his preferences. Conversely, if the citizen buys the newspaper \(j = \sigma\), then it must be that the citizen has observed privately the signal \(\sigma\) and that \(p_{j = \sigma} \leq \tau\). In fact if it was not so, then this would mean that the citizen buys a newspaper and bears a positive cost equal to the price although he does not receive any utility from reading the newspaper or receives a utility inferior to the price. In this case the citizen would be better off by not buying the newspaper.

\textit{iv) The number} \(n_{\sigma}\) \textit{is such that} \(n_{\sigma} < n_{\sigma}^* - 1\) \textit{(or} \(n_{\sigma} > n_{\sigma}^*\) \textit{and the citizen} \(\hat{i}\) \textit{has privately observed the signal} \(\phi\) \textit{or} \(\sigma\).}

Given the signal \(\sigma\) or \(\phi\) he has privately observed, again \(\hat{i}_{\sigma}(i_{\phi})\) is strictly better off not buying the newspaper as long as \(p_{j = \sigma} > 0\). On the other hand, if the citizen does not buy the newspaper \(j = \sigma\) sold at a strictly positive price \(p_{j = \sigma} > 0\), then it must be that either he has observed a signal different from \(\sigma\) or that he has observed the signal \(\sigma\) but \(p_{j = \sigma} > \tau\).

The proof for the newspaper \(j = \phi\) is similar to the one just seen for \(j = \sigma\), so I omit it.

After deriving the equilibrium strategies, given the equilibrium beliefs, now it is necessary to do the opposite, i.e. compute the equilibrium beliefs given the equilibrium strategies. Since all the \(\hat{i}_{\sigma}\) buy the newspaper \(j = \sigma\) if it is on offer, as long as \(p_{j = \sigma} \leq \tau\), while all the \(\hat{i}_{\sigma \in \{\phi, \sigma\}}\) do not, then upon observing a number \(n_{\sigma}\) of newspaper copies bought, the Incumbent can form the equilibrium beliefs on the probability of the state of the world \(\bar{\theta}\), knowing that the remaining \(N - n_{\sigma}\) citizens have each observed \(\sigma \in \{\phi, \sigma\}\).

Since \(Pr(\sigma | \bar{\theta}) = q\), therefore \(Pr(\sigma \in \{\phi, \sigma\} | \bar{\theta}) = 1 - Pr(\bar{\sigma} | \bar{\theta}) = 1 - q\). Of course from
\[ Pr(\sigma|\emptyset) = q \] it follows that \( Pr(\sigma \in \{ \phi, \sigma \} | \emptyset) = 1 - q \). Then it follows that:

\[
Pr(\emptyset|n_{\sigma}, N - n_{\sigma}) = \frac{Pr(n_{\sigma}; N - n_{\sigma})Pr(\emptyset)}{Pr(n_{\sigma}; N - n_{\sigma})Pr(\emptyset) + Pr(n_{\sigma}|\emptyset)Pr(\emptyset)} = \frac{\frac{N!}{(n_{\sigma})(N-n_{\sigma})}q^{(n_{\sigma})}(1-q)^{(N-n_{\sigma})}}{\frac{N!}{(n_{\sigma})(N-n_{\sigma})}q^{(n_{\sigma})}(1-q)^{(N-n_{\sigma})} + \frac{N!}{(n_{\sigma})(N-n_{\sigma})}q' q^{(n_{\sigma})}(1-q')^{(N-n_{\sigma})}} = \frac{\frac{N!}{(n_{\sigma})(N-n_{\sigma})}q^{(n_{\sigma})}(1-q)^{(N-n_{\sigma})}}{\frac{N!}{(n_{\sigma})(N-n_{\sigma})}q' q^{(n_{\sigma})}(1-q')^{(N-n_{\sigma})} + \frac{N!}{(n_{\sigma})(N-n_{\sigma})}q' q^{(n_{\sigma})}(1-q')^{(N-n_{\sigma})}} \quad (4.5)
\]

Finally, to complete the PBE, the following out-of-equilibrium beliefs can be devised in order to sustain the equilibrium. Remember that \( n_{\sigma}^* \) is the minimum number of signals necessary to be observed to convince the Incumbent that \( Pr(\emptyset|n_{\sigma}^*) > Pr(\emptyset) = 1/2 \) and that I label with \( Pr(\emptyset|n_{\sigma}, N - n_{\sigma}) \) the equilibrium belief. If one observes a number of out-of-equilibrium signals \( \tilde{n}_{\sigma} \), then with \( n_{\sigma} \geq n_{\sigma}^* \), \( Pr(\emptyset|\tilde{n}_{\sigma}) > 1/2 \), for \( \tilde{n}_{\sigma} \in \{ n_{\sigma}^*, N \} \), while \( Pr(\emptyset|\tilde{n}_{\sigma}) < 1/2 \), for \( \tilde{n}_{\sigma} \in \{ 0, n_{\sigma}^* \} \). On the other hand, if one observes a number of out-of-equilibrium signals \( \hat{n}_{\sigma} \), then with \( n_{\sigma} < n_{\sigma}^* \), \( Pr(\emptyset|\hat{n}_{\sigma}) < 1/2 \), for \( \hat{n}_{\sigma} \in \{ 0, n_{\sigma}^* \} \), while \( Pr(\emptyset|\hat{n}_{\sigma}) > 1/2 \), for \( \hat{n}_{\sigma} \in \{ n_{\sigma}^*, N \} \).

Furthermore if the Incumbent observes any number \( \tilde{n}_{\sigma} \) of signals \( \sigma \in \{ \phi, \sigma \} \) different from \( \sigma \), he will implement the policy he believes to be optimal contingent on the “true” state of the world. In order not to allow “crazy” beliefs, I assume that if \( n_{\sigma}^* \) is the minimum number of signals to convince the Incumbent that the “true” state of the world is \( \emptyset \), then if \( \tilde{n}_{\sigma} \geq n_{\sigma}^* (\tilde{n}_{\sigma} < n_{\sigma}^*) \) the Incumbent believes that \( Pr(\emptyset|\tilde{n}_{\sigma}) > \frac{1}{2} \) \( Pr(\emptyset|\tilde{n}_{\sigma}) < \frac{1}{2} \) and implements the policy \( \sigma \) \( \emptyset \). Similarly if the Incumbent observes any number \( \tilde{n}_{\sigma} \) of signals \( \phi \) he will mix between the two policies \( \sigma \) and \( \emptyset \) with any positive probability.

It is simple to show that these out-of-equilibrium beliefs sustain the equilibrium seen above. In fact, provided that the Incumbent behaves on the off-the-equilibrium path in the same way as he behaves when he observes equilibrium signals, and given that citizen’s utility from reading the newspaper is influenced only by the signal he has observed privately, then he will not change his reading behaviour by buying a newspaper carrying a signal different from the one he has privately observed, as this will give him a utility
inferior to the newspaper price. Therefore, the middle class citizen will never change his
newspaper buying decision and will never deviate from the equilibrium described.

As the last step of this proof one needs to consider what happens when the newspaper
\( j = \bar{\sigma} \) is on offer and \( p_{j=\bar{\sigma}} > \bar{c} \). In this case the equilibrium strategies are that nobody
buys the newspaper, given the preferences of the citizens \( \hat{\sigma}_{\sigma \in \{\sigma, \bar{\sigma}\}} \) towards the newspaper
on offer or the fact that the utility the \( \hat{\sigma} \) citizen receives from reading the newspaper
\( j = \bar{\sigma} \) is less than the price he has to pay for it. Since the incumbent does not observe
any signal, or, equivalently, he observes that zero copies of the newspaper \( j = \bar{\sigma} \) are sold
\( (n_{\bar{\sigma}} = 0) \) this means that \( P_{r}(\bar{\sigma}|N_{\bar{\sigma}}) = P_{r}(\bar{\sigma}) = \frac{1}{2} \), where \( N_{\bar{\sigma}} \) is the number \( N \) of empty
signals, where for the Incumbent receiving an empty signal is the same as receiving no
signal at all.

In fact:

\[
Pr(\bar{\sigma}|N_{\bar{\sigma}}) = \frac{Pr(N_{\bar{\sigma}}|\bar{\sigma})Pr(\bar{\sigma})}{Pr(N_{\bar{\sigma}}|\bar{\sigma})Pr(\bar{\sigma}) + Pr(N_{\bar{\sigma}}|\bar{\sigma})Pr(\bar{\sigma})} = \\
= \frac{\frac{N_{\bar{\sigma}}}{N_{\bar{\sigma}0}}(1 - q - q')(N_{\bar{\sigma}})(q + q')^{0 \frac{1}{2}}}{\frac{N_{\bar{\sigma}}}{N_{\bar{\sigma}0}}(1 - q - q')(N_{\bar{\sigma}})(q + q')^{0 \frac{1}{2}} + \frac{N_{\bar{\sigma}}}{N_{\bar{\sigma}0}}(1 - q - q')(N_{\bar{\sigma}})(q + q')^{0 \frac{1}{2}}} = \\
= \frac{(1 - q - q')(N_{\bar{\sigma}})^{1 \frac{1}{2}}}{(1 - q - q')(N_{\bar{\sigma}})^{1 \frac{1}{2}} + (1 - q - q')(N_{\bar{\sigma}})^{1 \frac{1}{2}}} = \frac{\frac{1}{2}}{1} = \frac{1}{2} \\
(4.6)
\]

So I have shown that in the case the Media Tycoon has produced a single Broadsheet
\( j \in \{\bar{\sigma}, \bar{\sigma}\} \), there is a separating equilibrium where all the citizens who have received
a signal equal to the one printed in the only newspaper produced buy a copy of the
newspaper, while the others do not.

Now one needs to derive the equilibrium strategy and beliefs when the Media Tycoon
has produced a Tabloid. The following holds:

**Lemma 19** There exists an (separating) equilibrium where Middle Class citizens in \( t = 3 \) buy the produced Tabloid if and only if they have received the signal printed on the
newspaper and the newspaper’s price is less than the utility the citizens receive from consuming it.

Proof. Regarding the \( j = \phi \) newspaper, assume that the equilibrium strategy is such that each \( \hat{i}_\phi \) buys the newspaper \( j = \phi \), while each \( \hat{i}_\sigma \in \{\overline{\sigma}, \underline{\sigma}\} \) does not buy it. Assuming that there are \( n_\phi \) such citizens buying the newspaper \( j = \phi \) it is straightforward to compute the following equilibrium beliefs:

\[
Pr(\overline{\theta}|n_\phi, N - n_\phi) = \frac{Pr(n_\phi, N - n_\phi|\overline{\theta})Pr(\overline{\theta})}{Pr(n_\phi, N - n_\phi|\theta)Pr(\theta) + Pr(n_\phi, N - n_\phi|\overline{\theta})Pr(\overline{\theta})} =
\]

\[
= \frac{\sum_{\theta} N! \theta^N \phi^{N-n_\phi} (1-q-\phi)^{N-n_\phi} \phi^{N-n_\phi} + \sum_{\overline{\theta}} N! \overline{\theta}^N \phi^{N-n_\phi} (1-q-\phi)^{N-n_\phi} \phi^{N-n_\phi}}{
\sum_{\theta} N! \theta^N \phi^{N-n_\phi} (1-q-\phi)^{N-n_\phi} \phi^{N-n_\phi} + \sum_{\overline{\theta}} N! \overline{\theta}^N \phi^{N-n_\phi} (1-q-\phi)^{N-n_\phi} \phi^{N-n_\phi}}
= \frac{1}{2}
\]

This means that if a \( j = \phi \) newspaper gets produced, then for any number of copies bought by \( \hat{i}_\phi \) citizens, this is never informative about the state of the world, since the posterior on the state of the world \( \overline{\theta} \) is equal to the prior.

Knowing this I now derive citizens’ equilibrium strategy regarding buying newspaper \( j = \phi \). Each \( \hat{i}_\sigma \in \{\overline{\sigma}, \underline{\sigma}\} \) citizen, after receiving the private signals \( \sigma \in \{\bar{\sigma}, \phi, \underline{\sigma}\} \), only looks at his preferences towards the Tabloid. This means that each \( \hat{i}_\sigma \in \{\overline{\sigma}, \underline{\sigma}\} \) never buys the Tabloid \( j = \phi \) since he does not receive any (strictly) positive utility from reading it and he would have to bear a (strictly) positive cost \( p_\phi > 0 \) if he were to buy it. On the other hand, any citizen \( \hat{i}_\phi \) always buys the the Tabloid \( j = \phi \), as long as \( \overline{\sigma} \geq p_\phi \). Conversely, given that some citizens buy the newspaper \( j = \phi \), they must be \( \hat{i}_\phi \) citizens whose utility from reading the Tabloid \( \overline{\sigma} \) is more than their price \( p_\phi \). In fact all the other citizens do not read the Tabloid, either because they are \( \hat{i}_\sigma \in \{\overline{\sigma}, \underline{\sigma}\} \) or because are \( \hat{i}_\phi \) citizens with \( \overline{\sigma} < p_\phi \).

Finally, in order to sustain the equilibrium, the following out-of-equilibrium-beliefs can be devised. Given that the equilibrium belief is equal to \( n_\phi \), if the Incumbent observes any number \( \bar{n}_\phi \) of signals \( \phi \), then he knows that the state of the world is \( Pr(\overline{\theta}|n_\phi, N - n_\phi) = \frac{1}{2} \) and therefore mixes between the two policies with any probability. Similarly to the out-of-equilibrium-beliefs devised in Lemma 18, I assume that if the Incumbent observes any number \( \bar{n}_\sigma \) of signals \( \sigma \in \{\overline{\sigma}, \underline{\sigma}\} \) he will adopt any policy he believes to be
optimal, contingent on the “true” state of the world. In order not to allow “crazy” beliefs, I assume that if \( n^*_\sigma(n^*_\sigma) \) is the minimum number of signals to convince the Incumbent that the “true” state of the world is \( \theta \), then if \( \tilde{n}_\sigma \geq n^*_\sigma \) the Incumbent believes that \( Pr(\theta|\tilde{n}_\sigma) > \frac{1}{2} \left(Pr(\theta|\tilde{n}_\sigma) > \frac{1}{2}\right) \) and implements the policy \( \pi(u) \).

Nevertheless these out-of-equilibrium beliefs sustain the equilibrium seen above. In fact, provided that the Incumbent behaves on the off-the-equilibrium path in the same way as he behaves on the equilibrium path, and given that citizen’s utility from reading the newspaper is influenced only by the signal he has observed privately, then he will not change his reading behaviour by buying a newspaper carrying a signal different from the one he has privately observed, as this will give him a utility inferior to the newspaper price. Therefore, the middle class citizen will never change his newspaper buying decision and will never deviate from the equilibrium described. 

Putting together the Lemma 18 and the Lemma 19, the following holds:

**Proposition 20** In \( t = 3 \) there exists an equilibrium where Middle Class citizens buy the produced newspaper if and only if they have privately observed the same signal printed on the newspaper and the price they pay for buying it is less than the utility they derive from reading it.

**Proof.** The proof follows immediately by considering the two Lemmata previously proved. In fact Lemma 18 shows that, provided a Broadsheet \( j = \sigma(\sigma) \) is produced and available to consumers, then all the Middle Class citizens who have privately observed the signal \( \sigma(\sigma) \) buy the newspaper, while the other do not. Likewise Lemma 19 shows that when a Tabloid (i.e. an uninformative newspaper with a \( \phi \) printed signal) is produced, the Middle Class citizens buy the newspaper if and only if they have privately observed the signal \( \phi \). The above behaviour holds as long as the price the citizens pay to buy the newspaper is less than the utility they derive from reading it.

Therefore, one can conclude that the same behaviour holds for all the Middle Class citizens, for any signal they receive and any newspaper available to them, provided that
The previous Proposition has shown that there exists a unique separating equilibrium where each Middle Class citizen buys the produced newspaper if and only if that newspaper has printed a signal coherent with his preferences, and therefore with the signal he has privately observed, as long as reading the newspaper is “enjoyable” enough. Otherwise citizens do not buy the newspaper if their preferences do not find an outlet to be represented or expressed.

Crucially this consuming behaviour has an important informative content. In fact the reading behaviour shown in Proposition (20) means that an external observer (in particular the Incumbent) can be sure that the quantity of newspapers bought by the citizens is informative about the number of signals they have received and, as a consequence, about the “true”, underlying, state of the world. As a consequence, apart from revealing the tastes of the polity regard the newspaper types, the demand for newspaper can be of great value for learning something more about the state of the world that the Incumbent does not already know.

The existence of the unique equilibrium in the citizens’ behaviour allows to derive the minimum number of signals $\sigma$ ($\sigma$) such that, upon observing it, the Incumbent believes that the state of the world $\overline{\theta}$ is more likely than $\overline{\theta}$. Needless to say this additional knowledge derived purely from the citizens’ reading behaviour has an important effect on policy implementation, as the following Proposition shows:

**Corollary 21** Upon observing a number of signals $n_\sigma > \frac{\log_{\theta'}(\frac{1+\theta'}{1-\theta'})}{1+\log_{\theta'}(\frac{1+\theta'}{1-\theta'})}$, the Incumbent believes that the state of the world $\overline{\theta}$ is more likely than the state of the world $\overline{\theta}$ and therefore he implements the policy $\overline{\alpha}$ with probability one. Likewise if the Incumbent observes $n_\sigma > \frac{\log_{\theta'}(\frac{1+\theta'}{1-\theta'})}{1+\log_{\theta'}(\frac{1+\theta'}{1-\theta'})}$, he implements the policy $\overline{\alpha}$ with probability one.

**Proof.** Let $n_\sigma$ be the minimum number of signals $\sigma$ such that, upon observing it, an external observer believes that the probability of $\overline{\theta}$ is larger than $\frac{1}{2}$. Formally, given
\[ Pr(\bar{\theta}|n^*_\alpha, N - n^*_\alpha) \], by applying the Bayes's rule it follows simply that:

\[
Pr(\bar{\theta}|n^*_\alpha, N - n^*_\alpha) = \frac{\frac{N!}{(n^*_\alpha)!(N-n^*_\alpha)!}q^{n^*_\alpha}(1-q)^{N-n^*_\alpha}}{\frac{N!}{(n^*_\alpha)!(N-n^*_\alpha)!}q^{n^*_\alpha}(1-q)^{N-n^*_\alpha} + \frac{N!}{(n^*_\alpha)!(N-n^*_\alpha)!}(q')^{n^*_\alpha}(1-q')^{N-n^*_\alpha}} \]

(4.7)

After some simple algebra the previous formula reduces to:

\[
q^{n^*_\alpha}(1-q)^{N-n^*_\alpha} \geq \frac{1}{2}. \]

Now it suffices to see when:

\[
q^{n^*_\alpha}(1-q)^{N-n^*_\alpha} \geq \frac{1}{2}. \]

By multiplying out the denominator of the LHS, and simplifying terms, one obtains that:

\[
q^{n^*_\alpha}(1-q)^{N-n^*_\alpha} \geq \frac{1}{2}. \]

Apply then the increasing monotonic function to both sides of the inequality and obtain that:

\[
log_q/q' \geq \log_{q'/q'} \frac{1}{2} \]

and solve finally conclude that:

\[
n^*_\alpha \geq \frac{\log_{q'/q'} \frac{1}{2}}{1 + \log_{q'/q'} \frac{1}{2}} N. \]

Therefore when:

\[
log_{q'/q'} \frac{1}{2} N \leq N_0, \]

if the Incumbent observes the number of newspapers \( \tilde{n}_\alpha \) is greater or equal to \( n^*_\alpha \), he updates his posterior beliefs and infers that the probability of the state of the world being \( \bar{\theta} \) is larger than \( \frac{1}{2} \). Since \( Pr(\bar{\theta}|\tilde{n}_\alpha, N - \tilde{n}_\alpha) > \frac{1}{2} \), the Incumbent politician will implement the policy \( \pi \) with probability one. Of course if:

\[
\tilde{n}_\alpha < n^*_\alpha, \]

then \( Pr(\bar{\theta}|\tilde{n}_\alpha, N - \tilde{n}_\alpha) < \frac{1}{2} \) and the Incumbent politician implements \( \bar{\alpha} \) with probability one. Instead when:

\[
log_{q'/q'} \frac{1}{2} N \in N_0, \]

and \( \tilde{n}_\alpha = n^*_\alpha, Pr(\bar{\theta}|n^*_\alpha, N - n^*_\alpha) = \frac{1}{2} \) and the Incumbent mixes between policies with any non negative probability. Of course when:

\[
\tilde{n}_\alpha > n^*_\alpha, \]

since \( Pr(\bar{\theta}|\tilde{n}_\alpha, N - \tilde{n}_\alpha) > \frac{1}{2} \), the Incumbent politician will implement the policy \( \bar{\pi} \) with probability one.

A similar discussion can be made if a Broadsheet \( j = \alpha \) is produced. It is easy to see that:

\[
Pr(\bar{\theta}|n^*_\alpha, N - n^*_\alpha) = \frac{Pr(n^*_\alpha, N - n^*_\alpha|\bar{\theta})Pr(\bar{\theta})}{Pr(n^*_\alpha, N - n^*_\alpha|\bar{\theta})Pr(\bar{\theta}) + Pr(n^*_\alpha, N - n^*_\alpha|\bar{\theta})Pr(\bar{\theta})} = \frac{\frac{N!}{(n^*_\alpha)!(N-n^*_\alpha)!}q^{n^*_\alpha}(1-q)^{N-n^*_\alpha}}{\frac{N!}{(n^*_\alpha)!(N-n^*_\alpha)!}q^{n^*_\alpha}(1-q)^{N-n^*_\alpha} + \frac{N!}{(n^*_\alpha)!(N-n^*_\alpha)!}(q')^{n^*_\alpha}(1-q')^{N-n^*_\alpha}} \]

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is the same expression as in eq. (4.7), apart from having \( n_{\bar{z}}^* \) instead of \( n_{\pi}^* \). This means that, without further calculation, it is possible to conclude that the minimum number of signals \( n_{\bar{z}}^* \) to be observed in equilibrium by the Incumbent to convince him that the state of the world \( \theta \) is more likely than the state of the world \( \bar{\theta} \) is

\[
\left( \frac{\log \theta / \phi \left( 1 - \phi \right)}{1 + \log \theta / \phi \left( 1 - \phi \right)} \right) N.
\]

Now it remains to analyse what happens in \( t = 2 \), i.e. at the newspaper production decision stage on part of the Media Tycoon (MT). Remember that the MT does not have any interest in which policy is adopted by the Incumbent. Therefore in the following discussion I focus on the entrepreneur’s decision, considering the expected profit he can obtain from the newspaper production only.

The problem the MT is facing is the following: knowing the probability distribution of signals among the Middle Class citizens, he has to estimate the demand for each newspaper type, and then he has to decide whether to produce a Tabloid (\( j = \phi \)) or a Broadsheet newspaper (\( j \in \{ \pi, \phi \} \)). In this latter case, the MT has to decide which policy side of the debate he wants to give a channel to. Remember that the MT knows that each reader’s utility is \( u_{i}(j|\sigma) = \pi \), for each \( j \in \{ \pi, \phi \} \) and for each \( i \in M \) group iff \( j = \sigma \), while \( u_{i}(j|\sigma) = 0 \) iff \( j \neq \sigma \). Therefore he has to estimate the demand for each newspaper \( j \in \{ \pi, \phi \} \) in order to be able to maximise his profit, knowing that the newspaper demand will depend on the realisation of a random variable, that is the probability describing the signal distribution.

While in a context of certainty there is no difference in maximising the expected profit with respect to price or with respect to quantity, this equivalence does not hold necessarily when a random demand is considered. In fact when one looks at the quantity of goods delivered by the MT, it might be that the production is smaller (larger) than the quantity demanded and bought by consumers. For instance the production might be less than what will be demanded and consumed at market prices, because the demand has experienced an unexpected peak. On the other hand, it might be that the production is larger than what will be actually bought and consumed because there is an unanticipated change in consumers’ tastes or a slowdown in the economy that makes that good less
consumed than it used to be. In cases like the previous ones it is necessary for the MT to decide the right instrument to use in order to maximise his expected profit. In particular, whether price or quantity is the correct instrument to use.

Following Leland (1972) and Harris and Raviv (1981) I assume that, if there is no production capacity constraint in the newspaper industry and if the quantity actually demanded is revealed after the price is decided, then it is optimal to maximize expected profit with respect to quantity. Regarding the first assumption, it seems coherent with casual observation and anecdotal evidence that supplementary newspaper production can be easily carried out if the market experiences additional and unexpected demand.\(^8\) On the other hand, unsold copies of newspapers can be (almost at no cost) freely disposed of. Regarding the second assumption, it seems natural to assume that the price is decided before the quantity is produced and sold, given that the newspaper price is known both to MT and customers before both consumers and MT know if and how many citizens will buy the paper.

After this discussion I can now derive the expression for the Expected Profit \(\Pi_j^E\) for each newspaper \(j \in \{\sigma, \phi, \alpha\}\):

**Lemma 22** The expected profit of producing a Broadsheet newspaper is the same regardless of the policy option the newspaper supports and it is equal to \((\bar{c} - \underline{c}) \frac{1}{2} N(q + q') - \overline{F}\), while the expected profit of producing a Tabloid is equal to \((\bar{c} - \underline{c}) N(1 - q - q') - \overline{F}\).

**Proof.** First one needs to derive the demand curve for any newspaper. I start with the \(j = \sigma\) Broadsheet and then similarly I derive the expression for the other newspapers.

It is straightforward to see that the inverse demand curve for the newspaper \(j = \sigma\) is constant for any level of newspaper production \(y_{j=\sigma}\). This follows easily from the fact

\(^8\)For instance think of a second edition of a newspaper whenever the readership is larger than anticipated. Or think of a special edition of national newspaper that can be printed and sold few hours after some extraordinary and unexpected event has happened, like the death of J.F.K. or Lady D.
that each of the middle class citizen has the same willingness to pay for the newspaper.

Therefore: \( P(Q_j=\sigma) = p_{j=\sigma}(y_j=\sigma) = \bar{c} \). Having established this, the expected profit expression \( \Pi^E_{j=\sigma} \) for the \( j = \sigma \) Broadsheet can now be written as:

\[
\Pi^E_{j=\sigma} = E_{y_j=\sigma}[p_{j=\sigma}(y_j=\sigma) * y_j=\sigma - C(y_j=\sigma)] = E_{y_j=\sigma}[\bar{c} * y_j=\sigma - c_{j=\sigma}y_j=\sigma - E_{j=\sigma}] = E_{y_j=\sigma}[\bar{c} * y_j=\sigma - \bar{c} * y_j=\sigma - \bar{F}]
\]

where \( E_{y_j=\sigma} \) is the expectation operator with respect to the random newspaper quantity \( y_j=\sigma \). Since the quantities \( \bar{c}, \bar{F}, \bar{\sigma} \) are fixed and do not depend on the realisation of the signals, I can rewrite the expression for the expected profit taking these quantities out of the expectation operator and rewriting \( \Pi^E_{j=\sigma} \) as: \( \Pi^E_{j=\sigma} = (\bar{c} - \bar{\sigma})E_{y_j=\sigma}[y_j=\sigma] - \bar{F} \). It turns out that \( E_{y_j=\sigma}[y_j=\sigma] = E_{y_j=\sigma}[Pr(n_{\sigma}, N - n_{\sigma}[\theta]) = E_{y_j=\sigma}[Pr(n_{\sigma}, N - n_{\sigma}[\tilde{\theta}])Pr(\tilde{\theta}) + Pr(n_{\sigma}, N - n_{\sigma}[\tilde{\theta}])Pr(\tilde{\theta})] = E_{y_j=\sigma}[\frac{N!}{n_{\sigma}!(N-n_{\sigma})!}q^{n_{\sigma}}(1-q)^{N-n_{\sigma}-1}\frac{N!}{n_{\sigma}!(N-n_{\sigma})!}(q')^{n_{\sigma}}(1-q')^{N-n_{\sigma}-1}) = \frac{1}{2}N(q + q') \). Plugging the expression for \( E_{y_j=\sigma}[y_j=\sigma] \) in the expected profit expression, one obtains that:

\[
\Pi^E_{j=\sigma} = (\bar{c} - \bar{\sigma})\frac{1}{2}N(q + q') - \bar{F}
\]

(4.8)

Following the same reasoning as the one above, it can be seen easily that \( \Pi^E_{j=\sigma} \), i.e. the expected profit expression for the \( j = \sigma \) Broadsheet, is the same as the one for \( \Pi^E_{j=\sigma} \). Therefore:

\[
\Pi^E_{j=\sigma} = (\bar{c} - \bar{\sigma})\frac{1}{2}N(q + q') - \bar{F}
\]

(4.9)

Finally the same procedure can be repeated to derive the expression for \( \Pi^E_{j=\phi} \). Again

\[
P(Q_j=\phi) = p_{j=\phi}(y_j=\phi) = \bar{c} \]

and therefore \( \Pi^E_{j=\phi} = E_{y_j=\phi}[p_{j=\phi}(y_j=\phi) * y_j=\phi - C(y_j=\phi)] = \Pi^E_{j=\phi} [\bar{c} * y_j=\phi - \bar{\sigma} * y_j=\phi - \bar{F}] \). Following the same reasoning already seen, the expression of the expected profit of the Tabloid can be rewritten as \( (\bar{c} - \bar{\sigma})E_{y_j=\phi}[y_j=\phi] - \bar{F} \). It is straightforward to derive the expression for \( E_{y_j=\phi}[y_j=\phi] \). In fact \( E_{y_j=\phi}[y_j=\phi] = E_{y_j=\phi}[Pr(n_{\phi}, N - \bar{c} - \bar{\sigma}) \frac{1}{2}N(q + q') - \bar{F} \)
\[ n_{\phi}[\theta] = E_{y_{j=\phi}}[Pr(n_{\phi}, N - n_{\phi}[\bar{\theta}])Pr(\bar{\theta}) + Pr(n_{\phi}, N - n_{\phi}[\bar{\theta}])Pr(\theta)] = \frac{1}{2}N(1 - q - q') + \frac{1}{2}N(1 - q - q') = N(1 - q - q'). \]
Again by plugging the expression for \( E_{y_{j=\phi}}[y_{j=\phi}] \) into the expression for the Tabloid’s expected profit, one obtains that:

\[ \Pi_{j=\phi}^{E} = (\bar{\tau} - \tau)N(1 - q - q') - F \quad (4.10) \]

Having derived the expression for the expected profit of each of the three newspapers that might be produced, the following Proposition highlights the determinants of the production of the Broadsheet instead of the Tabloid in the newspaper production decision stage of the game:

**Proposition 23** In \( t = 2 \) the MT produces a Broadsheet iff the total probability of obtaining signals that are informative on the state of the world \( (\sigma \in \{\bar{\sigma}, \sigma\}) \) instead of blank and uninformative signals \( (\sigma \in \{\phi\}) \) is greater than \( 2/3 \).

**Proof.** Knowing that the citizens willingness to pay is constant to \( \bar{\tau} \) for any quantity and any kind of (produced) newspaper, and having estimated the expected profit for each \( j \in \{\bar{\sigma}, \phi, \sigma\} \) (see Lemma 22), the MT may now decide which type of newspaper it is optimal to produce, depending on the expected profit.

Given expressions in (4.8) and (4.10), it turns out that producing a Broadsheet is optimal iff \( (\bar{\tau} - \tau)\frac{1}{2}N(q + q') - F \geq (\bar{\tau} - \bar{\tau})N(1 - q - q') - F \) or \( \frac{1}{2}(q + q') \geq (1 - q - q') \) from which one obtains that producing a Broadsheet is optimal iff \( q + q' \geq \frac{2}{3} \). 

Finally in \( t = 1 \), signals are sent and in \( t = 0 \) Nature chooses the state of the world with equal probability.

It is interesting to comment on Proposition 23. This Proposition says that the Broadsheet production takes place iff the environment is informative enough. Notice that the informativeness of the environment depends on the sum of the probabilities of “correct” signals (i.e. \( q \)) and “not correct” signals (i.e. \( q' \)). Therefore producing a Broadsheet on part of the MT maximises his expected profit if both \( q \) and \( q' \) are relatively large. This
means that a Broadsheet can be produced even if there is little difference between the probability of “correct” and “wrong” signals (i.e. $q - q'$ is small) as long as both $q$ and $q'$ are large enough (i.e. $q + q'$ is close to 1). Notice also that, whenever a Broadsheet newspaper is produced, if there is no difference in the Broadsheet’s fixed and variable cost or in the utility the citizen derives from either Broadsheet, then the MT is indifferent between the production of any $j \in \{\sigma, \omega\}$.

The next Proposition sums up the characteristics of the equilibrium of this game, focussing on the difference and the tension between the two features one can envisage in the Media. In fact, on one hand the Media can be regarded as any other for-profit enterprise: its fundamental objective is profit maximising. However, on the other hand, it has a considerable and important “social” role, given that favours communication between citizens and Incumbent and increases the probability of optimal policy implementation.

**Proposition 24** The presence of a Broadsheet always enhances the optimal policy decision and increases the total probability of implementing good policies. If producing a Broadsheet is profitable then the improvement of optimal policy making is possible, regardless of the policy side the Broadsheet chooses to support.

**Proof.** I first compute the probability that, given a Broadsheet is produced, the “right” policy contingent on the state of the world is implemented. Focussing on the $j = \sigma$ Broadsheet, this is equal to the cumulative probability that the number of signals $n_{\sigma}$ is larger or equal to $n_{\sigma}^*$, given that the state of the world is $\overline{\sigma}$, plus the cumulative probability that the number of signals $n_{\sigma}$ is less than $n_{\sigma}^*$, given that the state of the world
Therefore the probability of optimal policy implementation is equal to:

\[
Pr(n_\pi \geq n^*_\pi | \bar{\theta}) Pr(\bar{\theta}) + Pr(n_\pi < n^*_\pi | \bar{\theta}) Pr(\bar{\theta}) = \\
\sum_{n_\pi = n^*_\pi}^{N} \frac{N!}{n_\pi!(N-n_\pi)!} q^{n_\pi}(1-q)^{N-n_\pi} \left(1 - \frac{1}{2}\right) + \\
\sum_{n_\pi = 0}^{n^*_\pi-1} \frac{N!}{n_\pi!(N-n_\pi)!} (q')^{n_\pi}(1-q')^{N-n_\pi} \left(1 - \frac{1}{2}\right) = \\
\frac{1}{2} \left( \sum_{n_\pi = n^*_\pi}^{N} \frac{N!}{n_\pi!(N-n_\pi)!} q^{n_\pi}(1-q)^{N-n_\pi} + \sum_{n_\pi = 0}^{n^*_\pi-1} \frac{N!}{n_\pi!(N-n_\pi)!} (q')^{n_\pi}(1-q')^{N-n_\pi} \right) 
\]  
(4.11)

To show that having a Broadsheet increases the probability of implementing the optimal policy contingent on the state of the world, it suffices to compare the eq. (4.11) with the probability of implementing the optimal policy when no Broadsheet is present, i.e. when \( Pr(\bar{\theta}) = Pr(\bar{\theta}) = \frac{1}{2} \). In Corollary 17 it was shown that the probability of implementing the optimal policy in this case is equal to \( \frac{1}{2} \). Therefore it suffices to compute when, if a Broadsheet is produced, eq.(4.11) is greater than \( \frac{1}{2} \). Or, likewise, when

\[
\sum_{n_\pi = n^*_\pi}^{N} \frac{N!}{n_\pi!(N-n_\pi)!} q^{n_\pi}(1-q)^{N-n_\pi} + \sum_{n_\pi = 0}^{n^*_\pi-1} \frac{N!}{n_\pi!(N-n_\pi)!} (q')^{n_\pi}(1-q')^{N-n_\pi} > 1.
\]

Given that

\[
\sum_{n_\pi = 0}^{n^*_\pi-1} \frac{N!}{n_\pi!(N-n_\pi)!} (q')^{n_\pi}(1-q')^{N-n_\pi} = 1 - \sum_{n_\pi = n^*_\pi}^{N} \frac{N!}{n_\pi!(N-n_\pi)!} (q')^{n_\pi}(1-q')^{N-n_\pi}
\]

it follows that eq.(4.11) is greater than \( \frac{1}{2} \), iff

\[
\sum_{n_\pi = n^*_\pi}^{N} \frac{N!}{n_\pi!(N-n_\pi)!} q^{n_\pi}(1-q)^{N-n_\pi} > 1 - \sum_{n_\pi = n^*_\pi}^{N} \frac{N!}{n_\pi!(N-n_\pi)!} (q')^{n_\pi}(1-q')^{N-n_\pi}
\]

is iff

\[
\sum_{n_\pi = n^*_\pi}^{N} \frac{N!}{n_\pi!(N-n_\pi)!} q^{n_\pi}(1-q)^{N-n_\pi} > \sum_{n_\pi = n^*_\pi}^{N} \frac{N!}{n_\pi!(N-n_\pi)!} (q')^{n_\pi}(1-q')^{N-n_\pi}
\]

is always true given it was previously shown that, following the application of Bayes’s rule,

\[
\frac{N!}{n_\pi!(N-n_\pi)!} q^{n_\pi}(1-q)^{N-n_\pi} > \frac{N!}{n_\pi!(N-n_\pi)!} (q')^{n_\pi}(1-q')^{N-n_\pi}
\]

for each \( n_\pi \geq n^*_\pi \). Since

\[\text{To simplify the discussion I assume that } \log_q(\frac{1-q'}{1-q}) \notin \mathbb{N}_0; \text{ see above the implications of this.}\]
\[
\sum_{n_{\sigma} = n_{\bar{\sigma}}}^{N} \frac{N!}{n_{\sigma}!(N-n_{\sigma})!} q^n_{\sigma} (1 - q)^{N-n_{\sigma}}
\] is the sum of \(N - n_{\sigma}^* + 1\) addenda all having the property above, then the thesis follows.

To prove the second part of the Proposition, remember that the improvement in the decision making quality happens when a Broadsheet \(j = \sigma\) gets produced as it has just been shown. This depends, in turn, on the total probability of receiving the signal \(\bar{\sigma}\) being large enough. In fact the MT produces a Broadsheet iff \(q + q' > \frac{2}{3}\) as shown in Proposition 23. Therefore, in this case, the probability of optimal policy implementation is larger than when a Tabloid is produced or when no signal is available. On the other hand, the MT produces a Tabloid if and only if \(q + q' < \frac{2}{3}\). Although a Tabloid is produced in this case, a Broadsheet would be beneficial from the perspective of increasing the probability of optimal policy making. In fact when a Tabloid is produced the probability of optimal policy implementation is equal to \(\frac{1}{2}\) only. Finally the MT is indifferent between producing a Broadsheet and a Tabloid if and only if \(q + q' = \frac{2}{3}\).

Regarding the proof for the \(j = \bar{\sigma}\) Broadsheet, remember from Corollary 21 that \(n_{\bar{\sigma}}^* = n_{\sigma}^*\). It is easy to see that eq. (4.11) can be rewritten in terms of \(n_{\bar{\sigma}}^*\), that is:

\[
Pr(n_{\bar{\sigma}} \geq n_{\bar{\sigma}}^* | \bar{\theta}) Pr(\bar{\theta}) + Pr(n_{\bar{\sigma}} < n_{\bar{\sigma}}^* | \bar{\theta}) Pr(\bar{\theta}) =
\]

\[
\sum_{n_{\bar{\sigma}} = n_{\bar{\sigma}}^*}^{N} \frac{N!}{n_{\bar{\sigma}}!(N-n_{\bar{\sigma}})!} q^n_{\bar{\sigma}} (1 - q)^{N-n_{\bar{\sigma}}} + \sum_{n_{\bar{\sigma}} = 0}^{n_{\bar{\sigma}}^*-1} \frac{N!}{n_{\bar{\sigma}}!(N-n_{\bar{\sigma}})!} (q')^{n_{\bar{\sigma}}} (1 - q')^{N-n_{\bar{\sigma}}} =
\]

\[
\frac{1}{2} \left( \sum_{n_{\sigma} = n_{\sigma}^*}^{N} \frac{N!}{n_{\sigma}!(N-n_{\sigma})!} q^n_{\sigma} (1 - q)^{N-n_{\sigma}} + \sum_{n_{\sigma} = 0}^{n_{\sigma}^*-1} \frac{N!}{n_{\sigma}!(N-n_{\sigma})!} (q')^n_{\sigma} (1 - q')^{N-n_{\sigma}} \right) \quad (4.12)
\]

Given that \(n_{\sigma}^* = n_{\bar{\sigma}}^*\) it is straightforward to conclude that the expression (4.12), describing the probability of optimal policy adoption when a \(j = \bar{\sigma}\) Broadsheet is produced, is the same as the expression in eq. (4.11). This means that producing any Broadsheet is the same in terms of optimal policy implementation. Nevertheless producing any Broadsheet improves the quality of policy making with respect to a Tabloid. \(\blacksquare\)

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It is useful to remark that the possibility for a Broadsheet to be produced depends on the sum of both the probabilities of “right” and “wrong” signals arriving, i.e. on the the total informativeness of the environment. Since the policy quality, i.e. the probability of implementing optimal policy contingent on the state of the world, depends on the Broadsheet being produced, it might happen that, given \( q + q' < \frac{2}{3} \), an increase in \( q \) (i.e. in the probability of signals coherent with the true state of the world) brings about the possibility of the production of a Broadsheet if \( q + q' \) becomes greater than \( \frac{2}{3} \). More counterintuitively, the same could happen when an increase in \( q' \) (i.e. in the probability of signals not coherent with the true state of the world) takes place. In fact, although an increase in \( q' \) makes the signals less precise about the state of the world, it does make possible the production of a Broadsheet. The MT’s decision to supply an informative newspaper for reasons of profit maximisation, in turns, increases the probability of optimal policy implementation.

Surprisingly, it does not matter which of the two policy options the only Broadsheet produced favours or if the side of the policy the Broadsheet supports is the optimal one. In fact, all that matters is that an informative newspaper, i.e. a Broadsheet, gets produced; this will increase the dispersed information the Incumbent can receive, as a consequence, it will increase the probability of optimal policy adoption and the quality of decision making.

To make things clearer, the findings in Proposition 24 can be illustrated with a simple numerical example. Assume that \( N = 100, \ q = 0.45, \ q' = 0.30 \). Given the result in Proposition 23, since \( q + q' = 0.45 + 0.30 = 0.75 > 2/3 \), a Broadsheet is produced by the Media Tycoon. Regarding the probability of implementation of the correct policy, assume that the true state of the world is \( \tilde{\theta} \). In this case, if a Broadsheet \( j = \sigma \) is produced, then it will be bought by \( qN = 45 \) citizens, having observed the signal \( \sigma \). In this case, the critical value \( n^*_{\sigma} = n^*_{\sigma} = \frac{\log_{q'/q}(\frac{1}{1-q'})}{1+\log_{q'/q}(\frac{1}{1-q'})} N = \frac{\log_{0.45/0.30}(\frac{1-0.30}{1-0.45})}{1+\log_{0.45/0.30}(\frac{1-0.30}{1-0.45})} 100 = \frac{\log_{0.5}(0.75)}{1+\log_{0.5}(0.75)} 100 = 38 \).

Furthermore the ex ante probability of optimal policy implementation is \( Pr(n^*_{\sigma} \geq n^*_{\sigma} | \tilde{\theta}) = \)
\[
\sum_{n_{*\sigma} = 38}^{N} \frac{N!}{n_{*\sigma}!(N-n_{*\sigma})!} q^{n_{*\sigma}} (1 - q)^{N-n_{*\sigma}} = \sum_{n_{*\sigma} = 38}^{100} \frac{100!}{n_{*\sigma}!(100-n_{*\sigma})!} 0.45^{n_{*\sigma}} (1 - 0.45)^{N-n_{*\sigma}} = 0.93493
\]

On the other hand, if a Broadsheet \( j = \sigma \) is produced, but the true state of the world is \( \theta = \sigma \), \( n_{*\sigma} = 38 \), the Broadsheet \( j = \sigma \) is produced and bought by \( q'N = 30 \). However, now the ex-ante probability of implementing the policy supported by the \( j = \sigma \) Broadsheet is very low, and it is the following: \( Pr(n_{\sigma} \geq n_{*\sigma}|\theta) = \sum_{n_{*\sigma} = 38}^{N} \frac{N!}{n_{*\sigma}!(N-n_{*\sigma})!} q^{n_{*\sigma}} (1 - q)^{N-n_{*\sigma}} = \sum_{n_{*\sigma} = 38}^{100} \frac{100!}{n_{*\sigma}!(100-n_{*\sigma})!} 0.30^{n_{*\sigma}} (1 - 0.30)^{N-n_{*\sigma}} = 0.05305
\]

Fortunately, the probability of implementing the optimal policy \( a_1 \), contingent on the true state of the world \( \theta \), is just the complementary to 1, that is \( 1 - 0.05305 = 0.94695 \). Again one can see that the optimal policy is implemented almost with certainty, given the presence of a Broadsheet, no matter what is the true state of the world.

It is useful to remark that the properties of the law of large numbers can be seen at work here. In fact, assume that all the previous parameters values remain the same, but \( N = 10 \). Moreover assume that the \( j = \sigma \) Broadsheet is still produced. In this case \( n_{*\sigma} = 4 \) and \( Pr(n_{\sigma} \geq n_{*\sigma}|\theta) = \sum_{n_{*\sigma} = 38}^{N} \frac{N!}{n_{*\sigma}!(N-n_{*\sigma})!} q^{n_{*\sigma}} (1 - q)^{N-n_{*\sigma}} = \sum_{n_{*\sigma} = 4}^{10} \frac{10!}{n_{*\sigma}!(10-n_{*\sigma})!} 0.45^{n_{*\sigma}} (1 - 0.45)^{10-n_{*\sigma}} = 0.73396 \), which is much lower than the previous value 0.93493, obtained with \( N = 100 \).

Similarly, if a Broadsheet \( j = \sigma \) is produced but the true state of the world is \( \theta \), the ex-ante probability of implementing the “wrong” policy \( \overline{a} \) Broadsheet is still low, but larger than in the previous example. In fact it is the following: \( Pr(n_{\sigma} \geq n_{*\sigma}|\theta) = \sum_{n_{*\sigma} = 38}^{N} \frac{N!}{n_{*\sigma}!(N-n_{*\sigma})!} q^{n_{*\sigma}} (1 - q)^{N-n_{*\sigma}} = \sum_{n_{*\sigma} = 4}^{10} \frac{10!}{n_{*\sigma}!(10-n_{*\sigma})!} 0.30^{n_{*\sigma}} (1 - 0.30)^{10-n_{*\sigma}} = 0.35039 \), a value much larger than 0.05305. Likewise, the probability of implementing the optimal policy \( a_\alpha \), contingent on the true state of the world \( \theta \), is just the complementary to 1, that is \( 1 - 0.35039 = 0.64961 \). Again, the optimal policy is implemented with a larger probability than the wrong one, although with much less certainty than in the previous example with \( N = 100 \).
This is an interesting result in this model where citizens make themselves heard and are active in the “public sphere” through a “market” intermediary, rather than directly. This modelling leads to different results from the ones usually reached by the literature on “voice” such as the one by Lohmann (1993) and Lohmann (1994), and reviewed in Piketty (1999). In this literature the possibility of “voice” à la Hirschman (1970), i.e. of citizens expressing their views, preferences, or information in the community they are in, is done through their vote in election or through protests, strikes, petitions and so on. In other words, in this literature, citizens act directly on their own to try and influence the policy decisions of the Incumbent politician. However, to the best of my knowledge, in this literature what happens when there is an institutional intermediary (Media/Newspaper) that gives the citizens the possibility of expressing their views has never been modelled.\textsuperscript{10} Moreover, in this chapter, I have analysed how this institutional intermediary behaves when it allows the citizens to express their views not for free, or because the institution wants to maximise social welfare, but because in doing so the institution gains some profit from it. Instead of a generic institution, I have chosen to model the role of a Media Tycoon and his incentives regarding which newspaper he chooses to produce (Broadsheet or Tabloid). Furthermore I have shown how the choice between the two newspapers, and therefore their editorial content, may favour or hinder the probability of optimal policy implementation. Finally, given the preferences of the MT, the MT always prefers a Broadsheet to be produced since this increases the probability of optimal policy implementation. However, he is indifferent towards which Broadsheet to produce, since the production of either Broadsheet increases the decision making quality in the same way.

\textsuperscript{10}Of course the literature on lobbying is a notable exception to this. However, in that literature, authors model lobbies as groups of citizens (or entrepreneurs) who contribute to an institution having as its only objective the one of influencing the incumbent politician regarding the implementable policy. Since lobbies are "owned" directly by members they represent their preferences, once members have solved their coordination problem. Furthermore lobbies are “not-market” institutions, since they do not have to make a profit, differently from newspaper.
Similarly to Proposition 24, where I have shown that the probability of optimal policy implementation increases when a Broadsheet is produced, one can study the probability of errors in the decision making when either of the two newspaper types is produced:

**Corollary 25**  
The total weighted probability of error in implementing the optimal policy is larger when a Tabloid is produced than when a Broadsheet is produced.

**Proof.** In the Proof of Proposition 24 I have derived the expression for the probability of optimal policy implementation, contingent on the Broadsheet $j = \sigma$ being produced. This is equal to:

$$Pr(n_{\sigma} \geq n^*_{\sigma} | \theta) Pr(\theta) + Pr(n_{\sigma} < n^*_{\sigma} | \theta) Pr(\theta) =$$

$$= \frac{1}{2} \left( \sum_{n_{\sigma}=n^*_{\sigma}}^{N} \frac{N!}{n_{\sigma}!(N-n_{\sigma})!} q^{n_{\sigma}}(1-q)^{N-n_{\sigma}} + \sum_{n_{\sigma}=0}^{n^*_{\sigma}-1} \frac{N!}{n_{\sigma}!(N-n_{\sigma})!} (q')^{n_{\sigma}}(1-q')^{N-n_{\sigma}} \right) \quad (4.13)$$

In the same way as computing eq. (4.13) it is possible to compute the probability of error in the policy implementation. Remember that the statistical theory of hypothesis testing distinguishes two different Error Types: Type I Error and Type II Error. Type I Error is the probability of rejecting a hypothesis which is true, while Type II Error is the probability of accepting (or failing to reject) a hypothesis when the alternative is true (or when one should reject it). In this context, contingent on the $j = \sigma$ being produced, Type I Error is the probability of implementing the policy $\bar{a}$ when the optimal policy is $\bar{a}$. This is equal to:

$$Type I Error : Pr(n_{\sigma} < n^*_{\sigma} | \bar{\theta}) = \sum_{n_{\sigma}=0}^{n^*_{\sigma}-1} \frac{N!}{n_{\sigma}!(N-n_{\sigma})!} (q)^{n_{\sigma}}(1-q)^{N-n_{\sigma}} \quad (4.14)$$
Likewise, the Type II Error is the probability of implementing the policy \(\pi\) when the optimal policy is \(\overline{\pi}\). This is equal to:

\[
Type\ II\ Error : Pr(n_{\sigma} \geq n^*_{\sigma} \mid \theta) = \sum_{n_{\sigma} = n^*_{\sigma}}^{N} \frac{N!}{n_{\sigma}!(N-n_{\sigma})!} (q')^{n_{\sigma}}(1-q')^{N-n_{\sigma}} \quad (4.15)
\]

Again similar expressions for Type I and Type II Errors can be derived when a Broadsheet \(j = \overline{\sigma}\) is produced.

Regarding the Tabloid production, since in this case the Incumbent does not learn anything new about the state of the world, and \(Pr(\theta | n_{\phi}, N - n_{\phi}) = Pr(\theta) = \frac{1}{2}\), the probability of optimal policy implementation is equal to \(\Gamma^*(\pi | \theta)Pr(\theta) + (1 - \Gamma^*(\pi))Pr(\theta) = \Gamma^*(\overline{\pi}) + (1 - \Gamma^*(\overline{\pi}))\frac{1}{2} = \frac{1}{2}\) with \(\Gamma^*(\overline{\pi})\) being the probability of implementing the policy \(\overline{\pi}\). With the Tabloid, the expressions for Type I and Type II Errors become:

\[
Type\ II\ Error : Pr(\text{"implementing policy} \overline{\pi} | \theta) = \Gamma^*(\overline{\pi}) \quad (4.16)
\]

\[
Type\ I\ Error : Pr(\text{"implementing policy} \pi | \theta) = 1 - \Gamma^*(\overline{\pi}) \quad (4.17)
\]

which are indeterminate, given that \(\Gamma^*(\pi) \in [0, 1]\) when \(Pr(\theta) = \frac{1}{2}\). Notice that I have derived the above expressions to make possible comparisons with respect to the previous case of a \(j = \overline{\sigma}\) Broadsheet production.

Although the previous results imply that it is not possible to compute univocally Type I and Type II Errors in policy adoption when an uninformative Tabloid is produced, it is easy to see that having a Tabloid always increases the total probability of error in policy implementation with respect to having a Broadsheet. In fact averaging out eqq. (4.14) and (4.15), one gets that the total error in optimal policy implementation when a \(j = \overline{\sigma}\)
is produced, is equal to the following\footnote{It is useful to repeat that similar expressions can be derived for a \( j = \pi \) Broadsheet.}:

\[
\text{Total Error}_{j=\pi} = \frac{1}{2} \left\{ \sum_{n_{\pi}=0}^{n_{\pi}^*-1} \frac{N!}{n_{\pi}!(N-n_{\pi})!} (q)^n_{\pi} (1-q)^{N-n_{\pi}} + \sum_{n_{\pi}=n_{\pi}^*}^{N} \frac{N!}{n_{\pi}!(N-n_{\pi})!} (q')^n_{\pi} (1-q')^{N-n_{\pi}} \right\}
\]

Regarding the Tabloid instead, averaging out eqn. (4.16) and (4.17), the total error in optimal policy implementation is equal to the following:

\[
\text{Total Error}_{j=\phi} = \frac{1}{2} \left\{ \Gamma(\pi) + 1 - \Gamma(\pi) \right\} = \frac{1}{2}
\]

To show that \( \text{Total Error}_{j=\pi} < \text{Total Error}_{j=\phi} = \frac{1}{2} \), simply one needs to show that

\[
\sum_{n_{\pi}=0}^{n_{\pi}^*-1} \frac{N!}{n_{\pi}!(N-n_{\pi})!} (q)^n_{\pi} (1-q)^{N-n_{\pi}} + \sum_{n_{\pi}=n_{\pi}^*}^{N} \frac{N!}{n_{\pi}!(N-n_{\pi})!} (q')^n_{\pi} (1-q')^{N-n_{\pi}} < 1
\]

But this follows immediately from the fact that:

\[
\sum_{n_{\pi}=0}^{n_{\pi}^*-1} \frac{N!}{n_{\pi}!(N-n_{\pi})!} (q)^n_{\pi} (1-q)^{N-n_{\pi}} + \sum_{n_{\pi}=n_{\pi}^*}^{N} \frac{N!}{n_{\pi}!(N-n_{\pi})!} (q')^n_{\pi} (1-q')^{N-n_{\pi}} = 1
\]

and

\[
\sum_{n_{\pi}=n_{\pi}^*}^{N} \frac{N!}{n_{\pi}!(N-n_{\pi})!} (q')^n_{\pi} (1-q')^{N-n_{\pi}} < \sum_{n_{\pi}=n_{\pi}^*}^{N} \frac{N!}{n_{\pi}!(N-n_{\pi})!} (q)^n_{\pi} (1-q)^{N-n_{\pi}} \quad \text{for each } n_{\pi} \geq n_{\pi}^*
\]

as shown in the Proof of Corollary 21. \( \blacksquare \)

\subsection*{4.3.1 Comparative Statics}

In the previous Section I have derived the equilibrium of the model and highlighted the properties of the two types of newspapers in terms of the probability of implementing the optimal policies and relative errors. Having done this, it is useful now to conduct an exercise of comparative statics. Given the complexity of some of the expressions representing the probability of implementing the optimal policy and the relative errors,
the exercise of comparative statics will be conducted by changing some values of the parameters in those expressions, instead of using calculus. Then I will conjecture that the results found in this way extend to all the range of values for which the expressions are defined.

Of course in the following discussion I consider the Broadsheet only, given that the Tabloid newspaper has no influence on policy implementation. Again I focus on the \( j = \sigma \) Broadsheet but similar expressions can be derived for the \( j = \sigma \) Broadsheet.

**Proposition 26** When a Broadsheet newspaper is produced, whenever \( q, q' \) or \( N \) increase, the minimum number of signals \( n^*_{q'} \) one has to observe in order to implement the optimal policy increases. On the other hand, the probability of implementing the optimal policy increases when \( q \) or \( N \) increase, while it decreases when \( q' \) increases. Regarding errors in optimal policy implementation, both Type I and Type II Error decrease when \( q \) or \( N \) increase, while increase when \( q' \) increases.

**Proof.** First I show what happens to the threshold \( n^*_{q',N}(q, q', N) \) when the value of the parameters changes. Tidious but straightforward algebra shows that:

\[
\frac{\partial n^*_{q',N}(q, q', N)}{\partial q} = \frac{\partial}{\partial q} \left( \ln \left( \frac{\frac{1-q'}{1-q}}{1 + \ln \left( \frac{1-q'}{1-q} \right)} \right) \right) = -1 \cdot \ln \left( \frac{1-q'}{1-q} \right) \left( \frac{1-q'}{1-q} \right) N
\]

It is simple to show that \( \frac{\partial n^*_{q',N}(q, q', N)}{\partial q} > 0 \). In order to prove it, one has to show simply that \( \ln \left( \frac{1-q'}{1-q} \right) < 0 \) for any \( q \) and \( q' \in (0, 1) \). For this to happen, it has to be that \( 0 < \frac{1-q'}{1-q} < 1 \). Showing that \( 0 < \frac{1-q'}{1-q} \) is trivial, since \( q \) and \( q' \in (0, 1) \) by assumption and therefore the expression \( \frac{1-q'}{1-q} \) is positive.

Proving that \( \frac{1-q'}{1-q} < 1 \) is slightly more complicated. First I show necessity, since proving sufficiency is straightforward. Assume \( \frac{(1-q')q'}{(1-q)q} < 1 \) and multiply both sides of the inequality by \( (1-q)q' \). Then expand the result and obtain \( q' - (q')^2 < q - q^2 \). By rewriting the previous expression as \( q^2 - (q')^2 < q - q' \) and factoring the term \( q^2 - (q')^2 \), the expression rewrites as \( (q - q')(q + q') < q - q' \). Simplifying both sides of the inequality by
$q - q' > 0$, it follows that $q + q' < 1$, which is true, for each $q, q'$ given that $1 > q > q' > 0$ by assumption.

Having established necessity, sufficiency follows immediately given that $1 > q > q' > 0$ and $q + q' < 1$.

Similarly one can show that:

$$\frac{\partial n_x^*(q, q', N)}{\partial q'} = \frac{\partial}{\partial q'} \left( \frac{\log_q(q') \left( \frac{1-q'}{1-q} \right) N}{1 + \log_q(q') \left( \frac{1-q'}{1-q} \right)} \right) =$$

$$= \frac{q' \ln(q) - \ln(q' - q)}{1-q'} N - q'(1-q)[\ln(q) + \ln(q')]$$

$$= \frac{q' \ln(q) - (1-q') \ln(q')}{1-q'} N \quad (4.18)$$

To show that $\frac{\partial n_x^*(q, q', N)}{\partial q'} > 0$, given that the denominator is negative, since it is a product of positive factors multiplied by $-1$, it is enough to show that the numerator is negative as well. Therefore one has to prove that $q' \ln(q) - (1-q') \ln(q' - q) < 0$ for any $q$ and $q' \in (0, 1)$.

Again I prove necessity first, and then sufficiency. Assuming that $q' \ln(q) - (1-q') \ln(q' - q) < 0$ one obtains that $\ln(q')^{q'} < \ln(q')^{1-q'}$. By applying the strictly increasing function $e^x$ to both sides of the inequality it follows that $\left( \frac{q}{q'} \right)^{q'} < \left( \frac{1}{1-q} \right)^{1-q'}$. Therefore I need to show that $\left( \frac{q}{q'} \right)^{q'} < \left( \frac{1}{1-q} \right)^{1-q'}$. Observe that, since $q > q'$ and $q + q' < 1$, then it has to be $q' < \frac{1}{2}$. In fact, if not, it would be $q > q' > \frac{1}{2}$ and $q + q' > 1$ which is a contradiction of the hypothesis. Furthermore, since $q' < \frac{1}{2}$, then $q' + q' < 1$ and therefore $q' < 1 - q'$. Moreover, since $\frac{q}{q'} > 1$ and $\frac{1-q'}{1-q} > 1$, given that $\left( \frac{q}{q'} \right)^{q'} < \left( \frac{1}{1-q} \right)^{1-q'}$ it can be either $\frac{q}{q'} < \frac{1-q'}{1-q}$ or $\frac{q}{q'} > \frac{1-q}{1-q}$.

First consider the case when $\frac{q}{q'} < \frac{1-q'}{1-q}$. Since $q' < q$, one can rewrite $q' = q - \varepsilon$, with $\varepsilon > 0$ and “small”. Now substitute $q' = q - \varepsilon$ in the inequality $\frac{q}{q'} < \frac{1-q}{1-q}$. This rewrites
as:

\[
\frac{q}{q'} < \frac{1-q'}{1-q}, \\
\frac{q}{q'} < \frac{1-q + \varepsilon}{1-q}, \\
\frac{q + \varepsilon -\varepsilon}{q - \varepsilon} < \frac{1-q + \varepsilon}{1-q}, \\
1 + \frac{\varepsilon}{q - \varepsilon} < 1 + \frac{\varepsilon}{1-q}, \\
\frac{q - \varepsilon}{q - \varepsilon} < \frac{1-q}{q - \varepsilon}, \\
1 - q < q - \varepsilon, \\
1 + \varepsilon < 2q, \\
q > \frac{1}{2} + \frac{\varepsilon}{2}
\]

Instead, when \(\frac{q}{q'} > \frac{1-q'}{1-q}\), then it follows that it has to be \(q < \frac{1}{2} + \frac{\varepsilon}{2}\). Therefore the inequality \((\frac{q}{q'})^{q'} < (\frac{1-q'}{1-q})^{1-q'}\) holds strictly for any \(q \in (0,1)\setminus\{\frac{1}{2} + \frac{\varepsilon}{2}\}\), with \(\varepsilon\) positive and small.

To prove sufficiency remember that it can be either \(q < \frac{1}{2}\) or \(q > \frac{1}{2}\), but it has to be \(q' < \frac{1}{2}\). First consider the case when \(q > \frac{1}{2}\).

Let \(q = \frac{1}{2} + \varepsilon\) (with \(1 - q = \frac{1}{2} - \varepsilon\)) and \(q' = \frac{1}{2} - \varphi\) (with \(1 - q' = \frac{1}{2} + \varphi\)) with \(0 < \varepsilon < \frac{1}{2}\) and \(0 < \varphi < \frac{1}{2}\) and let \(\varphi < \varepsilon\). From this it follows that \(\varphi^2 < \varepsilon^2\) and \(\frac{1}{4} - \varepsilon^2 < \frac{1}{4} - \varphi^2\) or \((\frac{1}{2} - \varepsilon)(\frac{1}{2} + \varepsilon) < (\frac{1}{2} - \varphi)(\frac{1}{2} + \varphi)\). By cross multiplying the terms, one has that \(\frac{\frac{1}{2} + \varepsilon}{\frac{1}{2} - \varphi} < \frac{\frac{1}{2} + \varphi}{\frac{1}{2} - \varepsilon}\). Given that \(1 < \frac{\frac{1}{2} + \varepsilon}{\frac{1}{2} - \varphi} < \frac{\frac{1}{2} + \varphi}{\frac{1}{2} - \varepsilon}\), and that \(\frac{1}{2} - \varphi < \frac{1}{2} + \varphi\), it follows immediately that \((\frac{\frac{1}{2} + \varepsilon}{\frac{1}{2} - \varphi})^{\frac{1}{2} - \varphi} < (\frac{\frac{1}{2} + \varphi}{\frac{1}{2} - \varepsilon})^{\frac{1}{2} + \varphi}\), for the monotonicity of the power function. By substituting the values for \(q\) and \(q'\) one obtains \((\frac{q}{q'})^{q'} < (\frac{1-q'}{1-q})^{1-q'}\).

Now consider the case when \(q < \frac{1}{2}\) and let \(q = \frac{1}{2} - \varepsilon\) and \(q' = \frac{1}{2} - \varphi\). Since by assumption it has to be \(q > q'\), this holds iff \(q = \frac{1}{2} - \varepsilon > \frac{1}{2} - \varphi = q'\), that is \(\varphi > \varepsilon\). So let \(\varphi > \varepsilon\) and \(\frac{1}{2} + \varphi > \frac{1}{2} + \varepsilon\), from which it follows that \((\frac{1}{2} + \varphi)^2 > (\frac{1}{2} + \varepsilon)^2\). By expanding the binomial and cross multiplying the terms one obtains that \(\frac{\frac{1}{2} + \varphi}{\frac{1}{2} + \varepsilon} > \frac{\frac{1}{2} + \varepsilon}{\frac{1}{2} + \varphi}\).

Now multiply by the same factor \(\frac{\frac{1}{2} + \varepsilon}{\frac{1}{2} - \varepsilon} > 0\) both sides of the inequality and then obtain
that \( \frac{1}{2} + \varepsilon \frac{1}{2} - \varphi > \frac{1}{2} + \epsilon \frac{1}{2} - \frac{1}{2} - \varphi \). Thanks to the monotonicity of the power function, then it follows that:

\[
\left( \frac{1}{2} + \varepsilon \frac{1}{2} - \varphi \right)^{\varphi} < \left( \frac{1}{2} + \varphi \frac{1}{2} - \frac{1}{2} - \varepsilon \right)^{\varphi}
\]

given \( \varphi < 1/2 \). Thanks to some simple algebraic manipulation it is possible to rewrite the previous expression as:

\[
\left( \frac{1}{2} + \varepsilon \frac{1}{2} - \varphi \right)^{\varphi} < \left( \frac{1}{2} + \varphi \frac{1}{2} - \frac{1}{2} - \varepsilon \right)^{\varphi}
\]

\[
\frac{\left( \frac{1}{2} + \varepsilon \frac{1}{2} - \varphi \right)^{\varphi}}{\left( \frac{1}{2} + \varepsilon \frac{1}{2} \right)^{\varphi}} < \frac{\left( \frac{1}{2} + \varphi \frac{1}{2} - \frac{1}{2} - \varepsilon \right)^{\varphi}}{\left( \frac{1}{2} + \varphi \frac{1}{2} \right)^{\varphi}}
\]

\[
\left( \frac{1}{2} - \frac{1}{2} - \varphi \right)^{\frac{1}{2}} \left( \frac{1}{2} - \varepsilon \right)^{\varphi} < \left( \frac{1}{2} + \varphi \frac{1}{2} - \frac{1}{2} - \varepsilon \right)^{\frac{1}{2}} \left( \frac{1}{2} + \varphi \right)^{\varphi}
\]

\[
\left( \frac{1}{2} - \frac{1}{2} - \varphi \right)^{\frac{1}{2} - \varphi} < \left( \frac{1}{2} + \varphi \frac{1}{2} - \frac{1}{2} - \varepsilon \right)^{\frac{1}{2} - \varphi}
\]

(4.19)

By substituting in the above expression \( q = \frac{1}{2} - \varepsilon, q' = \frac{1}{2} - \varphi \) and \( 1 - q = \frac{1}{2} + \varepsilon, 1 - q' = \frac{1}{2} + \varphi \), it follows that the previous inequality is equivalent to:

\[
\left( \frac{q}{q'} \right)^{q'} < \left( \frac{1 - q'}{1 - q} \right)^{1 - q'}
\]

Therefore since I have shown that \( q'ln(\frac{q}{q'}) - (1 - q')ln(\frac{1 - q'}{1 - q}) < 0 \) (numerator of the fraction in eq. (4.18)) for any value where \( q \) and \( q' \) are defined, and that \( -q'(1 - q')ln(\frac{q}{q'}) + ln(\frac{1 - q'}{1 - q}) \) \( < 0 \) (denominator of the fraction in eq. (4.18)) again for any value \( q \) and \( q' \), I can conclude that \( \frac{\partial n^*_q(q,q',N)}{\partial q} > 0 \) for any value where \( q \) and \( q' \) are defined.

Finally, given \( n^*_q = \frac{\log_{q'/q}(\frac{1}{1-k})N}{1+\log_{q'/q}(\frac{1}{1-k})} \), then \( \frac{\partial n^*_q(q,q',N)}{\partial N} > 0 \) as \( \frac{\log_{q'/q}(\frac{1}{1-k})}{1+\log_{q'/q}(\frac{1}{1-k})} \in (0, 1) \).

After computing what happens to the threshold \( n^*_q(q, q', N) \), I am interested in analysing
the comparative statics properties of the optimal policy implementation probability, with respect to \( q, q' \) and \( N \). Remember that the expression of the probability of optimal policy implementation (\( POP \)) is equal to:

\[
POP = Pr(n_{\sigma} \geq n^*_\sigma|\bar{\theta})Pr(\bar{\theta}) + Pr(n_{\sigma} < n^*_\sigma|\bar{\theta})Pr(\bar{\theta}) = \\
= \frac{1}{2} \left( \sum_{n_{\sigma}=n^*_\sigma}^{N} \frac{N!}{n_{\sigma}!(N-n_{\sigma})!} q^{n_{\sigma}}(1-q)^{N-n_{\sigma}} + \sum_{n_{\sigma}=0}^{n^*_\sigma-1} \frac{N!}{n_{\sigma}!(N-n_{\sigma})!} (q')^{n_{\sigma}}(1-q')^{N-n_{\sigma}} \right)
\]

I conjecture that the following comparative statics properties hold:

\[ i) : \frac{\partial POP}{\partial q} > 0 \]
\[ ii) : \frac{\partial POP}{\partial q'} < 0 \]
\[ iii) : \frac{\partial POP}{\partial N} > 0 \]

Instead of computing the partial derivatives of a binomial distribution with respect to the parameters \( q, q' \) and \( N \), I show that the above expressions \( i) \), \( ii) \) and \( iii) \) hold for just one set of parameters \( q, q' \) and \( N \) when the values of this set are changed infinitesimally and then I conjecture that they hold for any value of \( q, q' \) and \( N \).

First I show that, for particular values of the parameters \( q, q' \) and \( N \), when \( q \uparrow \) infinitesimally, then \( Pr(n_{\sigma} \geq n^*_\sigma|\bar{\theta})Pr(\bar{\theta}) \) \( + \) \( Pr(n_{\sigma} < n^*_\sigma|\bar{\theta})Pr(\bar{\theta}) \uparrow \). In fact when \((q, q', N) = (0.205, 0.2, 100)\), then the probability of optimal policy implementation is equal to 0.524838752. However, when \( q \downarrow \), and in particular when \((q, q', N) = (0.305, 0.2, 100)\), then the probability of optimal policy implementation is equal to 0.887234726.

Secondly I show that, again for particular values of the parameters, when \( q' \uparrow \), then \( Pr(n_{\sigma} \geq n^*_\sigma|\bar{\theta})Pr(\bar{\theta}) \) \( + \) \( Pr(n_{\sigma} < n^*_\sigma|\bar{\theta})Pr(\bar{\theta}) \downarrow \). Infact when \((q, q', N) = (0.1, 0.005, 100)\), then the probability of optimal policy implementation is equal to 0.995245123. Instead when \((q, q', N) = (0.1, 0.05, 100)\), and therefore \( q' \uparrow \), then the probability of good policy is equal to 0.83299433.
Finally, for a particular set of parameters \((q, q', N) = (0.1, 0.005, 5)\), I calculate what happens to \(Pr(n_\sigma \geq n^*_\sigma | \theta) Pr(\theta) + Pr(n_\sigma < n^*_\sigma | \theta) Pr(\theta)\) when \(N \uparrow\). In this case the probability of implementing the optimal policy is equal to 0.692379377. However when \(N \uparrow\), for instance \((q, q', N) = (0.1, 0.005, 100)\), then the probability of implementing the optimal policy is equal to 0.995245123. Therefore one can conclude that when \(N \uparrow\) the probability of good policy implementation increases.

Now I analyse the Type I Error (TIE) = \(Pr(n_\sigma < n^*_\sigma | \theta) = \sum_{n_\sigma=0}^{n^*_\sigma-1} \frac{N!}{n_\sigma!(N-n_\sigma)!} (q)^n_\sigma (1 - q)^{N-n_\sigma}\) and I repeat the same exercise of comparative statics for some set of parameters \((q, q', N)\), by changing marginally those parameters values.

First I compute what happens to TIE when \(q \uparrow\). I take the first set of parameters I used to compute the \(\partial POP/\partial q\), that is \((q, q', N) = (0.205, 0.2, 100)\) and I compute the Type I Error which is equal to 0.509784081. If \(q \uparrow\), and in particular \((q, q', N) = (0.305, 0.2, 100)\), then TIE is equal to 0.138055164.

Now I calculate how TIE changes when \(q' \uparrow\). If \((q, q', N) = (0.1, 0.005, 100)\), then TIE = 0.007836487. If \(q' \uparrow\) and \((q, q', N) = (0.1, 0.05, 100)\), then TIE becomes 0.206050862.

Finally, one can easily see how TIE variates when \(N \uparrow\). If \((q, q', N) = (0.1, 0.005, 5)\), then TIE is equal to 0.59049. However with \(N = 100\) and the set of parameter is \((q, q', N) = (0.1, 0.005, 100)\), then TIE = 0.007836487. Therefore Type I Error decreases when \(q\) or \(N\) increase, while increases when \(qt\) increases. Again I conjecture that these results extend to all the sets of parameters \((q, q', N)\) where \(q, q'\) and \(N\) are defined.

As a last exercise I want to show, again for some set of parameters, what happens to the Type II Error (TIIE) when the values of parameters change marginally. When \((q, q', N) = (0.205, 0.2, 100)\), then TIIE = 0.440538415. If \(q\) goes to 0.305 and the set of parameters becomes \((q, q', N) = (0.305, 0.2, 100)\), then the TIIE is equal to 0.087475385.

On the other hand, when \((q, q', N) = (0.1, 0.005, 100)\), then TIE = 0.001673268. However, when \((q, q', N) = (0.1, 0.05, 100)\), then TIIE = 0.127960479.

Finally when \(N\) increases, for instance from 5 to 100, with \((q, q') = (0.1, 0.005)\), then
TIIE goes from 0.024751247 to 0.001673268. Therefore Type II Error decreases when $q$ or $N$ increase, while increases when $qt$ increases. Needless to say, also in this case I conjecture that these comparative statics results extend to all the set of parameters $(q, q', N)$. ■

Asymmetry in the probability of the policy implementation

Remember that the Middle Class is the only one of the three groups of citizens interested in the optimal policy implementation. Instead the other two groups of citizens, Rich and Poor, want their preferred policy implemented, regardless of the true state of the world. Now, contingent on the production of a Broadsheet, I compute the total probability of implementing the policy supported by the Broadsheet, whether this is optimal or not.

I focus my computation on $j = \sigma$ and on the policy $\pi$. In this case the total probability such that the Incumbent implements the policy $\bar{\sigma}$ regardless of the true state of the world is the following:

$$Pr(\bar{\sigma}|\theta) = Pr(n_{\pi} \geq n_{\bar{\sigma}}|\theta)Pr(\bar{\sigma}) + Pr(n_{\pi} \geq n_{\bar{\sigma}}|\bar{\sigma})Pr(\bar{\sigma}) =$$

$$= \sum_{n_{\pi}=n_{\bar{\sigma}}}^{N} \frac{N!}{n_{\bar{\sigma}}!(N-n_{\bar{\sigma}})!}q^{n_{\bar{\sigma}}}(1-q)^{N-n_{\bar{\sigma}}/2} + \sum_{n_{\pi}=n_{\bar{\sigma}}}^{N} \frac{N!}{n_{\bar{\sigma}}!(N-n_{\bar{\sigma}})!}(q')^{n_{\bar{\sigma}}}(1-q')^{N-n_{\bar{\sigma}}/2} =$$

$$= \frac{1}{2} \left( \sum_{n_{\pi}=n_{\bar{\sigma}}}^{N} \frac{N!}{n_{\bar{\sigma}}!(N-n_{\bar{\sigma}})!}q^{n_{\bar{\sigma}}}(1-q)^{N-n_{\bar{\sigma}}} + \sum_{n_{\pi}=n_{\bar{\sigma}}}^{N} \frac{N!}{n_{\bar{\sigma}}!(N-n_{\bar{\sigma}})!}(q')^{n_{\bar{\sigma}}}(1-q')^{N-n_{\bar{\sigma}}} \right) =$$

$$= \frac{1}{2} \sum_{n_{\pi}=n_{\bar{\sigma}}}^{N} \frac{N!}{n_{\bar{\sigma}}!(N-n_{\bar{\sigma}})!}(q^{n_{\bar{\sigma}}}(1-q)^{N-n_{\bar{\sigma}}} + (q')^{n_{\bar{\sigma}}}(1-q')^{N-n_{\bar{\sigma}}}) \quad (4.20)$$

Interestingly it can be proved that the production of the Broadsheet $j = \bar{\sigma}$, rather than of the Tabloid, matters for the probability that the Incumbent implements the policy $\bar{\pi}$ regardless of the state of the world. In fact the following proposition can be shown:

**Proposition 27** When the MT decides to publish the Broadsheet $j = \bar{\sigma}$ there exists some set of parameters such that the probability of implementing the policy $\bar{\pi}$, regardless of the
state of the world, is larger (smaller) than \( \frac{1}{2} \).

**Proof.** Notice that it cannot be decided whether the expression in eq. (4.20) is larger or smaller than 1/2. For this reason I have conducted an analysis with some values to show that \( Pr(\pi|\theta) \) can be either \( > \) or \( < \frac{1}{2} \). For instance with \((q, q', N) = (0.4, 0.32, 100)\) it follows that \( Pr(\pi|\theta) = 0.522714554 \). However with \((q, q', N) = (0.4, 0.385, 100)\) it follows that \( Pr(\pi|\theta) = 0.47684756 \).

The previous Proposition shows that when a Broadsheet is produced, there is some set of parameters such that the implementation of one policy, regardless of whether or not that policy is optimal, happens more (less) often than when a Tabloid is produced. In this sense there is a sort of asymmetry in the policy implementation depending on which newspaper type the MT decides to produce: one policy may be adopted more (less) often than the other when the Broadsheet campaigning for that policy option is produced instead of the Tabloid. All this could be exploited by either of the two groups interested in implementing the policy they favour, if they manage to induce the MT to produce the campaigning newspaper which supports the same policy that benefits them. In order to do so, the role of so called “ideological readers”, i.e. citizens that read the newspaper supporting the policy they like, may become crucial. I investigate this in the following section.

To conclude this section, given the existence of both \( n^*_\sigma \) and \( n^*_\varphi \) and the fact that \( n^*_\sigma = n^*_\varphi \), a Proposition similar to Proposition 27 can be stated and proved also for \( j = \sigma \) and \( a \).

**Proposition 28** When the MT decides to publish the Broadsheet \( j = \sigma \) there exists some set of parameters such that the probability of implementing the policy \( a \) regardless of the state of the world is larger (smaller) than \( \frac{1}{2} \).

**Proof.** Similar to the proof of Proposition 27. \( \blacksquare \)
4.4 The Role of Ideology

In Proposition 27 I have shown that, conditional on producing the Broadsheet newspaper \( j = \sigma \), there is a non-empty set of parameters such that the cumulative probability of implementing the policy \( \pi \) is larger (smaller) than \( \frac{1}{2} \), regardless of the state of the world. So it is clear that, for some parameters, producing one Broadsheet rather than the other favours the group who is benefitted by the policy the produced Broadsheet supports. In fact, in this parameter space, the policy is implemented with an ex-ante probability greater than \( \frac{1}{2} \), larger than the probability with which that policy is adopted when the MT produces a Tabloid.

To clarify, focus on \( j = \sigma \) (again the results for the Broadsheet \( j = \sigma \) are similar). Poor citizens are interested in the implementation of the policy \( \sigma \), as they benefit from \( \pi \) more than they do from \( \sigma \), regardless of the true state of the world. Remember that the polity is made of \( \hat{N} \) citizens of whom Rich citizens are \( N_R = \hat{p}\hat{N} \), Poor citizens are \( N_P = \hat{p}\hat{N} \) while the remaining \( N_M = N = (1 - \hat{p} - \hat{p})\hat{N} \) are citizens belonging to the Middle Class. So far in the chapter I have made the assumption that no citizen belonging to \( N_R \) or \( N_P \) buys any newspaper, while the number of individuals belonging to the Middle Class buying a newspaper depends on the realisation of signals. Now I assume that, together with the citizens belonging to the Middle Class, there is a fraction of the other two groups \( \gamma_k \in [0, 1] \) with \( k \in [R, P] \) who buy the newspaper supporting the policy preferred by that group, regardless of the signal on the state of the world. I call this the “partisan readers”, i.e. citizens who read the Broadsheet if and only if it supports the policy they benefit from, provided that the utility they derive from reading is larger than the price they pay for buying the newspaper. Therefore a fraction \( \gamma_p \) of Poor citizens buy the newspaper \( j = \sigma \) if that is available, while a fraction \( \gamma_R \) of Rich citizens buy the newspaper \( j = \sigma \) if it is produced. The complementary fraction \( 1 - \gamma_k \), \( k \in [R, P] \) reads a Tabloid instead, again provided that the utility they derive from
reading is larger than the price they pay for buying the newspaper.\footnote{12}

So if a Rich individual is a partisan reader, his utility is equal to \( u_i(j, a) = \tau + u_i(a|\theta) + u_i(j|\sigma) \) with \( u_i(j) = \tau \) when \( j = \sigma \), for any \( \sigma \in \{\sigma, \phi, \varnothing\} \) the Rich observe privately and \( u_i(\varnothing|\theta) > 0 = u_i(\pi|\theta) \), for any \( \theta \in \Theta \). Instead if a Rich individual is not a partisan reader his utility is equal to \( U_i(r, a, j) = \tau + u_i(a|\theta) + u_i(j|\sigma) \), with \( u_i(j) = \tau \) when \( j = \phi \), for any \( \sigma \in \{\sigma, \phi, \varnothing\} \) and \( u_i(\varnothing|\theta) > 0 = u_i(\pi|\theta) \). Similarly if a Poor individual is a partisan reader, his utility is equal to \( U_i(m, a, j) = \tau + u_i(a|\theta) + u_i(j|\sigma) \) with \( u_i(j) = \tau \) when \( j = \sigma \), for any \( \sigma \in \{\sigma, \phi, \varnothing\} \) the Poor observe privately and \( u_i(\varnothing|\theta) > 0 = u_i(\pi|\theta) \), for any \( \theta \in \Theta \). On the other hand if a Poor individual is not a partisan reader his utility is equal to \( U_i(m, a, j) = \tau + u_i(a|\theta) + u_i(j|\sigma) \), with \( u_i(j) = \tau \) when \( j = \phi \), for any \( \sigma \) and \( u_i(\varnothing|\theta) > 0 = u_i(\pi|\theta) \), for any \( \theta \in \Theta \). Likewise, if a Rich individual is not a partisan reader his utility is equal to \( u_i(r, a, j) = r + u_i(a|\theta) + u_i(j|\sigma) \), with \( u_i(j) = \tau \) when \( j = \phi \), for any \( \sigma \) and \( u_i(\varnothing|\theta) > 0 = u_i(\pi|\theta) \), for any \( \theta \in \Theta \).

In order to simplify the signaling game and to focus on the MT’s productive decision when the newspaper readership is made of both partisan and Middle Class non-partisan readers, I assume that the Incumbent politician is able to distinguish between the two groups of readers. Technically, in order for this to be true, it is sufficient that the fraction of partisan readers \( \gamma_k, k \in [R, P] \) is common knowledge. This means that if the Incumbent observes that the number of copies of Broadsheet bought is larger than \( \gamma_k \), he knows that the additional readers come from the middle class readership. Given the reading behaviour of Middle Class citizens, this is again informative of the underlying state of the world, as it was shown in the previous Section.

Thanks to the presence of the partisan readers, the Proposition 23 is modified accordingly:

**Proposition 29** The MT produces a Broadsheet supporting the policy favourable to the Poor (Rich) instead of a Tabloid, iff the total probability of obtaining signals informative

\footnote{12}{An alternative assumption would be that the complementary fraction \( 1 - \gamma_k \) does not read any newspaper. In this case the results would be qualitatively similar to the ones in Lemma (29).}
on the state of the world is greater than 

\[
\frac{2}{3}\left[1 + \frac{1 - \gamma_{R}^2 + (1 - 2\gamma_{R})p}{1 - p - p}\right] - \left(\frac{2}{3}\left[1 + \frac{1 - \gamma_{R}^2 + (1 - 2\gamma_{R})p}{1 - p - p}\right]\right).
\]

Moreover, conditional on producing a Broadsheet, the MT produces the Broadsheet having the larger number of partisan readers.

**Proof.** To prove the Proposition above, first I rewrite the expression for the expected profit of the \( j = \sigma \) Broadsheet. This is equal to \( \Pi_{j=\sigma}^E = E_{y_{j=\sigma}}[p_{j=\sigma}(y_{j=\sigma}) * y_{j=\sigma} - C(y_{j=\sigma})] \). Remember that \( y_{j=\sigma} \) is the number of copies of the \( j = \sigma \) newspaper produced and bought. Now this number \( y_{j=\sigma} \) is made up by a random variable, i.e. the number of copies bought by the Middle Class citizens \( (y_{j=\sigma}^{MC}) \) depending on the signals observed by the Middle Class citizens, and by a fixed quantity, the fraction \( \gamma_{p}p\tilde{N} \), i.e. the number of Poor partisan readers. Extending the reasoning of the proof in Lemma 22 it is possible to see that the inverse demand function for the newspaper \( j = \sigma \) is constant for any level of newspaper production \( y_{j=\sigma} \). This follows from the fact that each of the Poor partisan readers has the same willingness to pay for the newspaper, which is, in turn, equal to Middle Class citizens willingness to pay for the newspaper. Therefore one can conclude that: \( P(Q) = p_{j=\sigma}(y_{j=\sigma}) = \pi \).

Now I can rewrite \( \Pi_{j=\sigma}^E \) as \( E_{y_{j=\sigma}}[p_{j=\sigma}(y_{j=\sigma}^{MC}) * y_{j=\sigma}^{MC} - C(y_{j=\sigma}^{MC})] + \pi * \gamma_{p}p\tilde{N} - \pi * \gamma_{p}p\tilde{N} \). By expanding the expected profit expression following the proof in Lemma 22 and remembering that \( N = (1 - p - p)\tilde{N} \), it follows that:

\[
\Pi_{j=\sigma}^E = \frac{1}{2}(\pi - \pi)(q + q')(1 - p - p)\tilde{N} - F + (\pi - \pi) * \gamma_{p}p\tilde{N} =
\]

\[
(\pi - \pi)\tilde{N}[\frac{1}{2}(q + q')(1 - p - p) + \gamma_{p}p] - \tilde{F}
\]

Following the same reasoning as above, it is straightforward to see that the expression for the \( j = \sigma \) Broadsheet’s expected profit is:

\[
\Pi_{j=\sigma}^E = (\pi - \pi)\tilde{N}[\frac{1}{2}(q + q')(1 - p - p) + \gamma_{p}p] - \tilde{F}
\]

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I can also compute the expression for the Tabloid’s expected profit. Given the assumption that non-partisan readers read the Tabloid instead of a Broadsheet and they have a willingness to pay equal to \( \bar{c} \), this becomes:

\[
\Pi^E_{\bar{c} = \phi} = (\bar{c} - \bar{c})\hat{N}[(1 - q - q')(1 - \bar{p} - \bar{p}) + (1 - \gamma_R)\bar{p} + (1 - \gamma_P)\bar{p}] - F
\]

Now it is possible to prove the Proposition above. For the necessary part, first assume that for the MT producing the Broadsheet \( j = \bar{c} \) is more profitable than producing the Tabloid and then derive the condition(s) implied by this. To do so, compare the expected profit of a \( j = \bar{c} \) Broadsheet with the expected profit of a Tabloid. Producing the \( j = \bar{c} \) Broadsheet rather than a Tabloid is optimal only if the following holds:

\[
\Pi^E_{\bar{c} = \bar{c}} \geq \Pi^E_{\bar{c} = \phi}
\]

\[
(\bar{c} - \bar{c})\hat{N}\left[\frac{1}{2}(q + q')(1 - \bar{p} - \bar{p}) + \gamma_P\bar{p}\right] - F \geq (\bar{c} - \bar{c})\hat{N}\left[(1 - q - q')(1 - \bar{p} - \bar{p}) + (1 - \gamma_R)\bar{p} + (1 - \gamma_P)\bar{p}\right] - F
\]

\[
(\bar{c} - \bar{c})\hat{N}\left[\frac{1}{2}(q + q')(1 - \bar{p} - \bar{p}) + \gamma_P\bar{p}\right] \geq (\bar{c} - \bar{c})\hat{N}\left[(1 - q - q')(1 - \bar{p} - \bar{p}) + (1 - \gamma_R)\bar{p} + (1 - \gamma_P)\bar{p}\right]
\]

\[
\frac{1}{2}(q + q')(1 - \bar{p} - \bar{p}) + \gamma_P\bar{p} \geq [(1 - q - q')(1 - \bar{p} - \bar{p}) + (1 - \gamma_R)\bar{p} + (1 - \gamma_P)\bar{p}]
\]

\[
\frac{1}{2}(q + q')(1 - \bar{p} - \bar{p}) \geq [(1 - q - q')(1 - \bar{p} - \bar{p}) + (1 - \gamma_R)\bar{p} + (1 - \gamma_P)\bar{p} - \gamma_P\bar{p}]
\]

\[
\frac{1}{2}(q + q') \geq (1 - q - q') + \frac{(1 - \gamma_R)\bar{p} + (1 - 2\gamma_P)\bar{p}}{1 - \bar{p} - \bar{p}}
\]

\[
\frac{1}{2}(q + q') + (q + q') \geq [1 + \frac{(1 - \gamma_R)\bar{p} + (1 - 2\gamma_P)\bar{p}}{1 - \bar{p} - \bar{p}}]
\]

\[
\frac{3}{2}(q + q') \geq [1 + \frac{(1 - \gamma_R)\bar{p} + (1 - 2\gamma_P)\bar{p}}{1 - \bar{p} - \bar{p}}]
\]

\[
q + q' \geq \frac{2}{3} [1 + \frac{(1 - \gamma_R)\bar{p} + (1 - 2\gamma_P)\bar{p}}{1 - \bar{p} - \bar{p}}]
\]

Similarly it is straightforward to derive the condition implied by the fact that producing a \( j = \bar{c} \) Broadsheet is better than producing a Tabloid for the MT. Following the
above derivation, the condition is equal to:

$$
\Pi_{j=\bar{\sigma}}^E \geq \Pi_{j=\bar{\sigma}}^E \iff q + q' \geq \frac{2}{3} [1 + \frac{(1-\gamma_P)\bar{p} + (1-2\gamma_R)\bar{p}}{1-p}] \quad (4.21)
$$

Now to prove the sufficiency part, assume that $q + q' \geq \frac{2}{3} [1 + \frac{(1-\gamma_R)p + (1-2\gamma_P)p}{1-p}]$. It is easy to see that from this it follows that $\frac{1}{2}(q + q') \geq (1 - q - q') + \frac{(1-\gamma_R)p + (1-2\gamma_P)p}{1-p}$ and that $\frac{1}{2}(q + q') \geq (1 - q - q') + \frac{(1-\gamma_R)p + (1-2\gamma_P)p}{1-p}$. From here, by employing some relatively straightforward algebraic manipulations it is easy to conclude that: $\frac{1}{2}(q + q')(1-\bar{p} - \bar{p}) + \gamma_P\bar{p} \leq \left[(1 - q - q')(1 - \bar{p} - \bar{p}) + (1 - \gamma_R)\bar{p} + (1 - \gamma_P)\bar{p}\right]$ and therefore that $(\bar{p} - \bar{p})\bar{N}\left[\frac{1}{2}(q + q')(1-\bar{p} - \bar{p}) + \gamma_P\bar{p}\right] - F \geq (\bar{p} - \bar{p})\bar{N}\left[(1 - q - q')(1 - \bar{p} - \bar{p}) + (1 - \gamma_R)\bar{p} + (1 - \gamma_P)\bar{p}\right] - F$ which is $\Pi_{j=\bar{\sigma}}^E \geq \Pi_{j=\bar{\sigma}}^E$.

Having derived the conditions such that the MT prefers to produce a Broadsheet rather than a Tabloid, I now investigate when the MT finds it optimal to produce a $j = \bar{\sigma}$ Broadsheet rather than a $j = \bar{\sigma}$ Broadsheet. This is true if $[\tau^\top = \bar{\sigma}]$ holds:

$$
\Pi_{j=\bar{\sigma}}^E \geq \Pi_{j=\bar{\sigma}}^E \quad (\bar{p} - \bar{p})\bar{N}\left[\frac{1}{2}(q\bar{p} + q')(1-\bar{p} - \bar{p}) + \gamma_P\bar{p}\right] - F \geq (\bar{p} - \bar{p})\bar{N}\left[\frac{1}{2}(q\bar{p} + q')(1-\bar{p} - \bar{p}) + \gamma_P\bar{p}\right] - F
$$

$$
(\bar{p} - \bar{p})\bar{N}\left[\frac{1}{2}(q\bar{p} + q')(1-\bar{p} - \bar{p}) + \gamma_P\bar{p}\right] \geq (\bar{p} - \bar{p})\bar{N}\left[\frac{1}{2}(q\bar{p} + q')(1-\bar{p} - \bar{p}) + \gamma_P\bar{p}\right] - F
$$

$$
\gamma_P\bar{p} \geq \gamma_R\bar{p}
$$

So producing a Broadsheet $j = \bar{\sigma}$ is better than producing a $j = \bar{\sigma}$ Broadsheet for the MT if and only if the number of Poor “partisan readers” is larger than the number of Rich “partisan readers”. Notice that what counts is both the proportion of “partisan readers” for each group $\gamma_k$ and the fraction of population that makes up each group ($\bar{p}$ and $\bar{p}$).

The previous Proposition shows that partisan readers have an important role to play
when it comes to campaigning newspaper, i.e. Broadsheet newspapers. In fact, since there is a fraction of citizens/readers who read the campaigning newspaper in any case, this allows the MT to have a fixed readership, certain and independent from signal realisation, which, instead, continues to affect the buying decision of the Middle Class citizens. In turn this changes the MT’s relative choice of producing a Broadsheet rather than a Tabloid. The following Corollary compares the trade-off between producing a Broadsheet or a Tabloid when no partisan reader is present versus the same trade-off when partisan readers make up a part of the citizens readership.

**Corollary 30** Producing the Broadsheet \( j = \bar{\sigma} \) \( (j = \sigma) \) is more profitable for the MT when there are partisan readers than when there are not iff the fraction of Poor \( (\text{Rich}) \) partisan readers is greater than \( \frac{1}{2} + \frac{1}{2} \sqrt{1 - \gamma_R} \) \( \frac{1}{2} + \frac{1}{2} \sqrt{1 - \gamma_P} \) and the fraction of Rich \( (\text{Poor}) \) reading a Tabloid is smaller than the percentage of Poor \( (\text{Rich}) \) in the population.

**Proof.** From Proposition 23 I have found that the Broadsheet is produced instead of a Tabloid iff \( q + q' \geq 2/3 \). From Proposition 29 the MT prefers to produce a Broadsheet \( j = \bar{\sigma} \) instead of a Tabloid iff \( q + q' \geq \frac{2}{3} \left[ 1 + \frac{(1 - \gamma_R)^2 + (1 - 2 \gamma_R \gamma_P)}{1 - \gamma_R^2} \right] \). Now, together with the Middle Class citizens, Rich and Poor citizens read both types of newspapers also. Nevertheless this does not have a clear effect on the relative convenience of producing a Broadsheet rather than a Tabloid with respect to the case when no partisan reader is around. To verify when having a fraction of partisan readers makes the production of a Broadsheet easier than not having partisan readers, simply derive the condition such
that:

\[
\frac{2}{3} \left( 1 + \frac{(1 - \gamma_R) \bar{p} + (1 - 2\gamma_P) \bar{p}}{1 - \bar{p} - \bar{p}} \right) < \frac{2}{3} \\
1 + \frac{(1 - \gamma_R) \bar{p} + (1 - 2\gamma_P) \bar{p}}{1 - \bar{p} - \bar{p}} < 1 \\
\frac{(1 - \gamma_R) \bar{p} + (1 - 2\gamma_P) \bar{p}}{1 - \bar{p} - \bar{p}} < 0 \\
\frac{(1 - \gamma_R) \bar{p} + (1 - 2\gamma_P) \bar{p}}{1 - \bar{p} - \bar{p}} < 0
\]
given that \(1 - \bar{p} - \bar{p} > 0\) always. It is relatively straightforward to derive the conditions such that \((1 - \gamma_R) \bar{p} + (1 - 2\gamma_P) \bar{p} < 0\). In particular \(\gamma_P > \frac{1}{2} + \frac{1}{2} \bar{p} (1 - \gamma_R)\). Therefore producing the Broadsheet \(j = \bar{\sigma}\) is easier when partisan readers are present than when they are not iff the fraction of Poor partisan readers is large enough. In particular that fraction has to be larger than \(\frac{1}{2}\). Notice that, since \(\gamma_P \in [0, 1]\), then \(\frac{1}{2} + \frac{1}{2} \bar{p} (1 - \gamma_R) < 1\) iff \(\frac{\bar{p}}{2} (1 - \gamma_R) < 1\) or \(\bar{p} (1 - \gamma_R) < \bar{p}\) that is iff the fraction of Rich reading a Tabloid is smaller than the percentage of Poor in the population.

Likewise, one can easily derive the conditions such that producing a Broadsheet \(j = \sigma\) is easier when there are partisan readers rather than when there are not. In particular \(\gamma_R > \frac{1}{2} + \frac{1}{2} \bar{p} (1 - \gamma_P)\). Therefore producing the Broadsheet \(j = \sigma\) is easier when the fraction of Rich partisan readers is greater than \(\frac{1}{2} + \frac{1}{2} \bar{p} (1 - \gamma_P)\) and, by definition of \(\gamma_R\) it has to be smaller than 1. Notice that this is possible iff \(\bar{p} (1 - \gamma_P) \leq 1\) or \(\bar{p} (1 - \gamma_P) \leq \bar{p}\) that is iff the fraction of Poor citizens reading the Tabloid is smaller than the fraction of Poor in the polity.

So far I have analysed the role of partisan readers who, regardless of other circumstances, commit to buy, if available, the Broadsheet supporting their preferred policy. Neverthless in Proposition 27 I have shown that if a Broadsheet supporting one policy is produced by the MT, there is a space of parameters where that policy is implemented with an ex-ante probability of more than one half, regardless of the true state of the world. Therefore, one could envisage a situation where partisan readers may take advan-
tage strategically of this. For instance, if Poor partisan readers manage to coordinate their buying decisions in the space of parameters where producing the newspaper \( j = \sigma \)
brings about a probability of implementing the policy \( \pi \) greater than \( 1/2 \), then it will be optimal for them to do so. In turn this will increase the probability of optimal policy implementation, since, for this purpose, producing any Broadsheet is better than producing a Tabloid. On the other hand Rich partisan readers, anticipating this, will refrain from committing to buy the newspaper \( j = \sigma \) in that space of parameters.

Therefore one can conclude that when partisan readers are strategic and manage to coordinate among themselves, their ideological reading behaviour is such that it allows to increase both i) the probability of their preferred policy being implemented and ii) the probability of optimal policy implementation “tout court”, given that a Broadsheet is produced rather than a Tabloid.

Notice that the fact that the presence of partisan readers can ease the production of a Broadsheet and that this, in turn, increases the probability of implementing the optimal policy runs contrary to the conventional wisdom which sees the ideological behaviour at odds with “rational” (policy) decision making.

4.4.1 Comparative statics

In this last Section I carry out a final exercise of comparative statics on the results of Proposition 29 i.e. in the scenario where partisan readers commit to read the Broadsheet supporting the policy they prefer, for any value of parameters, without any strategic consideration. I focus again on the case of the production of a \( j = \sigma \) Broadsheet. Remember from Proposition 29 that in this scenario the Broadsheet production is carried out instead of the Tabloid whenever \( q + q' \geq \frac{2}{3}[1 + \frac{(1-\gamma)(p+(1-2\gamma)p)}{1-p-\frac{1}{p}}] \). This condition is easier to be satisfied the smaller \( \frac{(1-\gamma)(p+(1-2\gamma)p)}{1-p-\frac{1}{p}} \) is. The results of the comparative statics exercise can be summed up in the following proposition:

**Proposition 31** In a scenario where there are partisan readers committed to buy the Broadsheet supporting their preferred policy, the MT prefers to produce a \( j = \pi \) Broadsheet
rather than a Tabloid whenever the fraction of partisan readers, both Poor and Rich, is large, and whenever the fraction of Poor and Rich citizens increases, contingent on there being a great number of partisan readers. Also the MT prefers to produce a $j = \sigma$ Broadsheet rather than a Tabloid whenever the fraction of Poor citizens increases, contingent on there being a small fraction of Rich individuals and whenever the fraction of Rich increases, contingent of there being an increase in the fraction of Poor citizens, as far as there is a majority of Poor partisan readers.

**Proof.** To conduct an exercise of comparative statics, I take the derivative of the factor $f = \frac{2}{3}(1 + \frac{(1 - \gamma_R)p + (1 - 2\gamma_R)p}{1 - \overline{p} - p})$ with respect to the parameters $\overline{p}, p, \gamma_R, \gamma_P$.

- $\frac{\partial f}{\partial \gamma_P} = \frac{2}{3} \frac{(1 - \gamma_R)p + (1 - 2\gamma_R)p}{1 - \overline{p} - p}$
- $\frac{\partial f}{\partial \gamma_R} = \frac{2}{3} \frac{(1 - \gamma_R)p + (1 - 2\gamma_R)p}{1 - \overline{p} - p}$
- $\frac{\partial f}{\partial p} = \frac{2}{3} \frac{(1 - 2\gamma_R)p}{1 - \overline{p} - p} + \frac{(1 - \gamma_R)p + (1 - 2\gamma_R)p}{(1 - \overline{p} - p)^2}$
- $\frac{\partial f}{\partial \overline{p}} = \frac{2}{3} \frac{(1 - \gamma_R)p}{1 - \overline{p} - p} + \frac{(1 - \gamma_R)p + (1 - 2\gamma_R)p}{(1 - \overline{p} - p)^2}$

By looking at $\partial f / \partial \gamma_P$ and $\partial f / \partial \gamma_R$ one can see that both the partial derivatives are always negative, for any value of $\overline{p}$ and $p$. Therefore the $j = \sigma$ Broadsheet production is easier to be carried out whenever the fraction of partisan readers $\gamma_P$ and/or $\gamma_R$ increases. In fact this means that, when the fraction of non-Tabloid readers increases, whatever the Broadsheet they want to read and see produced, it will be harder for the MT to produce a Tabloid rather than a Broadsheet.

Regarding the parameters expressing the share of population, by taking the derivative $\frac{\partial f}{\partial \overline{p}}$ (where $\overline{p}$ is the fraction of polity made up of Poor citizens) one obtains that this is equal to $\frac{\partial f}{\partial \overline{p}} = \frac{2}{3} \frac{(1 - 2\gamma_R)p}{1 - \overline{p} - p} + \frac{(1 - \gamma_R)p + (1 - 2\gamma_R)p}{(1 - \overline{p} - p)^2}$. This derivative is negative (positive) and then the production of the $j = \sigma$ Broadsheet is easier (harder) to carry out when the fraction $\overline{p}$ of
Poor in the polity increases, conditional on the proportion of Poor partisan readers being larger (smaller) than a certain threshold, i.e. $\gamma_P > \frac{1 - \frac{\gamma_P}{1 - \frac{p}{\gamma}}}{2}$. For the consistency of the condition $\gamma_P > \frac{1 - \frac{\gamma_P}{1 - \frac{p}{\gamma}}}{2}$, one needs to have $\frac{1 - \frac{\gamma_P}{1 - \frac{p}{\gamma}}}{2} < 1$ which is true iff $1 - \frac{\gamma_P}{1 - \frac{p}{\gamma}} < 2(1 - \frac{p}{\gamma})$ and $-\frac{\gamma_P}{1 - \frac{p}{\gamma}} < 1 - 2\frac{p}{\gamma}$ from which it follows easily that $\gamma_P > 2 - \frac{1}{\gamma}$. Again since it has to be $2 - \frac{1}{\gamma} < 1$, and this is true for any $\gamma < 1$, it is easy to conclude that the condition $\frac{1 - \frac{\gamma_P}{1 - \frac{p}{\gamma}}}{2} < 1$ holds for any $\gamma_R$. By taking the derivative of the expression $\frac{1 - \frac{\gamma_P}{1 - \frac{p}{\gamma}}}{2}$ with respect to both the parameters $\gamma_R$ and $\frac{p}{\gamma}$, one can verify that $\frac{d}{\gamma_R} \left( \frac{1 - \frac{\gamma_P}{1 - \frac{p}{\gamma}}}{2} \right) = \frac{-\gamma_R}{2(1 - \frac{p}{\gamma})} < 0$ and that $\frac{d}{\frac{p}{\gamma}} \left( \frac{1 - \frac{\gamma_P}{1 - \frac{p}{\gamma}}}{2} \right) = \frac{1 - 2\gamma_P}{2(1 - \frac{p}{\gamma})} > 0$. Therefore, the larger is the proportion of Poor individuals in the polity, the easier it is to produce the $j = \sigma$ Broadsheet, contingent on the fraction of Poor partisan readers being larger than a certain threshold, whenever the fraction of Rich partisan readers is large and the fraction of Rich in the polity is small.

Similarly, by taking the derivative of the factor $f$ with respect to $\frac{p}{\gamma}$ (the fraction of polity made up of Rich citizens), the derivative is equal to $\frac{df}{dp} = \frac{2}{3} \left[ (1 - \gamma_R)^{1 - \gamma_R} \frac{1 - \gamma_R}{2} \right]$.

This derivative is negative (positive) and, therefore, the production of the $j = \sigma$ Broadsheet is easier (harder) to carry out when the fraction $\frac{p}{\gamma}$ of Rich in the polity increases, contingent on the proportion of Rich partisan readers being larger (smaller) than a certain threshold, i.e. $\gamma_R > \frac{1 - 2\gamma_R}{1 - \frac{p}{\gamma}}$. For the consistency of the condition $\gamma_R > \frac{1 - 2\gamma_R}{1 - \frac{p}{\gamma}}$, one needs to have $\frac{1 - 2\gamma_R}{1 - \frac{p}{\gamma}} < 1$ which is true iff $\gamma_R > \frac{1}{2}$. Therefore whenever the fraction of Rich individuals increases, the production of the $j = \sigma$ Broadsheet is easier iff there are enough Rich partisan readers, conditional on the Poor partisan readers being the majority of all the poor.

Finally to check when the condition $\gamma_R > \frac{1 - 2\gamma_R}{1 - \frac{p}{\gamma}}$ is easier to be satisfied, one needs to take the derivative of the expression $\frac{1 - 2\gamma_R}{1 - \frac{p}{\gamma}}$ with respect to the parameters $\gamma_R$ and $\frac{p}{\gamma}$. In this way one obtains easily that $\frac{d}{\gamma_R} \left( \frac{1 - 2\gamma_R}{1 - \frac{p}{\gamma}} \right) = \frac{2\gamma_R}{1 - \frac{p}{\gamma}} < 0$ and that $\frac{d}{\gamma_R} \left( \frac{1 - 2\gamma_R}{1 - \frac{p}{\gamma}} \right) = \frac{1 - 2\gamma_R}{(1 - \frac{p}{\gamma})^2}$, where $\frac{1 - 2\gamma_R}{(1 - \frac{p}{\gamma})^2} < 0$ iff $1 - 2\gamma_R < 0$, i.e. $\gamma_R > \frac{1}{2}$. One can conclude that the $j = \sigma$ Broadsheet production is easier to be delivered the larger is the proportion of Rich individuals in the polity, contingent on the fraction of Rich partisan readers being larger than a certain threshold, which is easier to happen whenever the fraction of Poor partisan readers
increases and/or the fraction of Poor in the polity increases, provided there is a majority of Poor partisan readers. ■

So the production of a Broadsheet supporting a specific policy favourable to a group of citizens is more profitable whenever the number of partisan readers (\(\gamma_R\) or \(\gamma_P\)) is large. Furthermore when the number of Poor citizens becomes larger the production of the \(j = \sigma\) Broadsheet is easier, conditional on the fraction of Poor partisan readers \(\gamma_P\) being larger than a certain threshold. This can be explained quite intuitively. In fact if the number of Poor people grows but they are not committed to supporting their interests by reading the newspaper favouring their policy, then both their non-ideological reading behaviour and the shrinking of an illuminated middle class make the production of an informative newspaper harder. Nevertheless the minimum fraction of Poor partisan people such that the MT prefers to produce a \(j = \sigma\) newspaper instead of a \(j = \emptyset\) decreases the more Rich partisan readers and the less Rich individuals there are. A similar phenomenon happens when the fraction of Rich citizens grows. In this case the production of the \(j = \sigma\) becomes easier iff the number of partisan Rich citizen is larger than a certain threshold. In fact, in this case, this means that there are many Rich citizens who are not willing to read a Tabloid, making the production of a Tabloid harder. Quite surprisingly this is true also for a Broadsheet which defends the interests different from the one of the Rich citizens. Finally the fraction of Rich partisan citizens necessary to induce a MT to produce a \(j = \sigma\) newspaper rather than a \(j = \emptyset\) decreases when the fraction of Poor partisan readers increases and the fraction of Poor individuals increases, as long as Poor partisan readers form the majority of all the Poor readers.

Therefore it is interesting to observe that a more partisan society, one where both Rich and Poor partisan readers make up a large proportion of all citizens, provided that this makes it easier the production of a Broadsheet, may be conducive to better policy making. Of course the role of the partisan readers is just servant to that of middle class readers: in fact it makes easier for the MT, given that the conditions in Corollary 30 are satisfied, to produce an informative newspaper that the middle class could then consume,
so allowing the incumbent to implement high quality policies. The same mechanism is 
at work with a more polarized society, a society where the middle class shrinks but the 
Poor grow in number and the Rich are fewer and fewer or both Rich and Poor increase 
their numbers. Even in this case a smaller but opinionated middle class still keeps its 
role as long as the partisan members of the Poor (in my example) are the majority. In 
this model partisanship and informed-open minded citizens are not substitute with each 
other but rather complementary: the existence of the former makes the role of the latter 
easier to be effective.

4.5 Conclusion

In this chapter I have described how citizens can take part in the public debate and 
communicate their views and preferences thanks to the mass media and, in particular, 
thanks to the newspapers they buy and read. The novelty of this approach is that it 
models how citizens can express themselves not directly, through their own actions, like 
in other models of “voice” à la Hirschman, but through the use of an “instrument”, 
the newspaper, that has been produced and marketed by a for-profit firm. Given the 
fact that this instrument can be bought but not directly produced by the citizens, I 
have highlighted how there exists a tension between the benefit of using a newspaper to 
express citizens’ views and the possibility that this newspaper can actually be produced. 
I have divided the possible newspapers that can be produced into Tabloid and Broadsheet, 
where the former is an uninformative newspaper, while the latter is informative on the 
state of the world. I have highlighted how the presence of a Broadsheet always improves 
the quality of policy decision making on part of the incumbent. However, this is possible 
when a Broadsheet is produced, which happens only when the environment is informative 
enough. If not, the MT produces a Tabloid which does not give any additional information 
on the state of the world or the optimal policy to be implemented and it does not allow 
the citizens to express themeselves.
Quite interestingly the production of the Broadsheet depends on the total probability of a signal arriving being large, therefore it depends on the sum of the probabilities of correct signal and of wrong one.

In this chapter I have assumed that there is one group of citizens which is interested in having the optimal policy adopted, i.e. the Middle Class. I first assumed the Middle Class citizens are the only one who read newspapers. Subsequently I analysed how the results change when citizens from the other classes read newspaper as well. In that case, given that they are interested in one policy or the other, regardless of the state of the world, I have assumed they read the newspaper supporting their views or the tabloid. I have stressed how the “partisan reader” can ease the production of the Broadsheet, instead of hardening it, contrary to conventional wisdom. In this case the existence of partisanship and of ideological readers make the implementation of optimal policy easier, not harder. A similar result has been found in the context of a more polarized society, a society where the Middle Class shrinks and Poor and Rich individuals grow in number. Even in this case, as long as there is a large fraction of partisan readers, a smaller Middle Class can still have the role in the public opinion to transmit useful information to the Incumbent, necessary to implement optimal policy.

Finally, I have found that there exists a non-empty set of parameters such that if a Broadsheet newspaper is produced, the policy that newspaper supports is implemented more often than the alternative policy, for any state of the world. In such a space of parameters the existence of partisan readers who coordinate between themselves and read the informative newspaper supporting the policy the prefer have two roles: i) it allows the preferred policy to be implemented with probability larger than one half; ii) it makes it easier for a Broadsheet newspaper to be produced and therefore it increases the probability of optimal policy implementation. However, the probability of errors in the policy implementation increases with respect to the case when just the Middle Class citizens read.
4.6 Appendix

In this Appendix I want to show how the results in Proposition 20 change when one considers citizens that are willing to buy newspapers not for their preferences towards reading them, but because they want to make themselves heard. Therefore, in this case, citizens buy newspapers because they want to act strategically and influence the policy implemented by the Incumbent. This means that the only reason the Middle Class citizen possesses to buy the newspaper is to induce the Incumbent politician to implement the policy that he prefers.

In Section 2, the $M$ class’s utility function was assumed to be equal to $U_i(l, a, j) = l_i + u_i(a|\theta) + u_i(j|\sigma)$ for each $j \in \{\sigma, \phi, \sigma \}$ and for each $i \in M$. Now I assume that the Middle Class citizen does not derive any utility from reading the newspaper. Therefore, the utility function rewrites as:

$$\overline{U}_i(l, a) = l_i + u_i(a|\theta)$$

The function $\overline{U}_i(l, a)$ is separable in the following arguments: the income $l_i$ and the utility the citizen derives from the implementation of the optimal policy, given the state of the world, i.e. $u_i(a|\theta)$. I make the assumption that each citizen belonging to the Middle Class has the same income $l_i = \bar{l}$ for each $i \in M$ and this is enough to buy a single copy of the newspaper, if the citizen wishes to do so. I also assume that each citizen $i \in M$ derives the same positive utility $u_i(a|\theta)$ from the implementation of the optimal policy, contingent on the state of the world. As before this means that $u_i(\bar{a}|\theta) = u_i(\bar{a}|\theta) > 0$, for each $i \in M$, while $u_i(a|\theta) = u_i(a|\theta) = 0$, for each $i \in M$. To simplify the discussion, I assume that the only available newspaper is the Broadsheet $j = \sigma$; nevertheless the discussion works also if the Broadsheet $j = \sigma$ is the only produced outlet. The timing of this game where citizens decide to buy the newspaper only for strategic reason is the same as the previously analysed game in Section 4.3.

The equilibrium concept I employ is Perfect Bayesian Equilibrium, where players do
not play weakly dominated strategies. I define an equilibrium to be symmetric when all the Middle Class citizens, in equilibrium, play the same strategy of buying the newspaper or not buying it. On the other hand, an equilibrium is asymmetric when some Middle Class citizens, in equilibrium, play the same strategy of buying the newspaper, while the remaining citizens do not buy it.\(^{13}\) The Incumbent, after observing the numbers of copies bought in equilibrium, decides which policy to implement. As usual, beliefs are derived along the equilibrium path, whenever it is possible.

I will show that there are two classes of equilibria in pure strategies, one symmetric and the other not, while there is no equilibrium in mixed strategies, where citizens randomise between the actions of buying the newspaper and not buying it, while the Incumbent randomises between implementing the two alternative policies.

In order to decide whether to buy the newspaper or not, the Middle Class citizen, given the signal he observes privately and the equilibrium signals he foresees will be observed publicly, compares the newspaper price and the expected utility he receives when the Incumbent politician adopts the policy, weighted by the probability it is optimal, contingent on the state of the world \(\theta\) (see Prat and Stromberg (2005) ).

The following Lemma substitutes the Lemma 18:

**Lemma 32** There exists an asymmetric equilibrium in pure strategies where exactly \(n^*_\sigma\) (\(n^*_\overline{\sigma}\)) Middle Class citizens in \(t = 3\) buy the Broadsheet produced \(j = \sigma\) \((j = \overline{\sigma})\) if and only if they have received the signal printed on the newspaper, provided that the price is less than the expected utility the Middle Class citizen derives, when he is pivotal, from the Incumbent implementing the policy more likely to be optimal. Furthermore, there exists a symmetric equilibrium in pure strategies where no Middle Class citizen buys the newspaper.

**Proof.** Consider what happens when the newspaper \(j = \sigma\) is produced. Remember

\(^{13}\text{see Mukhopadahaya (2003), Koriyama and Szentes (2009), and Borgers (2004) and Ghosal and Lockwood (2009) for discussion of this equilibrium characterization.}\)
that, given that there is one single newspaper, if in equilibrium $n_{\sigma}$ signals are observed, the Incumbent, and the remaining players, have to form expectations on the remaining $N - n_{\sigma}$ signals received by the citizens who have not bought any newspaper. Assume that in equilibrium a number of signals $n^*_{\sigma}$ (to be determined later) is the minimum number of signals sufficient for the Incumbent to believe that $Pr(\bar{\theta}|n^*_{\sigma}, N - n^*_{\sigma}) > Pr(\bar{\theta}) = 1/2$ and, as a consequence, to implement the policy $\pi$.

Consider what happens to the generic citizen when he has to decide his optimal strategy, contingent on his signal, on the number of signals he foresees he will observe in equilibrium and to the strategies of the other $N - 1$ citizens. Suppose that the other citizens all take a voting strategy such that if they observe a private signal $\sigma$ they buy the newspaper $j = \sigma$, provided that they have enough income to do so.\footnote{See Lohmann (1993) and Austen-Smith and Banks (1996).}

I first show that, given a number $n_{\sigma}$ of bought newspaper foreseen in equilibrium, corresponding to $n_{\sigma}$ citizens who have received a $\sigma$ signal $i_{\sigma}$ and bought the $j = \sigma$ newspaper, the citizen who has received a $\sigma$ signal $i_{\sigma}$ buys the $j = \sigma$ newspaper if and only if it is optimal to do so, contingent on the citizen $\hat{i}_\sigma$ being pivotal, while citizens $\hat{i}_{\sigma \in (\emptyset, \sigma)}$ never do.\footnote{Abusing notation, with $\hat{i}_\sigma$ I will indicate also the signal $\sigma$ received by the individual $i$. Of course $i_{\emptyset}$ and $i_{\sigma}$ have similar meanings.}

\begin{enumerate}
  \item The number $n^*_{\sigma} - 1$ is such that $Pr(\bar{\theta}|n^*_{\sigma} - 1, N - n^*_{\sigma} + 1) < Pr(\bar{\theta})$ and the citizen $\hat{i}$ has privately observed the signal $\sigma$.
\end{enumerate}

The citizen $\hat{i}_\sigma$ is willing to buy the newspaper $j = \sigma$ as long as the charged price $p_{j=\sigma}$ is less than, or equal to, the expected utility he receives when the policy $\bar{\pi}$ is implemented and this is optimal, contingent on the state of the world, given his private information and the information he foresees will be revealed in equilibrium.

More formally, consider $\hat{i}_\sigma$ and the other $N - 1$ citizens, of whom $n^*_{\sigma} - 1$ have received a $\sigma$ signal, while the remaining $N - n^*_{\sigma}$ have received either of the signals $\{\emptyset, \sigma\}$. Furthermore let $Pr(\theta|n_{\sigma}, N - n_{\sigma})$ be the probability that the state of the world is $\theta$, contingent on a number $n_{\sigma}$ of observed signals $\sigma$ in equilibrium. Therefore, contingent on $\hat{i}_\sigma$
being pivotal, which happens, when the true state of the world is \( \theta \), with probability 
\[
\left( \binom{N-1}{n^*_{j_{\sigma}-1}} q^{n^*_{j_{\sigma}-1}} (1 - q)^{N-1-(n^*_{j_{\sigma}-1})} \right) \text{Pr}(\theta | n^*_j, N - n^*_j) \]
\( j = \sigma \) is the following:

\[
u_{\sigma}(\widehat{j}_{\sigma} \text{ pivotal, buy } j = \sigma) = \sum_{\theta \in \Theta} \left[ u_{\sigma}(\bar{\pi} | \theta) \text{Pr}(\theta | n^*_j, N - n^*_j) \right] - p_{j = \sigma} \quad (4.22)
\]

In particular one needs to consider that \( \widehat{j}_{\sigma} \) buys the newspaper \( j = \sigma \) only when he is pivotal. In fact the citizen knows that the policy \( \bar{\pi} (\bar{a}) \) will be implemented in equilibrium in any case, whether he buys the newspaper or not, when \( n_{\sigma} > n^*_\sigma \) (\( n_{\sigma} < n^*_\sigma - 2 \)). Furthermore, given his private information and the information revealed in equilibrium by the other citizens buying the newspaper, \( \widehat{j}_{\sigma} \) knows that adopting the policy \( \bar{\pi} (\bar{a}) \) is optimal given the equilibrium information. Therefore he is indifferent between buying the newspaper or not for strategic reasons. However he is strictly worse off buying the newspaper as long as \( p_{\sigma} > 0 \). In fact, if he does not buy the newspaper the incumbent will implement the optimal policy anyway, but the \( \widehat{j}_{\sigma} \) will save the cost of buying the newspaper copy. Instead, if he buys the newspaper \( j = \sigma \), the incumbent implements the same optimal policy that he would have, if he had not bought the newspaper, but the citizen bears the positive cost \( p_{\sigma} > 0 \). Therefore \( \widehat{j}_{\sigma} \) is better off not buying the newspaper.

The expression in eq. (4.22) has to be compared with the expected utility when \( \widehat{j}_{\sigma} \) decides not to buy the newspaper, again contingent on being pivotal:

\[
u_{\sigma}(\widehat{j}_{\sigma} \text{ pivotal, not buy } j = \sigma) = \sum_{\theta \in \Theta} \left[ u_{\sigma}(\bar{\pi} | \theta) \text{Pr}(\theta | n^*_j, N - n^*_j) \right] \quad (4.23)
\]

If I want to compare the two equations and finding the condition such that citizen \( \widehat{j}_{\sigma} \) finds it optimal to buy the newspaper when he is pivotal, I can restrict my analysis to
the following condition:

$$\sum_{\theta \in \Theta} [w_{i\sigma}(\pi|\theta)[Pr(\theta|n^*_{\pi}, N - n^*_{\theta})]] - p_{j=\sigma} > \sum_{\theta \in \Theta} w_{i\sigma}(a|\theta) Pr(\theta|n^*_{\pi}, N - n^*_{\theta})$$

which, given that $w_{i\sigma}(\pi|\theta) = w_{i\sigma}(a|\theta) = 0$, boils down to the condition:

$$w_{i\sigma}(\pi|\theta)[Pr(\theta|n^*_{\pi}, N - n^*_{\theta})] - p_{j=\sigma} > w_{i\sigma}(a|\theta)[1 - Pr(\theta|n^*_{\pi}, N - n^*_{\theta})]$$

or:

$$w_{i\sigma}(\pi|\theta)[Pr(\theta|n^*_{\pi}, N - n^*_{\theta})] - w_{i\sigma}(a|\theta)[1 - Pr(\theta|n^*_{\pi}, N - n^*_{\theta})] > p_{j=\sigma} \quad (4.24)$$

$$w_{i\sigma}(\pi|\theta)[2Pr(\theta|n^*_{\pi}, N - n^*_{\theta}) - 1] > p_{j=\sigma} \quad (4.25)$$

which, given $w_{i\sigma}(\pi|\theta) = w_{i\sigma}(a|\theta) > 0$ and $p_{j=\sigma} > 0$, holds only if $2Pr(\theta|n^*_{\pi}, N - n^*_{\theta}) - 1 > 0$, or $Pr(\theta|n^*_{\pi}, N - n^*_{\theta}) > \frac{1}{2}$, true by assumption.

The interpretation of condition eq. (4.24) is straightforward: $\hat{\tau}$ finds it optimal to buy the newspaper, conditional on him being pivotal, if and only if the difference between his utility when the policy more likely to be optimal, given all the information available ($\pi$), is implemented and his utility when the alternative policy ($a$) is implemented, i.e. $w_{i\sigma}(\pi|\theta)[Pr(\theta|n^*_{\pi}, N - n^*_{\theta})] - w_{i\sigma}(a|\theta)[1 - Pr(\theta|n^*_{\pi}, N - n^*_{\theta})]$, is larger than the newspaper price $p_{j=\sigma}$.

Therefore, the citizen buys the newspaper with certainty when he is pivotal and it is convenient to do so, while he never buys it when he is not. Since all the citizens are the same, they behave in the same way when they are pivotal, provided that they have received the signal $\pi$. Therefore this is a case of asymmetric equilibrium in pure strategies, where $n^*_{\pi}$ citizens buy the newspaper, while the remaining $N - n^*_{\pi}$ do not.

ii) The number $n^*_\pi - 1$ is such that $Pr(\theta|n^*_\pi - 1) < Pr(\theta)$ and the citizen $\hat{i}$ has privately observed the signal $\pi$.

Given what I found in the previous point, I can restrict my analysis only to the
pivotal case. In this case, $i_{\bar{y}}$ will not buy the newspaper based on strategic consideration.

In fact suppose that, given $Pr(\bar{y}|n^*_\bar{y} - 1) < Pr(\bar{y})$, it follows that the policy $\bar{u}$ gets implemented by the Incumbent and will induce him iff $Pr(\bar{y}|n^*_\bar{y} - 1 + 1) > Pr(\bar{y})$. This will be optimal for citizen $i_{\bar{y}}$ and will induce him to buy a copy of the newspaper $j = \bar{y}$ iff he believes that $Pr(\bar{y}|n^*_\bar{y} - 1; i_{\bar{y}}) > 1/2$. However this is not so, based on his private and equilibrium public information. In fact given that $i_{\bar{y}}$ foresees that there will be other $n^*_\bar{y} - 1$ copies of $j = \sigma$ in equilibrium, given his own private signal $\sigma$, it follows that: $Pr(\bar{y}|n^*_\bar{y} - 1; i_{\bar{y}}; N - n^*_\bar{y}) =$$
\frac{Pr(n^*_\bar{y} - 1; i_{\bar{y}}; N - n^*_\bar{y})Pr(\bar{y})}{Pr(n^*_\bar{y} - 1; i_{\bar{y}}; N - n^*_\bar{y})Pr(\bar{y}) + Pr(n^*_\bar{y} - 1; i_{\bar{y}}; N - n^*_\bar{y})Pr(\bar{y})} =
\frac{N!}{(n^*_\bar{y} - 1)!N(N-n^*_\bar{y})}q^{n^*_\bar{y}-1}q'(1-q)^{N-n^*_\bar{y}+\frac{1}{2}} + \frac{N!}{(n^*_\bar{y} - 1)!N(N-n^*_\bar{y})}q'^{(n^*_\bar{y}-1)}q(1-q')^{N-n^*_\bar{y}+\frac{1}{2}}$

where $Pr(\bar{y}|n^*_\bar{y} - 1; i_{\bar{y}}; N - n^*_\bar{y})$ is the probability of the state of the world $\bar{y}$ given that $i_{\bar{y}}$ observes in equilibrium $n^*_\bar{y} - 1$ signals of type $\sigma$, his own signal $i_{\bar{y}}$ and then, regarding the remaining $N - n^*_\bar{y}$ signals, $i_{\bar{y}}$ knows that they are signals different from type $\sigma$, therefore having a $1 - q$ total probability when the state of the world is $\bar{y}$ (likewise, each of the other $N - n^*_\bar{y}$ signals will have a $1 - q'$ probability when the state of the world is $\bar{y}$).

If one assumes that $Pr(\bar{y}|n^*_\bar{y} - 1; i_{\bar{y}}; N - n^*_\bar{y}) < \frac{1}{2}$, multiplying both sides of the inequality by the denominator of the fraction and simplifying further, the expression reduces to: $\frac{N!}{(n^*_\bar{y} - 1)!N(N-n^*_\bar{y})}q^{n^*_\bar{y}-1}q'(1-q)^{N-n^*_\bar{y}} < \frac{N!}{(n^*_\bar{y} - 1)!N(N-n^*_\bar{y})}q'(n^*_\bar{y}-1)q(1-q')^{N-n^*_\bar{y}}$ from which it follows that:

$q^{n^*_\bar{y}-1}q'(1-q)^{N-n^*_\bar{y}} < (q')^{(n^*_\bar{y}-1)}q(1-q')^{N-n^*_\bar{y}}$ \hspace{1cm} (4.26)

From the starting hypothesis that $Pr(\bar{y}|n^*_\bar{y} - 1; N - (n^*_\bar{y} - 1)) < \frac{1}{2}$, through similar algebraic manipulations to the ones above, it follows that $Pr(\bar{y}|n^*_\bar{y} - 1; N - (n^*_\bar{y} - 1))$ reduces to the following expression:

$q'^{(n^*_\bar{y}-1)}(1-q)^{N-n^*_\bar{y}+1} < (q')^{(n^*_\bar{y}-1)}(1-q')^{N-n^*_\bar{y}+1}$ \hspace{1cm} (4.27)
Now multiply the LHS of eq. (4.27) by $\frac{q'}{1-q'}$ and the RHS by $\frac{q}{1-q}$ to obtain eq. (4.26).

To show that eq. (4.26) is less than $\frac{1}{2}$, given that $q^{(n^+)-(1-q)(N-n^+) < (q')^{(n^+)-(1-q')^N-n^+}$ is sure, it suffices to show that $\frac{q'}{1-q'} < \frac{q}{1-q}$. By cross multiplying the terms one obtains that $q'(1-q') < q(1-q)$, or $q' - (q')^2 < q - q^2$. By rewriting the previous expression as $q^2 - (q')^2 < q - q'$ and factoring the term $q^2 - (q')^2$, the expression rewrites as $(q - q')(q + q') < q - q'$. Simplifying both sides of the inequality by $q - q' > 0$, it follows that $q + q' < 1$, which is true, for each $1 > q > q'$.

\textit{iii) The number $n_{\sigma}^* - 1$ is such that $Pr(\bar{\sigma} | n_{\sigma}^* - 1) < Pr(\bar{\sigma})$ and the citizen $\hat{i}$ has privately observed the signal $\phi$.}

Again I restrict the analysis to the pivotal case. Like previously, $\hat{i}_\phi$ knows that $Pr(\bar{\sigma} | n_{\sigma}^* - 1; N - (n_{\sigma}^* - 1)) < Pr(\bar{\sigma}) = \frac{1}{2}$ and that $Pr(\bar{\sigma} | n_{\sigma}^*; N - n_{\sigma}^*) > Pr(\bar{\sigma})$. So it is necessary to check whether the $\hat{i}_\phi$ is going to change his strategy of not buying the $j = \bar{\sigma}$ newspaper, once he foresees that in equilibrium there will be $n_{\sigma}^* - 1$ signals of type $\sigma$. $\hat{i}_\phi$ knows that, upon observing $n_{\sigma}^* - 1$ signals of type $\sigma$ and $N - (n_{\sigma}^* - 1)$ citizens who have received the other two signals, the Incumbent rationally assigns $Pr(\bar{\sigma} | n_{\sigma}^* - 1; N - (n_{\sigma}^* - 1)) < \frac{1}{2}$. $\hat{i}_\phi$ will change his behavior if and only if, based on his private knowledge and the one revealed in equilibrium, he believes that the state of the world $\bar{\sigma}$ is more likely that the state of the world $\bar{\sigma}$. In fact, since his utility depends on the Incumbent implementing the optimal policy contingent on the state of the world, $\hat{i}_\phi$ will prefer the $\bar{\sigma}$ policy to be implemented if he believes $\bar{\sigma}$ being more likely than $\bar{\sigma}$. However this cannot be so because, by assumption, $Pr(\bar{\sigma} | n_{\sigma}^* - 1; N - (n_{\sigma}^* - 1)) < \frac{1}{2}$ for any combination of $n_{\sigma}^* - 1$ signals $\sigma$ and $N - (n_{\sigma}^* - 1)$ signals $\sigma$. This means that $Pr(\bar{\sigma} | n_{\sigma}^* - 1; N - (n_{\sigma}^* - 1)) < \frac{1}{2}$ also for the particular combination of $n_{\sigma}^* - 1$ signals $\sigma$, $\hat{i}_\phi$ and $N - n_{\sigma}^*$ signals different from $\sigma$. Since this is true by assumption then it must be true for the player $\hat{i}_\phi$, also. Therefore he does not believe that $\bar{\sigma}$ is more likely than $\bar{\sigma}$ and will not deviate from not buying the newspaper $j = \sigma$.

After deriving the citizen’s equilibrium strategies, given other citizens’ equilibrium strategies and equilibrium beliefs, now it is necessary to do the opposite. Since the
pivotal \( \hat{\sigma} \) buys the newspaper \( j = \sigma \) if and only if it is optimal to do so, while all \( \hat{\sigma} \in \{ \phi, \varrho \} \) do not, then, upon observing a number \( n_\sigma \) of copies bought, the Incumbent can form the equilibrium beliefs on the probability of state of the world \( \bar{\theta} \), knowing that the remaining \( N - n_\sigma \) citizens who have not bought the newspaper \( j = \bar{\sigma} \) have observed \( \sigma \in \{ \phi, \varrho \} \).

Since \( Pr(\bar{\sigma}|\bar{\theta}) = q \), therefore \( Pr(\sigma \in \{ \phi, \varrho \}|\bar{\theta}) = 1 - Pr(\bar{\sigma}|\bar{\theta}) = 1 - q \). Of course from \( Pr(\bar{\sigma}|\bar{\theta}) = q' \) it follows that \( Pr(\sigma \in \{ \phi, \varrho \}|\bar{\theta}) = 1 - q' \). Then it follows simply that:

\[
Pr(\bar{\theta}|n_\sigma, N - n_\sigma) = \frac{Pr(n_\sigma; N - n_\sigma)|\bar{\theta}) Pr(\bar{\theta})}{Pr(n_\sigma; N - n_\sigma)|\bar{\theta}) Pr(\bar{\theta}) + Pr(n_\sigma; N - n_\sigma)|\bar{\theta}) Pr(\bar{\theta})} \]

\[
= \frac{\sum_{n_\sigma} N!}{(n_\sigma)![(N-n_\sigma)]} q(n_\sigma)(1 - q)^{N-n_\sigma} + \frac{\sum_{n_\sigma} N!}{(n_\sigma)![(N-n_\sigma)]} q'(n_\sigma)(1 - q')^{N-n_\sigma} \]

Notice that from the condition \( Pr(\bar{\theta}|n_\sigma, N - n_\sigma) \geq \frac{1}{2} \) it is easy to derive the same threshold point as the one already seen in Corollary 21, that is \( n_\sigma \geq n_\sigma^* = \frac{\text{int}[\log_2 q'/(1-q')]}{1+\text{int}[\log_2 q'/(1-q')]} \times N \). Furthermore I can conjecture that, provided that the citizens can coordinate between them, exactly a number \( n_\sigma^* \) of signals \( \sigma \) will be sent in equilibrium, i.e. \( n_\sigma^* \) copies of newspaper \( j = \sigma \) will be bought.

In fact, if this was not so, provided there was a number of privately observed signals \( \sigma \) greater than \( n_\sigma^* \), there would be a number of signals shown in equilibrium greater than \( n_\sigma^* \). But then, this would mean that the generic citizen \( \hat{\sigma} \) would have bought the newspaper \( j = \sigma \) when it was not optimal to do so, which is a contradiction, given the characterization of equilibrium.

Finally, in order to sustain the equilibrium, the following out-of-equilibrium beliefs can be devised. Let \( n_\sigma^* \) be the number of equilibrium signals. If one observes a number of out-of-equilibrium signals \( \tilde{n}_\sigma \), I impose that \( Pr(\bar{\theta}|\tilde{n}_\sigma, N - \tilde{n}_\sigma) > 1/2 \), for \( \tilde{n}_\sigma \in [n_\sigma^*, N] \), while \( Pr(\bar{\theta}|\tilde{n}_\sigma, N - \tilde{n}_\sigma) < 1/2 \), for \( \tilde{n}_\sigma \in [0, n_\sigma^*) \). This means that the Incumbent’s out-
of-equilibrium beliefs are monotonic in the number of signals $n_\pi$, be it equilibrium or off-equilibrium signals. However the middle class citizen does not change his newspaper buying decision, given that his utility from reading the newspaper is influenced only by the implemented policy. Therefore each citizen does not have any incentive in deviating from the equilibrium\(^{16}\).

Given the existence of an asymmetric equilibrium in pure strategies just shown, it is possible to see that there exists also a symmetric equilibrium in pure strategies where no citizen, after receiving the $\pi$ signal, buys the newspaper $j = \pi$. This can be seen as a consequence of the fact that if $\hat{i}_\pi$ believes that, considering the other $N - 1$ individuals, there will be strictly less than $n_{\pi}^* - 1$ copies of the newspaper bought in equilibrium, he will not be willing to buy one, since the policy $\pi$ will not be implemented in equilibrium in any case. This happens when the citizen $\hat{i}_\pi$ is never pivotal, that is he is never called upon to play a strategy, contingent of the fact that he is pivotal, which happens when a number of signals $\pi$ strictly less than $n_{\pi}^* - 1$ has been privately received by all the citizens. Since this consideration holds for any individual, then no one will buy the newspaper $j = \pi$ in equilibrium. As a consequence, the Incumbent, seeing no copies of the newspaper bought, implements the policy $\underline{\pi}$ in equilibrium. In fact, since the Incumbent observes that no one has bought the produced newspaper $j = \pi$, he knows that this means that a number $n_{\pi}^* - 1$ at most have received the signal $\pi$. So rationally, he computes the $Pr(\bar{\pi}|n_{\pi}^* - 1, N - n_{\pi}^* + 1)$, which it is less than 1/2 by assumption. Therefore he implements the policy $\underline{\pi}$ with certainty.

Finally, I have to verify whether there is an equilibrium in mixed strategies. Again I can restrict my analysis to the case when $\hat{i}_\pi$ is pivotal, i.e. when he foresees there will be other $n_{\pi}^* - 1$ copies of the newspaper $j = \pi$ bought in equilibrium.

If such an equilibrium exists, it has to be that $\hat{i}_\pi$ mixes between the action $b$ of buying the newspaper $j = \pi$ and the action $nb$ of not buying it, with some positive probability, respectively $\eta$ and $1 - \eta$, with $0 < \eta < 1$. Likewise, the Incumbent, contingent on

\(^{16}\)For a similar off-equilibrium-beliefs see Lohmann (1993).
observing \( n^*_\sigma \) copies of the newspaper, has to mix between implementing the policy \( \sigma \) and \( \underline{a} \), again with some probability \( \Gamma(\overline{a}) \), with \( 0 < \Gamma(\overline{a}) < 1 \). From Lemma 16 we know that the only instance when the Incumbent mixes between the two policies \( \sigma \) and \( \underline{a} \), with any probability \( \Gamma(\overline{a}) \) and \( 1 - \Gamma(\overline{a}) \), is when the two states of the world have the same probabilities. Therefore, it has to be that \( \Pr(\overline{\theta}|n^*_\sigma, N - n^*_\sigma) = \frac{1}{2} \).

In order for the incumbent to mix between the two policies, contingent on observing \( n^*_\sigma \) copies of newspaper \( j = \sigma \) bought in equilibrium, it has to be that the Incumbent is indifferent between implementing the two policies. Likewise, in order for the citizen \( \widehat{i}_\sigma \) to mix between the two actions \( b \) and \( nb \), he has to be indifferent between the two. To simplify notation, let \( \beta \in B \equiv \{b, nb\} \), be the generic \( \widehat{i}_\sigma \) action.

Let \( u^E_\ell(a, \beta, \theta) = \sum_{\theta \in \Theta} \sum_{\beta \in B} u_\ell(a|\theta) \Pr(\theta|n_\sigma, N - n_\sigma) \Pr(\beta) \) be the Incumbent’s expected utility when he implements the policy \( a \in \{\overline{a}, \underline{a}\} \), the state of the world is \( \theta \) with probability \( \Pr(\theta|n_\sigma, N - n_\sigma) \), and the Citizen takes the action \( \beta \), with the associated probability. In order for the Incumbent to be indifferent, the following has to hold:

\[
\begin{align*}
\sum_{\theta \in \Theta} \sum_{\beta \in B} u_\ell(\overline{a}|\theta) \Pr(\theta|n^*_\sigma, N - n^*_\sigma) \Pr(\beta) &= \sum_{\theta \in \Theta} \sum_{\beta \in B} u_\ell(\underline{a}|\theta) \Pr(\theta|n^*_\sigma, N - n^*_\sigma) \Pr(\beta) \\
1 \cdot \frac{1}{2} \cdot \eta + 1 \cdot \rho(n^*_\sigma - 1)(1 - \eta) &= 1 \cdot \frac{1}{2} \cdot \eta + 1 \cdot [1 - \rho(n^*_\sigma - 1)](1 - \eta) \\
\rho(n^*_\sigma - 1)(1 - \eta) &= [1 - \rho(n^*_\sigma - 1)](1 - \eta) \\
\rho(n^*_\sigma - 1) &= 1 - \rho(n^*_\sigma - 1) \\
\rho(n^*_\sigma - 1) &= \frac{1}{2}
\end{align*}
\]

which is impossible, given that \( \rho(n^*_\sigma) = \frac{1}{2} \) by hypothesis, and \( \rho(n_\sigma) \) is strictly increasing in \( n_\sigma \).

Similarly, I have to check whether it is possible for the citizen \( \widehat{i}_\sigma \) to mix between the two actions \( b \) and \( nb \), provided that he anticipates that, contingent on \( b \), the Incumbent mixes between the two policies \( a \in \{\overline{a}, \underline{a}\} \), while upon observing \( nb \), he implements \( \underline{a} \) for
\[ w_{\tau}(a, b, \theta) = w_{\tau}(a, nb, \theta) \]

\[
\sum_{\theta \in \Theta} \sum_{a \in A} \Gamma(a) w_{\tau}(a|\theta) Pr(\theta|n_\tau, N - n_\tau) - p_\tau = \sum_{\theta \in \Theta} \Gamma(a) w_{\tau}(a|\theta) Pr(\theta|n_\tau, N - n_\tau) \tag{4.28}
\]

\[
\Gamma(\bar{\theta}) w_{\tau}(\bar{\theta}) \frac{1}{2} + (1 - \Gamma(\bar{\theta})) w_{\tau}(a|\theta) \frac{1}{2} - p_\tau = w_{\tau}(a|\theta) \frac{1}{2} \tag{4.29}
\]

where, expanding the formula in eq. (4.28), one obtains eq. (4.29) since \( Pr(\bar{\theta}|n_\tau, N - n_\tau) = \frac{1}{2} \) and the terms \( w_{\tau}(\bar{\theta}) \) and \( w_{\tau}(a|\theta) \) are equal to 0 by hypothesis. Remembering that \( w_{\tau}(\bar{\theta}) = w_{\tau}(a|\theta) = 1 \), and simplifying further the expression above, one obtains that:

\[
\Gamma(\tau) w_{\tau}(\tau|\bar{\theta}) \frac{1}{2} + (1 - \Gamma(\tau)) w_{\tau}(a|\theta) \frac{1}{2} - p_\tau = w_{\tau}(a|\theta) \frac{1}{2}
\]

\[
\Gamma(\tau) \frac{1}{2} + (1 - \Gamma(\tau)) \frac{1}{2} - p_\tau = 1 \frac{1}{2}
\]

\[
\Gamma(\tau) \frac{1}{2} - \Gamma(\tau) \frac{1}{2} + \frac{1}{2} - p_\tau = 1 \frac{1}{2}
\]

\[
p_\tau = 0
\]

which is impossible, given the assumption of \( p_\tau > 0 \). Since there cannot be a pivotal citizen mixing in equilibrium between the two actions, and the Incumbent mixing between the two policies contingent on observing a number of newspaper \( n_\tau \), I can conclude that an equilibrium in mixed strategies does not exist.

Finally, the proof for the \( j = \sigma \) newspaper is similar to the one just seen for \( j = \tau \), so I omit it. ■

So I have shown the existence of an asymmetric equilibrium in pure strategies, when a Broadsheet is produced, where \( n_\tau \) citizens who have received a signal equal to the one printed on the only produced newspaper buy a copy of the newspaper, while the others do not.

Regarding the production of the Tabloid, the following holds:
Lemma 33 There exists an equilibrium where Middle Class citizens in $t = 3$ never buy the produced Tabloid for any signal they have received, if the Tabloid price is strictly positive.

Proof. Regarding the $j = \phi$ newspaper, assume that the equilibrium strategy is such that each $\hat{i}_\phi$ buys the newspaper $j = \phi$, while each $\hat{i}_{\sigma \in \{\pi, \chi\}}$ does not buy it. Assuming that there are $n_\phi$ such citizens buying the newspaper $j = \phi$, it is straightforward to compute the following equilibrium beliefs: 

$$Pr(\tilde{\theta}|n_\phi, N-n_\phi) = \frac{Pr(n_\phi, N-n_\phi|\tilde{\theta})Pr(\tilde{\theta})}{Pr(n_\phi, N-n_\phi|\tilde{\theta})Pr(\tilde{\theta})+Pr(n_\phi, N-n_\phi|\tilde{\theta})Pr(\tilde{\theta})} = \frac{n_\phi(N-n_\phi)(1-q-q')^{n_\phi}(1-(1-q-q'))^{N-n_\phi}}{n_\phi(N-n_\phi)(1-q-q')^{n_\phi}(1-(1-q-q'))^{N-n_\phi} + n_\phi(N-n_\phi)(1-q-q')^{n_\phi}(1-(1-q-q'))^{N-n_\phi}} = \frac{1}{2}.$$ 

This means that if a $j = \phi$ newspaper gets produced, then for any number of copies bought by $\hat{i}_\phi$ citizens, this is never informative about the state of the world, since the posterior on the state of the world $\tilde{\theta}$ is equal to the prior. Knowing this, I can show that citizens $\hat{i}_\phi$ deviate from their equilibrium strategy regarding buying newspaper $j = \phi$. As I have just shown, the buying decision is not going to affect the implemented policy, since in equilibrium $Pr(\tilde{\theta}|n_\phi, N-n_\phi) = 1/2$ for each $n_\phi \in [0, N]$; therefore any $\hat{i}_{\sigma \in \{\pi, \chi\}}$ will not have any strategic motive of inducing the Incumbent to implement either of the two policy for sure, since buying the Tabloid does not change the Incumbent’s decision regarding the adopted policy but entails a positive cost, as long as $p_\phi > 0$. Furthermore, $\hat{i}_{\sigma = \phi}$ does not buy the Tabloid, since he knows that the Incumbent will mix between the two policies with any positive probability, whether he buys the newspaper or does not. Therefore no citizen buys the Tabloid which, in turn, does not get produced and the Incumbent mixes between the two policies with any positive probability.

Finally, in order to sustain the equilibrium, I impose the following rule: upon an out-of-equilibrium number of signals $\tilde{n}_\phi \neq n_\phi$, the Incumbent updates his beliefs as if $\tilde{n}_\phi$ was an equilibrium number of signals. Therefore $Pr(\tilde{\theta}|\tilde{n}_\phi, N-\tilde{n}_\phi) = \frac{1}{2}$ and the Incumbent mixes between the two policies. Since citizens anticipate this and know they will not change the implemented policy, but will have to bear a positive cost $p_\phi > 0$ in order to
buy the tabloid, they never change their equilibrium strategy of not buying the Tabloid.

By comparing the citizens' reading behaviour in the two scenarios, the one where citizens read only because they want to induce the Incumbent to implement their preferred policy, and the other where citizens read the newspaper because they derive some positive utility from consuming news, it is easy to see that there are some fundamental differences. In fact while both approaches justify the production of a Broadsheet, i.e. a campaigning newspaper that induces the Incumbent to adopt one policy or the other, only the approach where citizens read the newspaper for pleasure is able to justify the production of a Tabloid. Therefore one can conjecture that the right way to model the reading behaviour of (Middle Class) citizens is by having a model encompassing both the behaviours seen separately in this Chapter. In this more comprehensive model citizens would read the newspapers both for pleasure and to induce a policy shift in the Incumbent's policy adoption decision. Furthermore if one believes that reading any newspaper, be it Tabloid or Broadsheet, gives the same pleasure to the citizen, then the Broadsheet will give more utility to the reader, given the additional expected utility deriving from the probability of being pivotal and of having implemented the policy he thinks to be more likely to be optimal. Other things being equal this might be one explanation of why there is a price premium to the newspaper of high quality (Broadsheet) with respect to the newspaper of low quality (Tabloid). I leave the exploration of this topic for future research.

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Chapter 5

Whither Corruption? Bribes and Optimal Reforms in Business Startup

5.1 Introduction

Everyone has a word for it: 'hongbao' in China, 'baksheesh' in Arab countries, 'matabiche' in central Africa, 'propina' in Latin America, 'pots de vin' in France, 'mazzetta' in Italy or just plain bribery. Corruption is defined as the phenomenon arising whenever public officials “accept payments that violate some laws in order to affect the implementation of other laws or regulations” (Becker and Posner, Accessed 19 April 2010).12

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1This work is based on a previous project joint with Dr. Jad M. Chaaban of the American University of Beirut. While I thank him for his cooperation and invaluable inputs that made this Chapter possible, errors remain only mine.

2There is a large literature that sees corruption similar to a market mechanism which helps correcting the inefficiencies brought about by excessive and/or unsound regulation. Without disregarding this Coasian view, we prefer to view bribery as a phenomenon which reduces the social welfare. This might be because, for instance, there is a lack of competition among public officials which pushes the price of bribes above the benefit that bribers receive. From a dynamic viewpoint, corruption might be harmful because the economic resources spent in the bribing activity could rather be employed in reforming the inefficient regulations which create corruption. This reform would save money to the general public and increase social welfare if and only if the benefit from corruption is smaller than its cost.
Corruption and bribery are pervasive and universal phenomena, although their extent, size and importance is differentiated by nations and sectors of economic activity. They represent dangerous deficiencies in the correct relationship between the public and the private sector. One of the areas where corruption could be especially harmful to social welfare and growth is the start up of new businesses: the existence of corruption could constitute an additional cost of entry for new firms. Recognizing this, a number of international institutions have started to take moves to tackle bribery. In the wake of repeated scandals and the role that corruption played in the financial crises in South East Asia, the OECD launched in 1997 the Anti-Bribery Convention, the first global initiative to fight corruption in cross-border business deals. Until now it has been ratified by all 30 OECD members and six non-members. This convention makes it illegal for companies from member countries to bribe foreign government officials. The United States has had similar legislation for over 20 years: The Federal Corrupt Practices Act, adopted in 1977 in the wake of the Lockheed scandal, made the corruption of foreign officials a criminal offence. Yet these and other international conventions have not stopped local and multinational corporations from trying to secure valuable contracts by bribing government officials in the world’s emerging economies. Such practices seem widespread especially in the defence sector, public works and construction industries.

Several efforts have been also made to start quantifying the extent of corruption, especially when actors of different nationalities interact. Transparency International (TI), an international organization against corruption, released in 2002 a Bribe Payers Index (BPI) - a survey designed to measure perceptions in emerging market economies of the existence and extent of bribery performed by world companies. The survey was run in 15 emerging market economies and domestic companies in developing countries are ranked on top of the BPI: local firms in emerging market economies most often offer bribes to officials to secure contracts. Next come companies from Russia and then the People’s Republic of China. Companies from France, the United States, Japan and Italy - all part of the Group of Eight Industrial countries (G8) - are in the top ten of perceived
bribe paying nations. Companies from Australia are seen as the least likely to pay bribes (Transparency International, 2002).

The results from the BPI suggest that corporate bribe-paying to “get things done” is a pervasive phenomenon especially in developing and transition countries. It distorts the allocation of resources, inflates spending on public procurement and undermines competition in the market place. It has a devastating effect on investment and then on growth and development. One possible reason why corruption seems to depress investment is that it acts as a supplementary tax on private investment (Shleifer and Vishny, 1993). An additional corroboration of this comes from the World Bank’s Investment Climate Survey, a recent original database which contains, among others, indicators on firms’ side payments in developing countries “to get things done”. The data shows that, for instance, as much as 60 percent of surveyed firms in South Asia expected to give gifts when meeting with tax inspectors. The value of the gift expected to secure a government contract exceeds 8 percent of the contract’s value in Latin America.

This additional payment necessary to avoiding or reducing the payment of taxes, or to continue operating in a particular market, is sometimes required to prospective entrepreneur by corrupted public servant to start trading. In situation where underdevelopment is widespread and corruption is endemic, these additional upfront payments are even more distortionary to private initiatives and investment of start-up firms than taxation or legal cost of license (see Shleifer and Vishny (1993)). In fact corruption has the additional cost born by the businessman of the uncertainty of this illegal activity. Furthermore, an upper-front payment like that required to a prospective entreprenueur will be even more costly in situation where credit markets are far from being perfect or even well functioning. In institutional and economic settings of this kind, businesspersons will find hard to borrow easily and cheaply, especially in order to pay bribes to public officers. All this has the potential of impeding dramatically the entrepreneurial activity, particularly of investment in new ventures.
Nevertheless while research on corruption has thrived in recent years, work investigating its impact on business startup and private investment is still very limited. Mauro (1995) finds that an aggregate institutional indicator of corruption is negatively associated with total investment in his sample of countries. Brunetti, Kisunko and Weder (1997) present results from a survey of entrepreneurs suggesting that perceived unreliability of the judiciary, government instability, and corruption negatively influence cross-country differences in aggregate investment. Brunetti and Weder (1998) find that among institutional factors, lack or weak rule of law and large corruption are the most detrimental to investment.

This literature has provided important insights on the role of corruption as an impediment for private investment; nevertheless it also has few drawbacks. First, in this literature corruption is measured with perception indexes, which raises concerns about perception biases. Moreover, even if they were not plagued by biases, these indexes are ordinal: their use in studies trying to establish quantitative relations seems questionable. More importantly, a central feature lacking in this literature is a theoretical framework that provides a consistent framework for understanding how corruption relates to the incentives of various actors involved in the startup of businesses. In fact, most current research on the regulation of entry and its ensuing policy recommendations ((Djankov, McLiesh and R.Ramalho, 2006; WorldBank, 2007)) rely on a reasoning by which entry reforms always benefit firms and social welfare. Yet once government revenues, public employees welfare, and the potentially beneficial role of bribes is taken into account, recommendations on what is the best reform strategy in business startups are not straightforward anymore. This paper fills this gap by elaborating a stylized theoretical model which allows for strategic incentive-based interaction among three players: the government, the public sector employee, and the private entrant firm. A key result of this theoretical model is that bribery is now determined as an endogenous equilibrium.

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4See Dreher, Kotsogiannis and McCorriston (2007) for more on this point.

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and that, when setting the business tax policy, the Government anticipates the existence of bribes and decreases the optimal tax accordingly. Next I am able to identify the effect that reforms to the regulation of entry of new firms have on Government’s finances and on firms’ welfare. I show that reforming the start up regulation can help boosting the finances of the Government. In particular, the larger increase in Government’s fiscal resources comes from a complete liberalisation of the start up process, i.e. in a radical decrease in the cost of starting up a business.\(^5\) However I find that moving to a privatisation reform of the public sector is preferred when the savings coming from the downsizing of the public sector are larger than the losses in fiscal resources due to higher direct costs born by the firms. On the other hand implementing a performance wage reform is optimal when the additional costs following a more expensive public sector are smaller than the increases in fiscal resources received from the Firms due to the inferior direct costs born by them. Interestingly reforming the public sector might not be optimal whenever the transaction costs are small. Regarding the Firm preferences towards different scenarios, again the optimal reform is a complete liberalisation of entry. Furthermore the firm prefers privatisation to the status-quo if the transaction costs associated to the corruption are large enough and the private sector salaries are small. Surprisingly, to the last two institutional frameworks, the Firm prefers switching to a performance wage reform although this means having to pay higher business taxes. 

This chapter is organized as follows. In Section 2 I outline the main building blocks of our theoretical model. Section 3 discusses the theoretical results that emerge when the government has limited instruments (i.e. only confined to setting wages and taxes). Moreover I identify the change in the players’ utility that could be brought about by the hiring of honest employees. In Section 4 I investigate three common policy reforms which can be used to eradicate bribery: incentive wages, privatisation, and liberalisation and we derive players’ utility in each one of these scenarios. In Section 5 I establish the

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\(^5\)For a similar result on the effect of reforming the start-up sector on GDP growth, see Djankov, McLiesh and R.Ramalho (2006).
relative merits of each of the three reforms for the players’ utility and with respect to the status quo. Section 6 concludes.

5.2 The Model

The stylized model I employ has three players: the Government (principal), the government Employee or the civil servant (agent), and a startup Firm. The Employee has to perform a task on behalf of the Government. Since our context is one of business start-up, I think of the task as the amount of paper-work, administrative and bureaucratic procedures that the Employee has to complete before the Firm is allowed to start operating in the market. These bureaucratic procedures generate some disutility $\delta$ for the Firm equal to their costs of completion. For instance, think of the amount of time the Firm spends to complete those procedures and deal with the bureaucracy and the non-pecuniary costs this causes. In other terms I take this variable $\delta$ to represent the costs of regulation in the start-up sector of the economy. The variable $\delta$ can assume two different values $\delta \in \{d, D\}$ with $D > d > 0$. With this simple modelling choice I want to capture the fact that, in most of the bureaucratic procedures, there is some amount of discretion on part of the bureaucracy that may alter the regulatory burden cost suffered by the Firm. For example in many countries, and especially in countries where the quality of governance is low, rules are formally fixed but in reality rather flexible and discretionary; nevertheless regulation might be quite burdensome ((WorldBank, 2004b, Ch. 9)). This is true in general as well as in particular in the context of business start up regulation. As a consequence, the public Employee enjoys quite a large subjective power in deciding when to allow a business to (start to) operate. In fact the array of regulation might involve rules that, if taken literally, might long delay the Firm’s entry in the market. However, with another more favourable interpretation, the Firm could be given the permit to trade more quickly, so seeing its overall regulatory cost reduced. 6

6With reference to this, it is useful to read the World Bank’s Doingbusiness 2006 report (WorldBank, 2006). Among the set of rules to allow firms to start up their operations in Be-
Therefore I make the hypothesis that the Employee can favour or hinder the start up of the business that has asked for the permission to begin operating.

I model this assuming that, by exerting an effort the Employee will induce the good outcome, i.e. the smaller cost $d$ rather than the larger cost $D$. Nevertheless, I find it convincing to assume that the fact of one event happening rather than the other is probabilistic in nature. In fact the Employee does not control entirely the whole administrative process of the Firm entering the market. For instance there might be other procedures that affect the process of the regulatory activity and the related cost for the Firm. However these procedures are under the responsibility of other public employees left unmodelled here. Alternatively one may think that the Government could state a set of rules for the start-up firm that the employee would not have any choice but follow. However the Government cannot do so because he is aware that procedures cannot be fully specified under all the possible circumstances and the Employee has to enjoy some flexibility in implementing the rules.

For instance some firms could be allowed to enter the market promptly because they do not present particular problems with some aspects of the regulation (for instance health and safety regulation). Nevertheless other firms could be delayed to start operating because the Employee would like to make further inquiries on the implementing of those same rules by the would-be entrepreneurs. This might be because the Employee would

larus, Procedure 4 concerns the business registration with the State Registry. According to the details about the registration requirements, “[...] the registry also checks the background of founders and registers the company into the unified registration database. General term is 1 month. If the register needs to make an inquiry for additional information about the founders of the Company, it can extend the term till 2 months, in such case it should notify the founders.” (italics ours). The details for the procedures to start a business in Belarus are accessible online at http://www.doingbusiness.org/ExploreTopics/StartingBusiness/MoreDetails.aspx?economyid=19.

Like in Belarus also in Uzbekistan the procedures to start up a business are characterized by a certain amount of discretion. According to the Doingbusiness 2006 report the firm has to require and produce a whole array of documents, permits and authorization to “[...] register with the local authority (khokimiyat) and obtain the Certificate of State Registration [...] Time to complete is from 7 days to 1 month depending on how complicated the registration documents are”. The details for the procedures to start a business in Uzbekistan are accessible online at http://www.doingbusiness.org/ExploreTopics/StartingBusiness/MoreDetails.aspx?economyid=199

Similar features are encountered in most of the start up business procedures in the LDC, where a high degree of flexibility and discretion seems to be the norm rather than the exception.
like to apply the existing regulation in the best possible way, in order to maximise social welfare.

Alternatively, the Government leaves the Employee some discretion on purpose in order to give him some power to extract and grab the rents from the Firm.

Formally, I make the assumption that the following holds:

\[ Pr(d|e = 1) = \pi_1 \]
\[ Pr(D|e = 1) = 1 - \pi_1 \]
\[ Pr(d|e = 0) = \pi_0 \]
\[ Pr(d|e = 0) = 1 - \pi_0 \]

with \( \Delta \pi = \pi_1 - \pi_0 > 0 \). This indicates that a good outcome, i.e. a lower cost \( d \) is more likely to be achieved when the agent makes an effort (the usual First Order Stochastic Dominance assumption).

Given this setting, the Employee’s effort is assumed to benefit the Firm, which places a positive value on \( e = 1 \). However, when exerting the positive effort, the agent incurs a disutility \( -v \). i.e. \( v(e = 1) = v > 0 \). Obviously when the Employee does not exercise any effort, he does not bear any disutility. Without loss of generality I can set \( v(e = 0) = 0 \).

The Government has the task of setting a business tax policy and a public sector wage policy. The business tax policy consists of two instruments: i) a fixed entry fee \( F \) to allow the start-up Firm to start operating; ii) a corporate tax \( \gamma \), with \( \gamma \in (0, 1) \) on the expected profit \( \Pi > 0 \) the Firm is making when entering the market. Regarding the wage policy, the government pays \( w \) to the Employee to perform his job.\(^7\)

The Firm’s utility is given by the net profit \( (1 - \gamma) \Pi \) minus the sum of the costs of the regulatory activity \( F + \delta \). Notice that these are fixed costs that the Firm has to bear

\(^7\)I make the implicit assumption that the not-fiscal regulatory policy, i.e. the variable \( \delta \), is fixed and it is not decided upon by the Government. This is because I want to focus on the fiscal resources the Government can raise out of the start-up sector of the economy. However later in the paper I will analyse what happens when, in a liberalisation reform, the Government decides to eliminate altogether the regulatory activity, both fiscal \( F \) and not fiscal \( \delta \).
before operating in any market and are not deducted from the net profit \( \Pi \). The reason for this is twofold: regarding \( \delta \), this represents indirect and non-monetary costs that come out from the regulatory activity of the Government and as such cannot be substracted from the revenues of the Firm. As far as \( F \) is concerned, I want to isolate the effect of these costs on the Firm’s utility, in order to perform later on some simulations on the effect of changing the entry fee on players’ utility (Firm and especially Government).

Together with the legal interaction between Firm and Employee mediated by the Government, an illegal direct one coexists. In fact, the Firm may pay the Employee a bribe \( b \geq 0 \) to induce him to exert the effort and reduce the cost \( \delta \) from \( D \) to \( d \). Therefore the agent’s payoff is made of a legal part (the wage) and an illegal one (the bribe). For simplicity I assume that the agent’s utility is linear in both wage and bribe:

\[
U_E(w, b, e) = w + b - v(e)
\]

Likewise the Firm’s utility is linear in both payments and profit, i.e.:

\[
U_F(b, \gamma, F, \delta) = (1 - \gamma)\Pi - F - \delta - \beta b
\]

Notice that the Firm pays \( \beta b, \beta > 1 \), but the Employee receives \( b \). With the introduction of the parameter \( \beta > 1 \), I want to model the existence of transaction costs between Firm and Employee in the illegal market for bribing. I assume that illegal transactions are harder to carry out successfully than similar transactions performed lawfully. To model in a simple way this difficulty I introduce the assumption that there are some additional costs involved in the illegal transactions, i.e. the parameter \( \beta \); this makes what the Firm pays larger than what the Employee receives.

Throughout the chapter the Government is assumed to be benevolent. As already said the Government chooses a corporate tax policy and a public sector wage policy to maximize the following social welfare function subject to the incentives of the players involved in the start up sector of the economy:

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\[ U_G = N \left( U_F^* \right) \left( \gamma \Pi + F \right) - Mw + B \]  \hfill (5.3)

In eq. (5.3) the term \( B \) represents the net revenues for the Government coming from the taxation of the rest of the economy, i.e. from the non-start-up sectors of the economy. Since the focus of this paper is on the start-up sector, I take the term \( B \), normalising to zero without any loss of generality. The net revenues from the start-up sector of the economy are equal to \( N \left( U_F^* \right) \left( \gamma \Pi + F \right) - Mw \), where \( w \) is the wage of the public employee of the start-up sector, \( M \) is the number of public employees, and \( N \left( U_F^* \right) \left( \gamma \Pi + F \right) \) are the fiscal resources, with \( N \left( U_F^* \right) \) the number of the start-up firms, depending on the Firm’s net equilibrium utility \( U_F^* \). I find it reasonable to assume that, the larger is the utility the Firm enjoys in the market, the larger is the number of Firms willing to enter the market itself. Formally, this means that \( N' \left( U_F^* \right) \geq 0 \). However, the increase in the number of firms entering the market happens at a decreasing rate, with the increase of the utility the Firm enjoys in the market. Formally, this means that \( N'' \left( U_F \right) < 0 \). Furthermore I find it convenient to assume that there is some upper bound to the number of firms entering the market, i.e. there exists a number \( \bar{N} \) s.t. \( \lim_{U_F \to \Pi} N \left( U_F \right) = \bar{N} \).

So the assumptions just stated affirm that the number of firms starting up their business operations is increasing in the Firm’s utility, although at a decreasing rate and that the number of firms cannot increase indefinitely when the utility of the firms approaches its maximum level (\( \Pi \)), but there is a limit to this number.

These assumptions can be justified in the sense that there are some positive (network) externalities between Firms in this industry or, similarly, there are increasing returns to scale at the industry level, such that the larger is the net equilibrium utility the single Firm receives in the market, the larger is the number of Firm entering the market, sensing good business opportunity. However, since this cannot continue indefinitely, otherwise all the Firms would end up concentrating in one single industry, the increase in the number of Firms must have an upper bound, after which the number of firms operating in the industry decreases (and in any case it does not increase strictly) with the increasing in
the net equilibrium utility. In this case the negative externalities due to concentration becomes larger than the positive externalities. However, for the purpose of this chapter, it suffices to have an upper bound to the increase in the number of firms.

The Government wants to maximise its fiscal revenues because in this way it will be able to increase its resources in order to fund the supply of a public good or of a good publicly produced to the advantage of the citizens. Alternatively, I can think that the fiscal resources collected will be used to fund an income redistributive programme towards the rest of the society. For simplicity of treatment, and since it is outside the focus of this paper the optimal mix between public and private good in the economy, I do not model either the offer of the public good to the society or its effect on players’ utility. Finally, this modeling choice of the government maximising the fiscal revenues of the economy is common in the “corruption with a benevolent principal” stream in the literature (Aidt, 2003). In this literature, bribes arise when a benevolent principal delegates decision making power to a non-benevolent agent.

5.3 Bribes with Limited Government Instruments

I begin by assuming that the Government has limited instruments. Thus incentive wages cannot be devised and other reforms are also impossible or too costly to implement. The timing of the game is the following: first, the Government selects both a corporate income tax $\gamma$ and a fixed fee $F$ to be levied on the Firm and a (fixed) wage $w$ to be payed to the Employee; second, the Firm determines whether to bribe the Employee or not and if so, the Firm decides which “menu of bribes” $\{\bar{b}, \bar{\delta}\}$ to offer; third, the Employee decides whether to exert or not an effort, which is not observable; subsequent to the agent’s action, the outcome $\delta \in \{d, D\}$ is realized; finally contracts are executed, the Firm earns its profit and the Government raises its fiscal resources.

The game described above illustrates a case of sequential contracting in the presence of moral hazard, yet under a situation where the agent has two different principals: first
it is the Government offering him the wage $w$ and then the Firm offering the bribe $b$. I have therefore to solve this dynamic game by backward induction. I begin by solving for the optimal bribe which has to be paid by the Firm to induce the Employee’s effort $e = 1$.\(^8\)

### 5.3.1 Firm-Employee Interaction

At the second stage, the Firm would like to interact illegally with the Employee by offering a bribe if and only if effort is valuable and she anticipates that the Employee will not exert any effort following the contract offered by the Government. In fact if the Employee exerts effort following the Government contract, then for the Firm it will be useless to ask the Employee to do so using the bribes.

Since a positive effort decreases stochastically the Firm’s regulatory burden, then the Firm would like to induce agent’s effort $e = 1$ by offering the Employee a menu of bribes $\{b, \overline{b}\}$. The payment $\overline{b}$ is paid to the Employee if and only if the outcome is good (i.e. $\delta = d$), while $b$ is paid if and only if the outcome is bad (i.e. the regulatory cost is large $\delta = D$). To induce a positive effort, the Firm solves the following program:

\[
\begin{align*}
\text{For } (e = 1) & : \max_{\{b, \overline{b}\}} (1 - \gamma)\Pi - F - \pi_1 (d + \beta \overline{b}) - (1 - \pi_1) (D + \beta b) \\
\text{s.t. } & w + \pi_1 \overline{b} + (1 - \pi_1) b - v \geq w + \pi_0 \overline{b} + (1 - \pi_0) b \\
& (IC_{bE}^r) \\
& w + \pi_1 \overline{b} + (1 - \pi_1) b - v \geq w \\
& (IR_{bE}^r) \\
& \overline{b} \geq 0 \\
& (LL.a_{\overline{b}E}^r) \\
& b \geq 0 \\
& (LL.b_{bE}^r)
\end{align*}
\]

\(^8\)Laffont and Martimort (2002) provide an excellent exposition of principal-agent models involving moral hazard.
The Firm therefore has to offer a bribe scheme which satisfies the Employee’s incentive compatibility ($IC_{E}^{br}$ constraint), individual rationality ($IR_{E}^{br}$ constraint), and limited liability ($LL.a_{E}^{br}$ and $LL.b_{E}^{br}$ constraints). From the ($IR_{E}^{br}$) and ($IC_{E}^{br}$) constraints it is possible to see respectively that i) the Employee’s utility from participating in the bribing scheme has to be non-negative; ii) the Employee’s utility from exerting the effort has to be at least as large as his utility from not exerting the effort. Moreover the two ($LL.b_{E}^{br}$) constraints are natural in this setting because the bribe is by definition a non-negative payment to the employee (i.e. no penalties can be imposed by the Firm on the civil servant if the outcome is not successful).

By solving the above programme the following result is obtained:

**Lemma 34** The optimal bribe schedule that the Firm offers to induce the effort $e = 1$ is: $b^* = 0$ and $\bar{b}^* = \frac{\nu}{\Delta \pi}$.

**Proof.** Since paying bribes is costly for the Firm, from ($LL.a_{E}^{br}$) it is optimal to set $b^* = 0$. Following the same reasoning, it is optimal to have the ($IC_{E}^{br}$) binding. So from $w + \pi_1 \bar{b} + (1 - \pi_1) 0 - v = w + \pi_0 \bar{b} + (1 - \pi_0) 0$, it is easy to see that $\bar{b}^* = \frac{\nu}{\Delta \pi}$. Finally I check that the solution $\{b^*, \bar{b}^*\} = \{0, \frac{\nu}{\Delta \pi}\}$ satisfies the ($IR_{E}^{br}$) constraint with strict inequality. In fact $w + \frac{\pi_1}{\Delta \pi} v + (1 - \pi_1) 0 - v = w + \frac{\pi_0}{\Delta \pi} v > w$, given that $\frac{\pi_0}{\Delta \pi} v > 0$. ■

In words, the Firm commits not to pay the Employee in case of a “failure” ($\delta = D$). On the other hand, in the case of a “success” ($\delta = d$) the Firm will pay the agent a bribe equal to his disutility level $v$ divided by the probability differential $\Delta \pi$. The Firm’s expected utility when the effort is induced and these optimal bribes are implemented is equal to:

$$U_{F_{e=1}} = (1 - \gamma) \Pi - F - \pi_1 d - (1 - \pi_1) D - \beta \left( \frac{\pi_1}{\Delta \pi} v \right)$$

---

9 As it is known, the existence of an (LL) constraint makes the optimal contract with a risk neutral agent similar to the optimal contract when the agent is risk averse.

10 In considering the optimal bribing contract to offer to the Employee, notice that the Firm takes into account the Employee’s wage. However this is not going to influence the menu of bribes the Firm proposes.
In order for the Firm to be willing to induce effort through bribing, it has to enjoy a positive net expected utility from bribing \((U_{Fe=1} \geq 0)\). Moreover, the utility from inducing effort through bribing has to be larger than Firm’s utility when no effort is induced and no bribe is paid. In this latter case the Firm’s utility is equal to \(U_{Fe=0} = (1 - \gamma)\Pi - F - \pi_0d - (1 - \pi_0)D\), which I assume being positive, in order for the Firm to enter the market also when the Employee does not exert any effort. The condition such that the Firm’s utility is larger under bribing than under no bribing, i.e. \(U_{Fe=1} \geq U_{Fe=0}\) amounts to \(-\pi_1d - (1 - \pi_1)\Delta \geq -\pi_0d - (1 - \pi_0)D\), i.e. to the following condition:

\[
\Delta \pi (D - d) > \beta \left( \frac{\pi_1 v}{\Delta \pi} \right)
\]

Throughout the rest of the Chapter, I assume that the condition in eq. (5.5) for bribing to take place holds. The condition says that if the expected benefit gained from inducing effort through bribing, i.e. the reduction into the expected regulatory burden imposed to the Firm \(\Delta \pi (D - d)\), is greater than the expected cost \(\beta \left( \frac{\pi_1 v}{\Delta \pi} \right)\), bribing always takes place. It is clear that this happens the smaller are the transaction costs \(\beta\), the less hard is the task the Employee has to perform (i.e. the smaller is the effort cost \(v\)), and the larger is the cost of discretionality imposed on the Firm \(\Delta \pi (D - d)\).

### 5.3.2 The Employee and the Government

The results from the previous section (see Lemma 34) constitute the outcome of the Firm’s decision problem at node \((II)\). Now I want to show that this is in fact an equilibrium decision and that for the Firm it is optimal to bribe the Employee to induce his effort, since he would not do so without bribing. In fact at node \((IV)\) the Employee, having been offered a fixed and not contingent wage \(w\) by the Government, and subject to the fact that the Firm has decided not to bribe, decides whether or not to exert the effort in the legal interaction between him and the Firm. Comparing the Employee’s expected
utility when exerting the effort \( U_E(e = 1) \) and when not exerting it \( U_E(e = 0) \), at node (IV) subject to the Firm not bribing, I can establish the following Lemma:

**Lemma 35** At node (IV) the Employee’s dominant strategy is not to exert any effort: \( e^*_{IV} = 0 \).

**Proof.** At node (IV) the Employee rationally anticipates that if he exerts an effort \( e = 1 \) he gets an expected payoff of: \( U_E(e = 1) = w - v \). However if \( e = 0 \) the expected payoff is \( U_E(e = 0) = w \). By comparing \( U_E(e = 1) \) and \( U_E(e = 0) \) above it is obvious that \( U_{Ee=0} > U_{Ee=1} \). As a result Employee’s dominant strategy at node (IV) is to shirk. ■

Putting together all the previous results, I may state the following Lemma:

**Lemma 36** When the Government has limited instruments, the Employee never exerts any effort at the legal stage; however he always accepts an illegal bribing contract with the Firm.

**Proof.** Lemma 34 together with Assumption 2 above establish that the Firm’s equilibrium strategy is \( b^* = 0, \ b^*_e = \frac{w}{\Delta \pi} \) and that the Employee always exerts effort at node (III), i.e. \( e^*_{III} = 1 \). Lemma 35 shows that the Employee’s dominant strategy at node (IV) is \( e^*_{IV} = 0 \). All these partial and previous results establish the statement above. ■

At this point I can now compute the Firm’s and the Employee’s equilibrium utility in this situation. I put a superscript \( d \), to indicate that we are in the presence of a dishonest Employee in a framework of weak governance or capacity, i.e. in an institutional environment where the Government has no tools in the organization of the public sector:

\[
U^d_E = (1 - \gamma)\Pi - F - [\pi_1 d + (1 - \pi_1) D] - \left[ \beta \frac{\pi_1}{\Delta \pi} v \right]
\]
\[
U^d_E = w + \left[ \frac{\pi_1}{\Delta \pi} - 1 \right] v
\]

(5.6)

(5.7)
Notice here that, in addition to his fixed and non-contingent wage, the Employee receives a positive expected bribe payment equal to $\left[ \frac{\pi_1}{\Delta w} \right] v$, which is incurred in equilibrium by the Firm. The Firm’s expected utility consists of three parts: other than the positive part equal to the net profit $(1 - \gamma)\Pi$, there are two factors entering with a negative sign: i.e. the part expressing the fixed (monetary) cost of the regulatory activity of the Government $-F$ and the part coming from the discretionary activity of the Employee and the Firm, i.e. $-\left( [\pi_1 d + (1 - \pi_1) D] + \left[ \frac{\tau_n}{\Delta w} v \right] \right)$.

I can describe this equilibrium situation as a “self-enforcing corruption mechanism”: public sector employees receive bribes from firms willing to pay them in order to get a given expected benefit they are unable to receive legally. Moreover, the existence of this “illegal activity” always crowds out the legal one and brings about inefficiency in the public sector, as effort is never induced legally, i.e. following the wage contract between Firm and Government. What can the Government do in front of such a situation? From the utility equilibrium expressions of Firm and Employee it is possible to see that three variables have to be decided upon still: the equilibrium level wage $w$ and the equilibrium level of corporate tax $\gamma$ and fixed cost $F$. To find a solution for these three variables the Government has to be called upon to act: in fact the Employee is a public servant and the State is the only actor having the right (and the power) to tax and transfer. The Government’s decisions in terms of business tax policy and public sector wage policy are dealt with in the next subsection.

5.3.3 Government’s Equilibrium Decision

At node ($I$), the Government chooses a corporate income tax $\gamma$, a fixed entry cost $F$ and a wage level $w$ to maximize the following programme:
\begin{equation}
\begin{aligned}
\max_{\{\gamma, F, w\}} U_G &= N \left( U_E^* \right) (\gamma \Pi + F) - Mw + B \\
\text{s.t.} \quad & U_E^{d^w} \geq 0 \quad (IR^d_E) \\
& U_E^{d^x} \geq w_0 - v \quad (IR^d_E)
\end{aligned}
\end{equation}

The Government has to propose a corporate tax and a fixed entry cost acceptable to the Firm and a wage scheme to the Employee. Furthermore, the Government is aware of the fact that there is the possibility of bribing taking place illegally between Firm and Employee. Therefore it correctly anticipates that Firm’s and Employee’s utility to be considered in the programme above will be the ones in equations (5.6) and (5.7). I can then rewrite the above programme as follows:

\begin{equation}
\begin{aligned}
\max_{\{\gamma, F, w\}} U_G &= N \left( U_E^p \right) (\gamma \Pi + F) - Mw + B \\
U_E^p &= (1 - \gamma)\Pi - F - [\pi_1d + (1 - \pi_1)D] - \left[ \beta \frac{\pi_1}{\Delta \pi} v \right] \geq 0 \\
U_E^{d^x} &= w + \left[ \frac{\pi_1}{\Delta \pi} - 1 \right] v \geq w_0 - v
\end{aligned}
\end{equation}

Notice that the expression for the Employee’s utility is such that the net utility has to be larger than \(w_0 - v\), where \(w_0 - v\) indicates the Employee’s outside option, for instance the salary that he could earn in the private sector net of the disutility from the effort.\(^{11}\) Since the Government is interested in maximising fiscal resources, i.e. the sum \(y = \gamma \Pi + F\), I rewrite the above programme by substituting \(y\) for \(\gamma \Pi + F\). So the new program the Government maximises is the following:

\(^{11}\) I make the implicit assumption that the private sector is endowed with some (contractual) mechanism that induces Employee’s effort. Therefore the term \(w_0\) can be thought of salary in the private sector and the effort \(v\) is such that the Employee’s effort in the private sector is equal to Employee’s effort in the public sector.
\[
\begin{align*}
\max_{y,w} U_G &= N \left( U^*_F \right) y - Mw + B \\
U^*_F &= \Pi - y - [\pi_1 d + (1 - \pi_1) D] - \left[ \beta \frac{\pi_1}{\Delta \pi} v \right] \geq 0 \\
U^*_E &= w + \frac{\pi_0}{\Delta \pi} v \geq w_0 - v
\end{align*}
\]

Finally notice that the programme above is well behaved, since the two constraints are linear and the objective function is strictly concave in the variable \( y \) when the fiscal burden on corporate income is not too large. In fact \( \frac{\partial}{\partial y} U_G = -N' \left( U^*_F \right) y + N(U^*_F) \geq 0 \) for \( y \leq \frac{N(U^*_F)}{N'(U^*_F)} \) and \( \frac{\partial^2}{\partial y^2} U_G = -N'' \left( U^*_F \right) (-1)y + [\Pi - N'(U^*_F)] + (-1)N'(U^*_F) = N'' \left( U^*_F \right) y - 2N' \left( U^*_F \right) < 0 \) by assumption.

By solving the programme above the results can be summed up in the following Proposition:

**Proposition 37** When the Government has limited instruments, the Employee is dishonest and a bribing stage is beneficial to both the Firm and the Employee, the Government pays the Employee a fixed minimum wage of \( w^d = w_0 - \frac{\pi_1}{\Delta \pi} v \) and taxes the Firm the amount \( y^* = \gamma \Pi + F = \frac{N(U^*_F)}{N'(U^*_F)} \).

**Proof.** [In the Appendix] □

Since the Government has limited instruments, it can only propose a fixed wage \( w^d \), which I assume to be positive (i.e. \( w^d \geq 0 \) or \( w_0 \geq \frac{\pi_1}{\Delta \pi} v \)), which is not contingent on Employee’s effort or performance. The Government cannot devise incentive wages and it has to offer a wage which is equal to the outside option the Employee has, say the wage \( w_0 \) offered in the private sector. However, by anticipating that bribes will be offered by the Firm in equilibrium, then the Government can decrease the wage offered consequently and still attract employees.
With the results in Proposition 37 I can compute the Government’s utility in the case when it has limited instruments to induce the Employee’s effort and an illegal market for bribes exists and it is beneficial. The Government’s equilibrium welfare is then:

\[
U^*_G = N \left[ \Pi - (\pi_1 d + (1 - \pi_1) D) - \left( \beta \frac{\pi_1}{\Delta \pi} v \right) - y^* \right] \frac{N(U^*_F)}{N'(U^*_F)} - M \left( w_0 - \frac{\pi_1}{\Delta \pi} v \right) + B
\]

\[
U^*_G = N \left( U^*_F \right) y^* - M \left( w_0 - \frac{\pi_1}{\Delta \pi} v \right) + B
\]

I can interpret the above expression in the following way: the Government’s utility from the start-up sector of the economy is equal to the fiscal resources raised per start-up firm \((y^*)\) times the number of starting-up firms in equilibrium \((N \left( U^*_F \right))\) minus the total wages paid to the public employees \(M \left( w_0 - \frac{\pi_1}{\Delta \pi} v \right)\) plus the resources from the not-start up sector of the economy \(B\). Notice that the fiscal resources raised per firm is equal to \(y^* = \frac{N(U^*_F)}{N'(U^*_F)}\), i.e. to the ratio between the number of Firms as a function of the Firm’s utility and the derivative of this function.

This means that the Government taxes the Firm to the point where a marginal increase to the taxation \(y^*\) times the decrease into the number of firms brought about by this \((N'(U^*_F))\), is equal to the number of Firms in the industry \((N \left( U^*_F \right))\) which gives the total amount of fiscal resources.

Finally notice that, throughout the chapter I will assume that \(y^* = \frac{N(U^*_F)}{N'(U^*_F)}\) is an interior solution, i.e. that the utility of the firm is large enough, so that \(U^*_F (y^*) > 0\).

### 5.3.4 Limited Instruments with an Honest Employee

In this paragraph I conduct a similar analysis to the one above, assuming that Employee is honest: in our framework this corresponds to the Employee exerting effort at the node \((IV)\), i.e. \(e^*_{IV} = 1\). The reason for carrying out this analysis is to compare the different players’ payoffs when the public servants are dishonest with their payoffs when the civil servants are honest, that is they do not take bribes. One can imagine that the Employee
does not like to take bribes in the illegal market and then he always exercises effort at the legal stage, with no need for a wage contract contingent on his performance.\textsuperscript{12} For instance one can think that there are cultural norms or beliefs which have a strong impact on the Employee’s behaviour and then shape his actions, without the need for monetary and explicit incentives.\textsuperscript{13} Alternatively, assume that the transaction cost parameter is very large, at the limit going to infinity ($\beta = +\infty$). The existence of such large transaction costs makes collusion between Firm and Employee impossible to be performed: in this case, bribes are not exchanged and effort is not exerted illegally. The programme above rewrites in the following way, with the superscript $h$ indicating the honest Employee case:

\begin{eqnarray*}
\max_{\{y,w\}} U^h_G &=& N (U^h_E) y - Mw + B \quad (5.9) \\
U^h_F &=& \Pi - [\pi_1 d + (1 - \pi_1) D] - y \geq 0 \quad (IR^h_F) \\
U^h_E &=& w - v \geq w_0 - v \quad (IR^h_E)
\end{eqnarray*}

The programme rewrites in such a way that for the players (Firm and Employee) there is no illegal contracting. However in the legal interaction between Employee, Firm and Government, the possibility of success is equal to $\pi_1$, given the Employee exerts the effort with certainty. Regarding the Employee, the Government anticipates that he will exert effort for sure and then his utility must be not less than the outside option he would get in the private sector, i.e. $w_0 - v$.

Solving the programme above one obtains the following Proposition:

\textbf{Proposition 38} When the Government has limited instruments and yet the Employee

\textsuperscript{12}In this case bribes are never exchanged for any value of the transaction cost parameter $\beta$ and in particular for $\beta = 1$.

\textsuperscript{13}Think of the “commis d’etat” tradition in the French Bureaucracy of the Grande Ecoles (for instance the ENA, (Ecole Nationale d’Administration)), where the graduated bureaucrats are and feel part of an elite which sees the service to the State as its greatest aspiration and a task worthy to be pursued per se, beyond its financial reward.
is honest, the Government pays the Employee a fixed wage of \( w^h = w_0 \) and taxes the Firm with the amount \( y^{h*} = \gamma \Pi + F = \frac{N(U_F^h)}{N'(U_F^h)} \).

**Proof.** To solve the program apply the same reasoning as in the previous program with the dishonest employee. As before the Government wants to decrease the wage as much as it can and increase the tax. By making the \((IR^h_F)\) constraint binding, one obtains the equilibrium wage \( w^h = w_0 \). In this case the salary the Government has to offer to the honest Employee is higher than in the case with the dishonest one: the Government anticipates the Employee is going to exert effort in his task with probability one and then wants to compensate him for the disutility he is going to incur. Regarding the tax, it is easy to see that \( y^{h*} = \gamma \Pi + F = \frac{N(U_F^h)}{N'(U_F^h)} \).  

Since \( U_F^h > U_F^d = U_F - \beta \frac{\pi_1}{\Delta \pi} v \) then \( N(U_F^h) > N(U_F^d) \) and \( N'(U_F^h) < N'(U_F^d) \). As a conclusion, in equilibrium \( \frac{N(U_F^h)}{N'(U_F^h)} = y^{h*} > y^{d*} = \frac{N(U_F^d)}{N'(U_F^d)} \); in the honest scenario, the Government optimally taxes the Firm more than in the dishonest scenario.

In order to conduct easily the comparison between different scenarios, I specify a functional form for the function \( N(U_F) \). For simplicity I assume that \( N(U_F) = \sqrt{U_F} \). Rewriting the results, I find that:

\[
y^{h*} = \frac{\sqrt{\Pi - [\pi_1 d + (1 - \pi_1) D] - y^{h*}}}{2\sqrt{\Pi - [\pi_1 d + (1 - \pi_1) D] - y^{h*}}} = 2 \left( \Pi - [\pi_1 d + (1 - \pi_1) D] - y^{h*} \right)
\]

\[
y^{h*} = \frac{2}{3} (\kappa)
\]

with \( \kappa = \Pi - [\pi_1 d + (1 - \pi_1) D] \). From this it follows easily that \( U_F^{h*} = \Pi - [\pi_1 d + (1 - \pi_1) D] - y^{h} = \Pi - [\pi_1 d + (1 - \pi_1) D] - \frac{2}{3} (\kappa) = \frac{1}{3} (\Pi - S - [\pi_1 d + (1 - \pi_1) D]) = \frac{1}{3} (\kappa) \).

Following the same reasoning, it is simple to see from Prop. 37 that:

\[
y^{d*} = \frac{\sqrt{\Pi - S - [\pi_1 d + (1 - \pi_1) D] - y - \beta \frac{\pi_1}{\Delta \pi} v}}{2\sqrt{\Pi - S - [\pi_1 d + (1 - \pi_1) D] - y - \beta \frac{\pi_1}{\Delta \pi} v}} = 2 \left( \kappa - \beta \frac{\pi_1}{\Delta \pi} v \right)
\]

and that, in equilibrium, \( U_F^{d*} = \frac{1}{3} (\kappa - \beta \frac{\pi_1}{\Delta \pi} v) \). So it is straightforward to conclude that
having a honest employee, although it increases the Firm’s equilibrium tax, it also raises its utility. In fact, thanks to the presence of honest Employees, the Firm does not bear anymore the cost of bribing and can save a substantial share of the (transaction) costs it used to have in a less transparent scenario.

In order to complete the analysis of the two situations, it suffices to compare the Government’s utility in the case of the honest Employee ($U^h_G$) and the Government’s utility in case of the dishonest Employee ($U^d_G$). Simple algebra shows that $U^h_G = \sqrt{\frac{1}{3}} (\kappa)^{\frac{3}{2}} (\kappa) - M\left(w_0 + B\right)$ and $U^d_G = \sqrt{\frac{1}{3}} (\kappa - \beta \frac{w}{\delta \pi})^{\frac{3}{2}} (\kappa - \beta \frac{w}{\delta \pi}) - M\left(w_0 - \frac{w}{\delta \pi}\right) + B$. From this it follows simply that $U^h_G \geq U^d_G$ iff

\[
\sqrt{\frac{1}{3}} (\kappa)^{\frac{3}{2}} (\kappa) - \sqrt{\frac{1}{3}} (\kappa - \beta \frac{w}{\delta \pi})^{\frac{3}{2}} (\kappa - \beta \frac{w}{\delta \pi}) \geq M\left[\frac{w}{\delta \pi}\right].
\]

So the Government increases its utility (i.e. its fiscal resources) if the expansion in the fiscal resources coming from more start-up firms and more tax per firm is larger than the increase in the wages $\left[\frac{w}{\delta \pi}\right]$ given to the honest employee. Of course, this depends critically on the number of employees $M$ and transaction costs $\beta$.

We may think that having honest employees rather than dishonest is tantamount to having better hiring policies which allow the Government to employ honest Employees rather than dishonest ones. From the above comparison between the two scenarios, such a policy is optimal only if the transaction costs $\beta$ are large enough, so that the cost saving associated to their cancellation are big. For the same reason, better hiring policies (in the above sense) are optimal, only if the number of Public Employees $M$ is not “too” large. In this case, the increase in the wage bill to be paid to the Employees does not outweigh the reduction in the cost coming from the reduced corruption.

In the previous discussion I have shown an example where the existence of corruption is not necessarily a harmful activity. I have shown that, in our particular model, the Firm strictly prefers to have less corruption while the Employee is indifferent between the two scenarios. However, I have highlighted the conditions such that the Government prefers to have dishonest Employees rather than honest ones. I have stressed that the dishonest Employee scenario is preferred to the honest one, iff the transaction cost $\beta$ are
not too large and the number of public Employee $M$ is not too small.

One can highlight the fact that, for certain values of $\beta$, substituting dishonest with honest Employees might not be sufficient to make a better hiring policy an optimal one. In fact if better hiring policies consist of improving the quality and loyalty of the Employees to the Government, a reduction in $M$ might be necessary in this case to improve Government’s utility. If one interprets this reduction in the number of Employees as saying that a reduced number of Employees $M' < M$ must have a higher productivity that the larger number $M$, this means that the hiring policies have to be modulated depending on the transaction costs $\beta$. For values of $\beta$ very large, it can be be enough to substitute dishonest employees with honest ones. However when $\beta$ is not that large, it is crucial that the new Employee are both more honest and more productive.

5.4 Institutional Reforms

In this section I want to show what happens when the Government is able to devise and implement several reforms. First I describe a situation where the Government is able to devise and implement a wage contract contingent on the Employee’s performance. I call this the “performance wages” reform ($pw$). Next, I will analyse a reform where the Government does not hire any more the Employee as a public servant. Rather, the Government privatises some of its functions and lets the Firm and the Employee contract directly with each other. Now the Government has just the limited role of enforcing the contracts. I will call this scenario a “privatisation reform” ($pr$). Finally I want to investigate whether a better opportunity is offered by the “liberalization reform”: in this scenario the Government reduces some of the Firm’s costs given by the various burdens imposed by the start-up procedures. The Government also gives up some of the fiscal resources connected to the starting-up (the “entry fee” $F$) but fixes optimally the corporate tax $\gamma$. 

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5.4.1 Reform I: Implementing Performance Wages

The Government is now able to write contracts contingent on the dishonest Employee’s performance and then to induce effort legally at node (III). The Government also anticipates that there is the possibility that an illegal contract between Firm and Employee takes place; so, through its performance wage contract, the Government wants to eradicate the bribing interaction from occurring.

The timing of the game is now the following: first the contract between Government and Employee is written; then the task is carried out legally and, contingent on the outcome, performance wages contracts are executed and taxes are collected.\(^{14}\)

The Government solves the following programme, conditional on inducing effort on the Employee legally \((e = 1)\):

\[
\begin{align*}
\max_{(y, \pi_1, \pi_2, \pi_3, \pi_4, \pi_5)} U^p_w &= (\sqrt{\frac{R}{1 - \gamma}}) y - M (\pi_1 \bar{w}^{pw} + (1 - \pi_1) \bar{w}^{pw} + B ) \\
\text{s.t.:} & \quad U^p_w \geq 0 & (IR_p^w) \\
\pi_1 \bar{w}^{pw} + (1 - \pi_1) \bar{w}^{pw} - v & \geq w_0 - v & (IR_{E}^w) \\
\pi_1 \bar{w}^{pw} + (1 - \pi_1) \bar{w}^{pw} - v & \geq \pi_0 \bar{w}^{pw} + (1 - \pi_0) \bar{w}^{pw} & (IC_{E}^w) \\
\pi_1 \bar{w}^{pw} + (1 - \pi_1) \bar{w}^{pw} - v & \geq \pi_1 \bar{b}^* + (1 - \pi_1) \bar{b} - v & (NB) \\
\bar{w}^{pw} & \geq 0 & (LL.1_{E}^w) \\
\bar{w}^{pw} & \geq 0 & (LL.2_{E}^w)
\end{align*}
\]

In the programme above, the Government can induce the Employee’s effort legally by writing down the incentive contract subject to Incentive and Individual Rationality constraints. Notice that the Government cannot impose a negative wage upon an unsuccessful outcome \((i.e. \delta = D)\). Finally notice how the constraint corresponding to eq. \((NB)\) highlights the condition such that the Government offers the Employee a wage

\(^{14}\)For simplicity we continue to carry out our analysis with the specific functional form, \(N(U_F) = \sqrt{U_F}\).
contract which gives him a utility not inferior to the bribing contract \( \left\{ g^*, b^* \right\} \equiv \left\{ 0, \frac{w}{\pi_1} \right\} \).

Solving the above programme, the findings can be summarised in the following Proposition:

**Proposition 39** In the performance wage reform scenario, the Government pays the Employee a wage equal to 0 in case of failure, while it pays a wage equal to \( \frac{w_0}{\pi_1} \) in case of success; and taxes the firm with \( y^{pw*} = \frac{2}{3} \kappa \).

Given the result above it can be established easily that the Firm’s utility in this reform scenario is equal to \( U_F^{pw*} = \kappa - y^{pw*} = \frac{1}{3} \kappa \) and the Employee’s utility is equal to \( U_E^{pw*} = \pi_1 \frac{w_0}{\pi_1} + (1 - \pi_1) 0 - v = w_0 - v \). Finally, the Government’s utility is equal to \( U_G^{pw*} = \sqrt{\frac{2}{3} \kappa (\frac{2}{3} \kappa)} - M \left( \pi_1 \frac{w_0}{\pi_1} \right) = \sqrt{\frac{2}{3} \kappa (\frac{2}{3} \kappa)} - M (w_0) + B \).

These results will be used in the section below when discussing about the optimal policy design and optimal reform(s) in the start-up sector.

### 5.4.2 Reform II: Privatisation of the Public Sector

In this section I introduce another possible reform scenario: now the Government is not any more involved in hiring and paying directly the Employee; as a result the Employee is not any more a civil servant. Instead the Government allows the Firm and the Employee to contract directly with each other. In a certain sense this is a simple formalisation of a reform scenario where the Government reduces its own role and privatises its public sector, or at least some of its functions. Such a reform would not be so different from some institutional arrangements present in countries like France, Italy or Germany and in general in countries of Civil Law, i.e. where the legal origins are Latin rather than Anglo-Saxon. In these countries a prominent role in some of the procedures connected to the starting-up of business is played by the public notary, a self-employed individual performing some of the administrative acts that in other countries are routinely carried out by the public administration. As WorldBank (2004a, page 27) puts it:
The service a notary provides—checking the identity of company founders and company officers—is routinely performed by public administrators for many other services. And clerks at the business registry are as able as notaries to confirm identity.

What the World Bank states is certainly true in countries where the public servants are honest or can be motivated by performance wages. However, in countries where the public employees are corruptible, I argue that a possible reform strategy could be that of privatising these functions. In this way the (bribing) costs born illegally by the Firm previously, could be paid now legally to the (privatised) Employee. Therefore I devise a situation where the former civil servants are now workers in the private labor market that have to contract directly with the firms to offer their services. The Government now has a minimal “law-and-order” role: it will enforce the contracts signed between parties and punish those who do not comply.

Formally the programme is now the following: the principal (now the Firm) maximizes its utility and induces agent’s effort subject to satisfying his constraints. However, contrary to the previous institutional arrangements, since the relationship between Firm and Employee is carried out legally, there are no longer the transaction costs of the previous scenarios. This means that $\beta = 1$. Moreover remember from the scenario with limited instrument and dishonest employee, that the legal wage offered by the Government was $w_0 - \frac{r}{\Delta} v$. I make the assumption that $w_0 - \frac{r}{\Delta} v \geq 0$ and therefore $w_0 \geq \frac{r}{\Delta} v$.

The contract between Firm and Employee represents the solution to the following maximisation programme:

$$\begin{align*}
\max_{(w, \varpi)} U^pr_F &= \kappa - y - (\pi_1 \bar{w}^pr + (1 - \pi_1) w_i^pr) \\
\text{s.t.} : & \quad \pi_1 \bar{w}^pr + (1 - \pi_1) w_i^pr - v \geq \pi_0 \bar{w}^pr + (1 - \pi_0) w_i^pr \quad (IC^pr_E) \\
& \quad \pi_1 \bar{w}^pr + (1 - \pi_1) w_i^pr - v \geq w_0 - v \quad (IR^pr_E) \\
& \quad \bar{w}^pr \geq 0 \quad (LL.1^pr_E) \\
& \quad \bar{w}^pr \geq 0 \quad (LL.2^pr_E)
\end{align*}$$
Lemma 40 The optimal incentive contract in the privatisation scenario requires the Firm to offer a menu of wages which comprises a wage equal to $\bar{w}^{pr^*} = \frac{w_0}{\pi_1}$ conditional on a successful outcome, and a wage $w^{pr^*}$ equal to zero conditional on a failure.

Notice that there is an important difference between the Firm-Employee contracting relationship under the limited instruments scenario and the contracting relationship under the privatisation scenario. The “costs of illegality” have now been removed and therefore there are no transaction costs between the Firm and the Employee, as the transaction takes place lawfully.

Since now the Firm contracts with the Employee, the only role for the Government is to determine the optimal fiscal resources to be raised from the Firm, i.e. the sum of corporate income tax and fixed fee $y = \gamma I + F$. The Government solves this simple programme:

$$\max_{\{y\}} U^r_G = \sqrt{\kappa - y - \frac{w_0}{\pi_1}y + B}$$

s.t : $U^r_F = \kappa - y - w_0 \geq 0$

where the equilibrium Firm’s utility $U^r_F = k - y - \pi_1 \frac{w_0}{\pi_1}$ comprises the cost the Firm will pay when contracting with the Employee. Knowing this, the Government levies the optimal tax on the Firm in order to maximise its fiscal revenues. The result of the maximisation programme can be summarised in the following Proposition:

Proposition 41 In a privatisation reform the Government taxes the Firm the amount $y^{pr^*} = \frac{2}{3}(\kappa - w_0)$ and lets the Firm and the Employee contract with each other, with the Firm offering a contract contingent on performance equal to $(\bar{w}^{pr^*}, w^{pr^*}) = \left( \frac{w_0}{\pi_1}, 0 \right)$

Proof. [In the Appendix] □

Gathering all the results from the previous Lemma and Proposition, one can easily obtain the expression for the utility of all the players in this $pr$ scenario: in particular the equilibrium Employee’s utility is $U^r_E = w_0 - v$ and the equilibrium Firm’s utility
in this privatisation scanario is equal to $U^p_F = \kappa - w_0 - y^p F = \frac{1}{3} (\kappa - w_0)$. Finally the Government’s utility is equal to $U^p_G = \sqrt{\frac{1}{3} (\kappa - w_0)^2 (\kappa - w_0)} + B$.

5.4.3 Reform III: Liberalisation of Entry

The last example of the possible reform scenarios the Government could carry on is the one of Liberalisation of Entry where the Government reduces the entry cost of the start-up businesses. In this scenario the Government makes the entry of new firms as easy as possible. In our interpretation of a strategy of liberalisation reform this has to comprise a reduction of the pecuniary cost to enter the market, i.e. of the fixed fee $F$ which the Government receives as a fiscal resource.\footnote{Of course a strategy of liberalisation of entry could also comprise a reduction in the bureaucratic requirements and administrative procedures the entering firm will have to comply to in order to start operating in the market. Although I do not consider these here explicitly, a previous version of the paper shows that the results found here carry on in this alternative scenario also.} Furthermore a liberalisation reform also has to reduce the cost of the regulatory activity of the Government, i.e. the non-pecuniary costs $\delta$. Reforms along these lines have been advocated, for instance, by WorldBank (2004a) and Djankov, McLiesh and R.Ramalho (2006) in order to promote private sector and GDP growth. However I want to investigate if these reforms can also improve the public finances as well as stimulating the growth of the Government’s fiscal resources. As I have argued above this could benefit all the individuals in the society through the financing of public goods or goods publicly produced.

To show my argument in the strongest and simplest way, I want to analyse what happens when the Government decides to allow immediate entry to any firm wanting to begin operating in the market. So I make the assumption that the Government does not want to impose any additional cost on the Firm, other than the corporate tax on profit $\gamma$ and the fixed entry fee $F$. Therefore a complete liberalisation of entry means that any Firm that wants to enter the market can, without any additional regulatory cost to be paid. This means that one can set $\pi_1 d + (1 - \pi_1) D = 0$.

Since the Government does not perform any administrative and bureaucratic check
on the starting up businesses, this means that it can fire all the $M$ employees working
in the start-up department of the public administration and save the cost arising from
the related wage bill. However, since I make the hypothesis that the labour market is
in equilibrium, then the fired former public employees can go and work for the private
sector and earn a wage of $w_0$, enjoying a utility of $U^{lib}_E = w_0 - v$. The Government and
the Firm are the only players left in this new scenario, with the former having to decide
the optimal tax to impose on the latter in order to maximise the fiscal revenues. The
programme the Government solves is the following:

$$Max_{\tilde{y}} U^{lib}_{\tilde{y}} = \sqrt{\Pi - \gamma \Pi - F \tilde{y}} + B$$
$$s.t. : U^{lib}_F = (1 - \gamma) \Pi - F \geq 0$$

where $\tilde{y} = \gamma \Pi + F$. One can rewrite the programme as:

$$Max_{\tilde{y}} U^{lib}_{\tilde{y}} = \sqrt{\Pi - \gamma \Pi - \tilde{y} \Pi} + B$$
$$s.t. : U^{lib}_F = \Pi - \tilde{y} \geq 0$$

The solution of the programme above is in the following Proposition:

**Proposition 42** In the Liberalisation of Entry scenario, the Government taxes the Firm
the amount $y^{lib} = \frac{2}{3} \Pi$.

I can now simply compute Firm and Government’s utility following a liberalisation
reform. $U^{lib}_F = (1 - \frac{2}{3}) \Pi = \frac{1}{3} \Pi$ and $U^{lib}_G = \sqrt{\frac{2}{3} \Pi \left( \frac{1}{3} \Pi \right)} + B$.

5.5 Discussion: What is the Optimal Policy Design?

In the previous sections I have analysed a situation where the public Employee suffers
from moral hazard, the Government has limited instruments to induce his effort and
an illegal market for bribes exists. I have seen how wages and taxes change when the
Government can devise three different reforms to induce a higher effort from the Employee
and eradicate corruption altogether. In this section I want to find the conditions such that
each of the three players sees welfare improved when going from the status quo (limited
instruments scenario) to one of the three reforms. This will enable us to understand the
winners and losers from each possible reform and to identify the conditions under which
each of the three reforms can be implemented in order to improve social welfare.

First I can see that in all the reforms considered the Employee enjoys the same utility
in equilibrium, with a payoff \( U_E^* = w_0 - v \). This is a result of the assumptions that the
labour market is always in equilibrium, that Employees can be freely hired and dismissed,
and that there is always an outside opportunity in the private job market for work.

Alternatively this could be related to the theory of corruption and the dissipation of
rents. In fact, as it is clear from my discussion, there is some rent to be obtained from
being a civil servant and issuing firms permits to start operating in the market. However,
civil servants compete to be in the position to obtain rent. By doing so, they exhaust
all the gains that might be made from corruption. So rents are obtained but dissipated
given the competition among public servants who do not obtain any net private benefit
in equilibrium.

However, since the focus of the paper is on the relations between Government’s utility
and Firm’s utility in various reform scenarios, I focus on these two players.

It is interesting to notice that a scenario where honest employees are hired is equivalent
to a scenario where the dishonest employees are motivated by performance wages. In fact,
in both cases, \( U^*_F = U^*_{pw} = \frac{1}{3} \kappa \) and \( U^*_G = U^*_{pw} = \sqrt{\frac{1}{3} \kappa} \left( \frac{2}{3} \kappa \right) - M (w_0) + B \). In a way,
the Firm’s and the Government’s welfares are the same whether better hiring policies
are adopted or good incentive instruments are devised.\(^{16}\) If I have to compare these

\(^{16}\)Of course, in a more complete analysis, the choice between which of the two reforms adopt would
depend on the relative cost of implementing one policy rather than the other, given that the merits are
equal.
two alternative reform scenarios with the status quo of a limited instruments scenario with dishonest Employee, it is straightforward to see that for the Firm there is a clear improvement in switching from the status quo to a performance wage scenario, given that: \( U_F^{hr} = U_F^{pr} = \frac{1}{3} \kappa > \frac{1}{3} (\kappa - \beta \frac{\pi_1}{\pi_2} v) = U_F^{ir} \).

The same analysis can be repeated for the privatisation scenario. In this scenario the Firm pays the Employee directly for the service he supplies and this happens through a legal interaction, at market prices. In the status quo with dishonest Employee scenario the Firm pays for the service of the Employee too, although through an illegal interaction.

If I want to conduct a comparative static analysis, I have to compare these two situations, remembering the assumption \( w_0 > \frac{\pi_1}{\pi_2} v \). However one needs to distinguish whether \( \beta \frac{\pi_1}{\pi_2} v > w_0 > \frac{\pi_1}{\pi_2} v \) or \( w_0 > \beta \frac{\pi_1}{\pi_2} v > \frac{\pi_1}{\pi_2} v \). In fact \( U_F^{pr} = \frac{1}{3} (\kappa - w_0) > \frac{1}{3} (\kappa - \beta \frac{\pi_1}{\pi_2} v) = U_F^{d} \), iff \( \beta \frac{\pi_1}{\pi_2} v > w_0 \) or \( \beta > \frac{1}{v} \frac{\pi_1}{\pi_2} w_0 \). However, \( U_F^{hr} = \frac{1}{3} (\kappa - w_0) < \frac{1}{3} (\kappa - \beta \frac{\pi_1}{\pi_2} v) = U_F^{d} \), iff \( w_0 > \beta \frac{\pi_1}{\pi_2} v \) or \( \beta < \frac{1}{v} \frac{\pi_1}{\pi_2} w_0 \).

So, quite intuitively, the relative advantage of a privatisation scenario with respect to the status quo depends on the transaction costs \( \beta \) and the wage \( w_0 \): if the transaction costs in the dishonest scenario are large enough (and the private sector salary to be paid \( w_0 \) is small enough), then the Firm will be better off with a privatisation reform. Otherwise, quite surprisingly, when the transaction costs \( \beta \) are small enough (and the salary to be paid \( w_0 \) is large enough) the status quo where the corruption is retained is better for the Firm than the privatisation scenario. This interesting result might give some foundation to the idea that, in case of a corrupt environment where the transaction costs due to the illegality are quite large, it might be better to “legalise” the illegal transaction in such a way to decrease the transaction costs for the firm. In this case, the starting up entrepreneurs could be part of a coalition in favour of reforming the public sector and privatising some of it function. However, whenever the transaction costs coming from the corruption are small or, alternatively, the factor \( \frac{1}{v} \frac{\pi_1}{\pi_2} w_0 \) is large enough, the Firm prefers a situation with corruptible public employee, rather than a privatisation scenario.
If I continue the comparison among different scenarios, it is interesting to notice that for the Firm both the privatisation scenario and the status quo are always dominated by the performance wage scenario: in fact notice that $U_F^{p*} = U_F^{pw*} = \frac{1}{3} \kappa > \frac{1}{3} (\kappa - w_0) = U_F^{p*}$ and that $U_F^{p*} = U_F^{pw*} = \frac{1}{3} \kappa > \frac{1}{3} (\kappa - \beta \frac{1}{\Delta v}) = U_F^{p*}$. So, surprisingly, I arrive at the rather counterintuitive result that, in the context of this model, the Firm prefers having a “better” public sector, where public employees are motivated financially (performance wage) or where better hiring policies are adopted (honest employees), rather than having to deal directly through a market interaction with the public employees. Therefore, if I had to adopt a political economy perspective the starting up entrepreneurs could be part of a coalition willing to push for reform in the public administration, rather than privatising some of it functions or leaving unchanged the status quo.

Finally it emerges clearly that the most preferred scenario by the Firm is the liberalisation scenario, where the costs of start-up are reduced to zero and Firm’s utility is equal to $U_F^{lib} = \frac{1}{3} \Pi$.

Given the previous discussion about the Firm’s utility in the different scenarios, it is possible to state the following Proposition:

**Proposition 43** In the event of a reform of the start up bureaucratic sector, the Firm prefers a liberalisation reform, followed by a performance wage one which is equivalent to a scenario where only honest employees are hired. Furthermore he prefers a privatised start-up bureaucratic sector to the status quo scenario iff the transaction cost eliminated by a reform of the start-up sector are large enough.

The previous proposition can be summed up thanks to the following relationships, among the equilibrium Firm’s utilities, in the different reform scenarios:

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17 Remember that the $pw$ scenario is equivalent to the $h$ one.
\[ U^*_F \geq U^*_{FW} \geq U^*_{FS} \geq U^*_F \quad \text{iff} \quad \beta \geq \frac{1}{v} \Delta \pi w_0 \]

\[ U^*_F \geq U^*_{FW} \geq U^*_{FS} \geq U^*_F \quad \text{iff} \quad \beta \leq \frac{1}{v} \Delta \pi w_0 \]

I can conduct the same analysis for the Government and verify under which reform scenario the Government maximises its utility. I start by comparing the Government’s utility when a performance wage reform is implemented to the Government’s utility in the status quo scenario, where only dishonest employees are working in the public sector.¹⁸ It is simple to see that: \( U^*_G = U^*_{GW} = \sqrt{\frac{1}{\pi} \left( \frac{2}{3} \kappa \right)} - M (w_0) + B \geq \sqrt{\frac{1}{\pi} \left( \kappa - \beta \frac{4}{3} \frac{\pi}{v} \right) \left( \frac{2}{3} \left( \kappa - \beta \frac{4}{3} \frac{\pi}{v} \right) \right)} - M (w_0 - \frac{4}{3} \frac{\pi}{v}) + B = U^*_{GW} \), which is true if and only if \( \sqrt{\frac{1}{\pi} \left( \frac{2}{3} \kappa \right)} - \sqrt{\frac{1}{\pi} \left( \kappa - \beta \frac{4}{3} \frac{\pi}{v} \right) \left( \frac{2}{3} \left( \kappa - \beta \frac{4}{3} \frac{\pi}{v} \right) \right)} \geq M \left( \frac{4}{3} \frac{\pi}{v} \right) \), i.e. when the gains from higher taxation of each of the Firms (the difference between \( \frac{2}{3} \kappa \) and \( \frac{2}{3} \left( \kappa - \beta \frac{4}{3} \frac{\pi}{v} \right) \)) are larger than the additional cost coming from higher wages for the M public employees, i.e. \( M \left( \frac{4}{3} \frac{\pi}{v} \right) \). As already noticed in the previous discussion in Section 5.3.4, the gain for the Government coming from switching from one scenario to the other will be larger, the larger is the transaction cost parameter \( \beta \) and the smaller is the number of public employees \( M \).

Furthermore, it is straightforward to verify that the Government’s utility following a privatisation reform is larger than the Government’s utility under a performance wage reform, if \( U^*_G = \sqrt{\frac{1}{\pi} \left( \kappa - w_0 \right) \left( \frac{2}{3} \left( \kappa - w_0 \right) \right)} - M (w_0) + B \geq \sqrt{\frac{1}{\pi} \left( \kappa - w_0 \right) \left( \frac{2}{3} \left( \kappa - w_0 \right) \right)} - M (w_0) + B = U^*_{GW} \), i.e if the reduction in cost given by the downsizing of the public sector \( M (w_0) \) is larger than the decrease in fiscal resources collected by the Government from the start-up sector.

This is due to a smaller number of entrant Firms \( \sqrt{\frac{1}{\pi} \left( \kappa - w_0 \right) \left( \frac{2}{3} \left( \kappa - w_0 \right) \right)} \) and an inferior tax rate \( \left( \frac{2}{3} \left( \kappa - w_0 \right) \right) \), given the increased cost born out directly by any entrant Firm.

Finally, I can identify the conditions such that a scenario comprising a privatisa-

¹⁸ Again remember that a performance wage scenario is equivalent to a scenario where honest employees are hired.
tion reform brings about a Government’s utility larger than the status quo: 
\[
U^\text{pr}^* = \sqrt{\frac{1}{3} (k - w_0)^2 (k - w_0)} + B = \sqrt{\frac{1}{3} (k - \beta \pi_1 v)} - M (w_0 - \frac{\pi_1}{\Delta \pi} v) + B
\]
i.e. 
\[
M (w_0 - \frac{\pi_1}{\Delta \pi} v) \geq \sqrt{\frac{1}{3} (k - \beta \pi_1 v)} - \sqrt{\frac{1}{3} (k - w_0)^2 (k - w_0)}.
\]
Here I can notice that the Government’s increases its utility following a privatisation reform as compared to a limited instruments scenario if and only if the cost saving coming from the shutting down of the department dealing with the starting up enterprises and the firing of its Employees are larger than the reduction in the fiscal resources
\[
\sqrt{\frac{1}{3} (k - \beta \pi_1 v)} - \sqrt{\frac{1}{3} (k - w_0)^2 (k - w_0)}.
\]
Again, the Government reaches the maximum utility when a liberalisation reform is implemented: in this case 
\[
U^\text{lib}^* = \sqrt{\frac{1}{3} \Pi_2} \Pi + B.
\]
Summing up the results, and given that the Government attains the maximum utility when a liberalisation reform is implemented, the relationship among equilibrium Government’s utilities which establishes the superiority of the privatisation reform with respect to the other two is the following:

\[
(U^\text{lib}^* \geq) U^\text{pr}^* \geq U^\text{lib}^*
\]

if 
\[
M (w_0) \geq \sqrt{4/27} \left[ k^{3/2} - (k - w_0)^{3/2} \right]
\]

\[
(U^\text{lib}^* \geq) U^\text{pr}^* \geq U^\text{lib}^*
\]

if 
\[
\sqrt{4/27} \left[ k^{3/2} - (k - \beta \pi_1 v)^{3/2} \right] \geq M \left( \beta \frac{\pi_1}{\Delta \pi} v \right)
\]

\[
U^\text{pr}^* \geq U^\text{lib}^*
\]

\[
M (w_0 - \beta \pi_1 v) \geq \sqrt{4/27} \left[ (k - w_0)^{3/2} - (k - \beta \frac{\pi_1}{\Delta \pi} v)^{3/2} \right]
\]

where the eq.(5.11) establishes the condition such that Government’s utility from privatisation reform is larger than its utility from a performance wage scenario; instead eq.(5.12) establishes the condition such that Government’s utility from performance wage is larger than its utility in the status quo and the last eq.(5.13) finds the condition when the Government’s utility from privatisation is larger than the utility from the status quo.
From the above conditions it emerges that moving to a privatisation reform from one of the other two scenarios is the optimal policy when the cost savings achieved from the reduced wage bill following the downsizing of the public sector (LHS in eqn. (5.11) and (5.13)) are larger than the losses in fiscal resources (RHS in eqn. (5.11) and (5.13)) due to higher direct costs born by the firms.

Finally I can write down the condition such that a privatisation reform is better than a performance wage scenario and this is better than the status quo of a limited instruments scenario:

\[
(U^{lib}_G \geq U^{pr}_G \geq U^{pw}_G \geq U^d_G)
\]

iff \[
M(w_0) \geq \sqrt{4/27} \left[k^{3/2} - (k - w_0)^{3/2}\right] \geq \sqrt{4/27} \left[k^{3/2} - (k - \beta \frac{\pi_1}{\Delta_\pi} v)^{3/2}\right] \geq M(\beta \frac{\pi_1}{\Delta_\pi} v)
\]

(5.14)

The same exercise can be conducted if I want to establish the condition under which a performance wage reform is superior to the other two scenarios:

\[
(U^{lib}_G \geq U^{pw}_G \geq U^{pr}_G)
\]

if \[
\sqrt{4/27} \left[k^{3/2} - (k - w_0)^{3/2}\right] \geq M(w_0)
\]

(5.15)

\[
(U^{lib}_G \geq U^{pr}_G \geq U^d_G)
\]

if \[
\sqrt{4/27} \left[k^{3/2} - \left(k - \beta \frac{\pi_1}{\Delta_\pi} v\right)^{3/2}\right] \geq M \left(\beta \frac{\pi_1}{\Delta_\pi} v\right)
\]

(5.16)

\[
M \left(w_0 - \beta \frac{\pi_1}{\Delta_\pi} v\right) \geq [(k - w_0)^{3/2} - \left(k - \beta \frac{\pi_1}{\Delta_\pi} v\right)^{3/2}]
\]

(5.17)

where the eq. (5.16) identifies the conditions when moving to a performance wage scenario is better for the Government than the status quo; similarly eq. (5.17) establishes the conditions such that the privatisation of the public sector improves the Government’s
finance as opposed to the status quo scenario.

From the equation above it emerges that moving to a performance wage reform from one of the other two scenarios is optimal when the additional costs born following a more expensive public sector (RHS in eqq. (5.15) and (5.16)) are smaller than the increases in fiscal resources (LHS in eqq.(5.15) and (5.16)) received from the Firms thanks to the inferior direct costs born by them.

Again I can write down the condition such that a performance wage reform is better than a privatisation scenario and this is better than the status quo of a limited instruments scenario:

\[
(U_G^{lb*} \geq U_G^{pr*} \geq U_G^{pr*} \geq U_G^{lb})
\]

iff \[
\sqrt{4/27 \left[ k^{3/2} - (k - w_0)^{3/2} \right]} \geq M(w_0) \geq M(\beta \frac{\pi_1}{\Delta \pi} v) \geq \sqrt{4/27 \left[ k^{3/2} - \beta \frac{\pi_1}{\Delta \pi} v \right]}^{3/2}
\]

Finally I can determine the condition such that a status quo will be preferred to reforming the start-up sector of the economy according to a performance wage reform or a privatisation reform. The condition such that the former holds is equal to

\[
M\left( \frac{\pi_1}{\Delta \pi} v \right) \geq \sqrt{4/27 \left[ k^{3/2} - \left( \kappa \right)^{3/2} \right]} \geq (k - w_0)^{3/2}, \text{ i.e. whenever the increase in the wage bills needed to reform the public sector is larger than the fiscal resources gained from the firms and whenever the values of } \beta \text{ is small, in particular for values of } \beta \text{ such that the following holds:}
\]

\[
\beta \leq \frac{\Delta \pi}{\pi_1} \left\{ \kappa - \left[ (\kappa)^{3/2} - M \frac{\pi_1}{\Delta \pi} \frac{v}{\sqrt{4/27}} \right]^{2/3} \right\}
\]

Furthermore the status-quo of a not reformed public sector is preferred to a privatisation reform whenever \[
\sqrt{4/27 \left[ \left( \kappa - \beta \frac{\pi_1}{\Delta \pi} v \right) \right]}^{3/2} - (k - w_0)^{3/2} \geq M(w_0 - \frac{\pi_1}{\Delta \pi} v) \text{ i.e. whenever the decrease in the wage bill obtained thanks to the privatisation of the public sector is smaller than the fiscal resources lost by privatising the public sector dealing with start-up procedures. Again this is true also for values of } \beta \text{ small enough and in}
\]

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particular whenever the following holds:

$$\beta \leq \frac{\Delta \pi}{\pi_1} \left\{ \kappa - \left[ (\kappa - w_0) \right]^{3/2} + \frac{1}{\sqrt{4/2^t}} M \left( w_0 - \frac{\pi_1}{\Delta \pi} v \right) \right\}^{2/3}$$

So when the transaction costs due to the corruption are not so important, leaving the status quo scenario with a positive amount of corruption is better than reforming the start up department of the public sector.

Summing up the discussion above about the Government’s utility in the different scenarios, it is possible to state the following Proposition:

**Proposition 44** In the event of a reform of the start up bureaucratic sector, the Government prefers a liberalisation reform to all the other scenarios and to the status quo. The privatisation scenario is preferred to the performance wage one (equivalent to the honest employee scenario) if and only if the cost savings achieved from the reduced wage bill following the downsizing of the public sector are larger than the losses in fiscal resources due to higher direct costs born by the firms. Finally, performance wage reform and privatisation reforms are preferred to a limited instruments status quo if and only if the change in the wage bill of the public sector is larger than the change in the fiscal resources coming from the start-up sector, given that the transaction costs due to corruption are large.

In order for a policy reform to be successfully adopted and implemented, it is preferable that it is agreed upon by all the stakeholders. It is interesting to see the conditions such that the various policy reforms presented in this Chapter are welfare improving for all the players. Given that the Employee receives the same utility under any scenario, I focus on the Firm and the Government. For both the Firm and the Government the *liberalisation* is preferred to any other reform and to the status quo.

However the ranking is not anymore trivial when one goes on to consider the other two reforms. In fact, while for the Firm the *performance wage* scenario is always preferred to the *privatisation* scenario, for the Government this is true if and only if the larger
wage bills paid directly by the Government to motivate the Employees is smaller than the increase in fiscal resources. This is true when there is a relatively small number of Employees $M$ and the wage $w_3$ is small as well.

Finally the Firm prefers the privatisation reform to the status quo if and only if the transaction costs from the corruption are large in the status quo situation and they are “saved” by privatising the public sector dealing with issuing the permits to start new businesses. Furthermore, also the Government agrees to the privatisation reform if and only if the transaction costs are large. However, another condition has to be satisfied so that the Government can agree to moving from the status quo to the privatisation of the public sector: that is the decrease in the wage bills due to the privatisation has to be larger than the fiscal resources lost in this way. For the Firm, instead, things are different regarding the wage. In fact, in order to have convenience in the privatisation, it has to be that the wages paid in the public sector, and then in the privatised sector dealing with issuing the permits, are not so large, relatively to the transaction costs due to the corruption.

Therefore, while each actor, Firm and Government, agrees on reforming the system through privatisation when the costs imposed by the corruption are very important, the coalition for the reform can break down when the actors start considering who will born the costs of a leaner, privatised, public sector. In fact, while reduction in the cost of corruption affects positively all the actors in my simple economy, a privatised system cannot have the support of the Firm if the would be Entreprenuer has to bear the large costs that were paid by the Government in an inefficient and corrupted economy.

Therefore the performance wage reform seems to be preferable and more viable politically to the privatisation reform, given that the Firm always prefers it to the status quo and to the privatisation reform scenario, while for the Government it is preferable when starting wages are not so large and the increased wage bills to be paid is smaller than the effect in raising the revenues a more efficient public sector has.
5.6 Conclusion

This chapter has shown that a simple agency model of bribes involving three players (the Firm, the civil service Employee and the Government) can help explain persistent corruption and bribery, especially in countries which have a limited capacity of running the public sector, and the perverse effects this has on business start-up. The findings show that in a situation where the Government has limited instruments, public sector wages must provide some sort of insurance to the Employee and bribes cannot be eradicated completely. However, a benevolent Government, which has a limited ability at managing the public sector, limits the extent of business taxation as it anticipates that Firms will have to pay an additional tax in form of bribes in order to be able to start operating quickly in the market.

I have analysed three possible reforms to improve the functioning of the public sector regarding business start-up: performance wages, privatisation, and liberalisation. The theoretical findings show that the Employee is indifferent among the reforms proposed and the status quo. However, the Firm might want to see privatisation to be implemented instead of the status-quo. This will be true if the transaction costs associated with the illegal dealings between firm and employee are large enough and/or the private sector wage the Firm has to pay directly now to the employee is small. Therefore if transaction costs are small or private sector wage is large, the Firm prefers the corruption status-quo scenario. Quite interestingly the Firm always prefers switching to a performance wage reform although this means having to pay larger business taxes. The most preferred reform of them all is, however, a complete liberalisation of entry.

Furthermore I have compared the Government’s welfare under several reform scenarios and highlighted the relative merits of the three reforms and of the status quo from a social welfare point of view. Again complete liberalisation of the business start-up emerges as the best reform from a social welfare perspective. However, I have found that moving to a privatisation reform is the optimal policy when the savings following the downsizing of the public sector are larger than the losses in fiscal resources due to higher direct
costs born by the firms. On the other hand implementing a performance wage reform is optimal when the additional costs born following a more expensive public sector are smaller than the increases in fiscal resources received from the Firms due to the inferior direct costs born by them.

Finally, I have highlighted how also for the Government the status quo scenario with limited instruments is the preferred option whenever the transaction costs coming form the existence of the corruption are not so large.

5.7 Appendix

Proof. of Proposition 37. To solve the programme above, let us write the Lagrangian and the associated constraint of the Kuhn-Tucker programme. The expression for the Lagrangian is the following:

\[ L = N \left( U_{F'}^d \right) y - M w + B + \lambda_1 \left[ \Pi - y - (\pi_1 d + (1 - \pi_1) D) - \left( \beta \frac{\pi_1}{\Delta \pi} v \right) \right] + \lambda_2 \left[ w + \frac{\pi_0}{\Delta \pi} v - w_0 + v \right]. \]

To solve the programme, as usual, it is necessary to solve the following system:

\[
\frac{\partial L}{\partial y} = 0
\]

\[
\frac{\partial L}{\partial w} = 0
\]

\[
\lambda_1 \left[ \Pi - y - (\pi_1 d + (1 - \pi_1) D) - \left( \beta \frac{\pi_1}{\Delta \pi} v \right) \right] = 0
\]

\[
\lambda_2 \left[ w + \frac{\pi_0}{\Delta \pi} v - w_0 + v \right] = 0
\]

By computing the partial derivatives, the above system of equations is equivalent to the one below:

\[
-N' \left( U_{F'}^d \right) y + N \left( U_{F'}^d \right) - \lambda_1 = 0 \tag{5.19}
\]

\[-M + \lambda_2 = 0 \tag{5.20} \]

\[
\lambda_1 \left[ \Pi - y - (\pi_1 d + (1 - \pi_1) D) - \left( \beta \frac{\pi_1}{\Delta \pi} v \right) \right] = 0 \tag{5.21}
\]

\[
\lambda_2 \left[ w + \frac{\pi_0}{\Delta \pi} v - w_0 + v \right] = 0 \tag{5.22}
\]
From eq. (5.20) it immediately follows that $\lambda_2 = M$. This is enough to ensure that the constraint associated with the Employee’s utility is binding. In fact since eq. (5.22) holds with equality and given $\lambda_2 = M$, then it is necessary and sufficient that $w = w_0 - v - \frac{\pi}{\Delta\pi} v$. From eq. (5.19) I can obtain an expression for $\lambda_1 = -N' (U^d_{e'}) y + N (U^d_{e'})$. Then let us plug the expression for $\lambda_1$ in eq. (5.21). I obtain then the following equation in the variable $y$: $[-N' (U^d_{e'}) y + N (U^d_{e'})] [\Pi - y - (\pi_1 d + (1 - \pi_1) D) - (\beta \frac{\pi_1}{\Delta\pi} v)] = 0$. To make the problem interesting I assume that $\frac{N(U^d_{e'})}{N'(U^d_{e'})} \neq \Pi - (\pi_1 d + (1 - \pi_1) D) - (\beta \frac{\pi_1}{\Delta\pi} v)$. This means that either $y \neq \frac{N(U^d_{e'})}{N'(U^d_{e'})}$ and $y = \Pi - (\pi_1 d + (1 - \pi_1) D) - (\beta \frac{\pi_1}{\Delta\pi} v)$ or $y = \frac{N(U^d_{e'})}{N'(U^d_{e'})}$ and $y < \Pi - (\pi_1 d + (1 - \pi_1) D) - (\beta \frac{\pi_1}{\Delta\pi} v)$. Since I want to assure that there is a positive number of firms starting up, then I require the utility of the firm $U^d_{e'} > 0$ and the solution to be $y^d = \frac{N(U^d_{e'})}{N'(U^d_{e'})} < \Pi - (\pi_1 d + (1 - \pi_1) D) - (\beta \frac{\pi_1}{\Delta\pi} v)$. ■

Proof. of Proposition 39.

To solve the above programme, as usual, first write down the Lagrangian: then to find the system, take the derivatives of the Lagrangian with respect to the instruments and solve the system composed of these plus the associated constraints.

$$L = \sqrt{\kappa - y} - M (\pi_1 m^u + (1 - \pi_1) u^w) + B + \lambda_1 (\kappa - y) + \lambda_2 (\pi_1 (m^u - u^w) + u^w - w_0) + \lambda_3 (\Delta\pi (m^u - u^w) - v)$$

$$+ \lambda_4 (\pi_1 (m^u - u^w) + u^w - \frac{\pi_1}{\Delta\pi} v) + \lambda_5 (u^w) + \lambda_6 (m^u)$$

$$\frac{\partial L}{\partial y} = 0; -\frac{y}{2\sqrt{\kappa - y}} + \sqrt{\kappa - y} - \lambda_1 y = 0$$

$$\frac{\partial L}{\partial m^u} = 0; -M \pi_1 + \lambda_2 \pi_1 + \lambda_3 \Delta\pi + \lambda_4 \pi_1 + \lambda_6 = 0$$

$$\frac{\partial L}{\partial u^w} = 0; -M (1 - \pi_1) + (1 - \pi_1) \lambda_2 - \lambda_3 \Delta\pi + (1 - \pi_1) \lambda_4 + \lambda_5 = 0$$

$$\lambda_1 (\kappa - y) = 0$$

$$\lambda_2 (\pi_1 (m^u - u^w) + u^w - w_0) = 0$$

$$\lambda_3 (\Delta\pi (m^u - u^w) - v) = 0$$

$$\lambda_4 (\pi_1 (m^u - u^w) + u^w - \frac{\pi_1}{\Delta\pi} v) = 0$$

$$\lambda_5 (u^w)$$

$$\lambda_6 (m^u)$$

As in previous programme, it is easy to verify that, given $\kappa - y > 0$, otherwise $\frac{1}{2\sqrt{\kappa - y}}$
would not be defined, then $\lambda_1 = 0$. It follows simply that $y^{pcw^*} = \frac{2}{3}k$.

One can already see that $\underline{w}^{pcw} > \underline{w}^{pcw}$ and then that $\lambda_6 = 0$. In fact if $\underline{w}^{pcw} \leq \underline{w}^{pcw}$, then $\underline{w}^{pcw} - \underline{w}^{pcw} \leq 0$ and $\Delta \pi (\underline{w}^{pcw} - \underline{w}^{pcw}) \leq 0$. From here it would follow that $\Delta \pi (\underline{w}^{pcw} - \underline{w}^{pcw}) - v < 0$ which is impossible given constraint in eq. $(IC_E^{pcw})$.

Moreover, as I have already stated before Proposition 39, I make the assumption that $w_0 - \frac{\pi}{\Delta \pi} v \geq 0$ and therefore $w_0 \geq \frac{\pi}{\Delta \pi} v$. This will induce $(IR_E^{pcw})$ to be binding. Alternatively, if $w_0 - \frac{\pi}{\Delta \pi} v \leq 0$ it would be $(IC_E^{pcw})$ that binds. Results will change, but with the little realistic assumption of the Employee being offered a negative wage $w_0 - \frac{\pi}{\Delta \pi} v \leq 0$ by the Government.

From this it follows that since $\pi_1 \underline{w}^{pcw} + (1 - \pi_1)\underline{w}^{pcw} - \frac{\pi_1}{\Delta \pi} v \geq \pi_1 \underline{w}^{pcw} + (1 - \pi_1)\underline{w}^{pcw} - w_0 \geq 0$, then if the optimal solution $(\overline{w}^{pcw^*}, \underline{w}^{pcw^*})$ satisfies the constraint $\pi_1 \overline{w}^{pcw} + (1 - \pi_1)\underline{w}^{pcw} - w_0$, then it will satisfy the constraint $\pi_1 \overline{w}^{pcw} + (1 - \pi_1)\underline{w}^{pcw} - \frac{\pi_1}{\Delta \pi} v$. From this I can disregard this last constraint in the problem.

To simplify even more the programme disregard the constraint in eq. $(IC_E^{pcw})$ and the associated multiplier. Once the solution is found, I will check that the solution satisfies this constraint.

So given the system of equation above reduces to this one:

\[
\frac{\partial L}{\partial \pi} = 0; \quad -M \pi_1 + \lambda_2 \pi_1 = 0 \tag{5.23}
\]

\[
\frac{\partial L}{\partial w} = 0; \quad -M(1 - \pi_1) + \lambda_2(1 - \pi_1) + \lambda_5 = 0 \tag{5.24}
\]

\[
\lambda_2[\pi_1 \overline{w}^{pcw} + (1 - \pi_1)\underline{w}^{pcw} - w_0] = 0 \tag{5.25}
\]

\[
\lambda_5[\underline{w}^{pcw}] = 0 \tag{5.26}
\]

From the eq.(5.23) it follows that $\lambda_2 = M$. So the constraint in equation $(IR_E^{pcw})$ is binding, i.e. $\pi_1 \overline{w}^{pcw} + (1 - \pi_1)\underline{w}^{pcw} - w_0 = 0$. From equation (5.24) it follows easily that $\lambda_5 = 0$. So I have solved the system for all the constraints $\lambda_i$, $i \in [0, 1, ..., 5, 6]$ and for the value of the fiscal resources $y^{pcw}$.

It remains to determine the value for the wages. I guess that the solution for $\underline{w}^{pcw^*} = 0$
and from equation \( (IR_E^{pw}) \) that \( \bar{w}^{pw*} = \frac{w_0}{\pi_1} \) and I check that this solution for the optimal wage contract satisfies the remaining constraint associated to the multipliers \( \lambda_3 \) and \( \lambda_4 \), given the assumption \( w_0 \geq \frac{\pi_1}{\Delta \pi} v \). Simple algebra shows that they do.

Notice that the solution \( (\bar{w}^{pw*}, \bar{w}^{pw*}) = \left(0, \frac{w_0}{\pi_1}\right) \) is such that it satisfies the constraint in eq. \( (IC_E^{pw}) \). In fact:

\[
\begin{align*}
\pi_1 \bar{w}^{pw*} + (1 - \pi_1) w^{pw*} - v & \geq \pi_0 \bar{w}^{pw*} + (1 - \pi_0) w^{pw*} \\
\frac{\pi_1 w_0}{\pi_1} + (1 - \pi_1)0 - v & \geq \frac{\pi_0 w_0}{\pi_1} + (1 - \pi_0)0 \\
w_0 & \geq \frac{\pi_0 w_0}{\pi_1} \\
\pi_1 & > \pi_0
\end{align*}
\]

Notice how in this case, the solution obtains by making binding the constraint in eq. \( (IR_E^{pw}) \), i.e. the one associated to the Individual Rationality of the Employee.

As an extra check, notice that if I had to guess the solution for \( \bar{w}^{pw*} \), by making the eq. \( (IC_E^{pw}) \) such that \( \bar{w}^{pw*} = \bar{w}^{pw} \), then this solution would not satisfy the remaining constraints. ■

**Proof.** of Lemma 40.

The proof is similar to the one in Proposition 39. Again disregard the constraint in eq.\( (IC_E^{pr}) \) and, once the solution is found, check that the solution satisfies this constraint.

To solve the problem, again write the Lagrangian for the Employee: \( L = \kappa - y - (\pi_1 \bar{w}^{pr} + (1 - \pi_1) w^{pr}) + \lambda_1 [\bar{w}^{pr} + \pi_1 (\bar{w}^{pr} - w^{pr}) - w_0] + \lambda_2 [w^{pr}] + \lambda_3 [\bar{w}^{pr}] \).

First notice that it must be that \( \bar{w}^{pr} > \bar{w}^{pw} \geq 0 \). In fact if it was \( \bar{w}^{pr} - \bar{w}^{pw} \leq 0 \), then \( \Delta \pi (\bar{w}^{pr} - \bar{w}^{pw}) \leq 0 \) and then \( \Delta \pi (\bar{w}^{pr} - \bar{w}^{pw}) - v < 0 \), which is impossible given the constraint in equation \( (IC_E^{pr}) \). Then from the above result it follows that it must be \( \lambda_3 = 0 \).

Now, in order to find the system to be solved, take the partial derivatives of the Lagrangian with respect to the instruments and put them equal to zero and then associate to these equations the ones given by the constraints.

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I obtain then the following system of equations:

\[
\frac{\partial L}{\partial \overline{w}^{pr}} = -\pi_1 + \lambda_1 \pi_1 + \lambda_3 = 0
\]

\[
\frac{\partial L}{\overline{w}^{pr}} = -(1 - \pi_1) + \lambda_1 (1 - \pi_1) + \lambda_2 = 0
\]

\[
\lambda_1 [\pi_1 \overline{w}^{pr} (1 - \pi_1) \overline{w}^{pr} - w_0] = 0
\]

\[
\lambda_2 [\overline{w}^{pr}] = 0
\]

\[
\lambda_3 [\overline{w}^{pr}] = 0
\]

Since \( \lambda_3 = 0 \), then it follows easily that \( \lambda_1 = 1 \) and then the Individual Rationality Constraint is binding. From the second equation, I can see that \( \lambda_2 = 0 \). Again to solve for the optimal contract solution \((\overline{w}^{pr^*}, \overline{w}^{pr^*})\), I guess that \( \overline{w}^{pr^*} = 0 \) and that \( \overline{w}^{pr^*} = \frac{w_0}{\pi_1} \).

It is straightforward to check that the contract having this characteristic satisfies also the Incentive Constraint I disregarded previously.

**Proof.** of Proposition 41

I have derived in the Lemma above the optimal contract between Firm and Employee. To derive the solution to the Government’s maximisation programme as usual write down the Lagrangian for the Government’s maximisation programme: \( L = \sqrt{\kappa - y - w_0} y + B + \lambda_1 [\kappa - y - w_0] \). To solve the programme, derive the Lagrangian with respect to \( y \) and equate to zero, i.e. \( \frac{\partial L}{\partial y} = -\frac{y}{\sqrt{\kappa - y - w_0}} + \frac{\sqrt{\kappa - y - w_0}}{2} = 0 \); then associate to this equation, the one coming from the complementary slackness condition \( \lambda_1 [\kappa - y - \pi_1 \frac{w}{\Delta x}] = 0 \). Since for the expression \( \frac{y}{\sqrt{\kappa - y - w_0}} \) to be defined, it cannot be that \( \kappa - y - w_0 = 0 \), then it must be that \( \kappa - y - w_0 > 0 \) and \( \lambda_1 = 0 \). It follows that \( -y + \kappa - y - w_0 = 0 \) and then, solving for the optimal \( y^{pr^*} = \frac{1}{2} (\kappa - w_0) \).

**Proof.** of Proposition 42.

As usual, let us write down the Lagrangian and take the partial derivative with respect to the instrument \( y \) and put equal to zero. The other equation is given by the associated complementary slackness condition.
The Lagrangian for the Government is:

\[ L = \sqrt{\Pi - \tilde{y}y} + B + \lambda_1[\Pi - \tilde{y}] \]

Then the system of equations is given by the following:

\[ \frac{\partial L}{\partial \gamma} = -\frac{\tilde{y}}{2\sqrt{\Pi - \tilde{y}}} + \sqrt{\Pi - \tilde{y}} = 0 \]

\[ \lambda_1[\Pi - \tilde{y}] = 0 \]

Again since it cannot be \( \Pi - \tilde{y} = 0 \), in order for \( -\frac{\tilde{y}}{2\sqrt{\Pi - \tilde{y}}} \) to be defined, then it must be that \( \Pi - \tilde{y} > 0 \). From here it follows that \( \lambda_1 = 0 \). Finally it is straightforward to see that from the first equation \( \tilde{y} = y^{\text{lib}} = \frac{2}{3}\Pi \) □

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Chapter 6

Concluding Remarks

The concept of Governance and of how to establish, develop and consolidate Good Governance in institutions, be they public or private, has been at the centre of the social science research for some time. The World Bank especially has given enormous attention to concepts like accountability and voice, which, if developed in societies, could contribute to the right relationships between citizens and public officers, making the latter responsive to the needs and preferences of the former and constrained in their actions. In fact, a great deal of discretionality could lead the public officials (politicians or bureaucrats) to take actions which are not aimed at increasing social welfare but at advantaging their private benefits in forms of private, appropriated rents. Following this line of reasoning, the World Bank has focussed its attention on corruption being the biggest enemy of the correct interaction between citizens and public officers in the public realm.

The present thesis has aimed at shedding some light on the mass media and its role as an instrument of the citizens to, on one hand, control politicians and make them accountable and, on the other hand, make them more responsive when elections are not ready available. Furthermore, this thesis has analysed what happens when corruption is widespread in a strategic sector of the bureaucracy: the office dealing with issuing permits to start up new businesses. In this case the problem of governance is that it is necessary to design and implement a reform in this corrupted office, reform that might
see losers and winners in terms of welfare.

In the two first essays I have analysed how the role of the mass media as informed supervisor on the politicians’ quality on behalf of the citizens, has to be thought through more deeply once one considers other information that citizens can freely get by observing the policy outcome of the incumbent’s performance. By using both the two pieces of information coming from the media and the good publicly produced, I have shown that citizens manage to sort honest politician from dishonest ones more often than if they were relying on media information only. More importantly, the essay has concluded that the use of both signals makes collusion between media and politician harder to achieve. This is very important and goes against what most of the public opinion believes, that is that media have an almost absolute power to convince and persuade the citizens. This essay has conjectured that this is not exactly so when citizens have other sources of information, given by their everyday experience, for their own nature independent and not controlled by the media. These other sources different from media limit the media power and the possibility for them to collude with the incumbent politician, if they want to keep on being credible and continue to be bought by the citizens. Moreover, while in previous works voters have quite a passive role towards information, in this essay I have started endogenising citizens’ information acquisition and show how this decision depends critically on the time discount factor between the two periods the game consists of. By using media in an active way the citizen can decide whether to use information if and only if this increases her expected utility. I have highlighted how this happens in a certain region of the time discount factor where it is optimal ex-ante for the citizen to commit not to acquire information about the incumbent. However a well known result is that there might exist a tension between optimality ex-ante and optimality ex-post. Even though for the voter may be optimal ex-ante to commit not to use any information, once the new information is available, it is optimal for her to use it. This argument might make some equilibria unstable, given that the voter commits ex-ante to a sort of “rational and strategic ignorance”, but media are still there and might reveal the information about
the incumbent. On the other hand, I have conjectured that, if citizen’s commitment
not to acquire information is not possible, the existence and easing of collusion might
contribute, by concealing informative signals, to increase citizen’s utility ex-ante. This is
a quite surprising and novel result which contradicts most of the findings of the literature
in the research in political economy of mass media. Corruption of the media on part of
the incumbent, or, rather, collusion between media and politician to suppress useful
information, for some values of the time discount factor between the two periods and
some values of the probability of having a honest political class, is welfare enhancing.

While the first essay has delved deeper in the role of media as informed supervisor
the second essay has analysed the issue of voice, that is of how citizens can take part
to the public debate and communicate their views and preference thanks to the mass
media and in particular thanks to the newspapers they buy and read. This second essay
represents an innovation of this literature because it models how citizens can express
themselves not directly, through their own actions, like in other models of “voice” à la
Hirschman, but thanks to the use of an “instrument”, the newspaper, that is produced
and marketed by a for-profit firm. Given the fact that this instrument can be bought but
not directly produced by the citizens, there exists a tension between the benefit of using a
newspaper to express citizens’ views and the possibility that this newspaper can actually
be produced. I have assumed that there might be two possible types of newspaper:
a Tabloid and a Broadsheet, where the former is an uninformative newspaper, while
the latter is informative on the state of the world and on the policy which is optimal,
contingent on the state of the world.

I have highlighted how the results show that the presence of a Broadsheet always
improves the quality of policy decision making on part of the incumbent, whatever is the
policy option the informative newspaper is endorsing. However, this is possible when a
Broadsheet is produced, which happens only when the environment is informative enough.
If not, it is a profit maximising strategy for the media entrepreneur to produce a Tabloid
which does not give any additional information on the state of the world or on the optimal
policy to be implemented and it does not allow the citizens to express themselves. In the second essay I have departed from the single-representative agent framework of the first essay: in fact, I have assumed that there are at least two different kinds of citizen, one who is ideological and always buys the newspaper supporting her view, no matter what is her private information; and the other who is open-minded and his private information influences his ideas and preferences and, therefore, the kind of newspaper she is willing to buy. The results of the essay, contrary to conventional wisdom, show how the presence of “partisan reader” can ease the production of the Broadsheet, instead of hardening it. In this case the existence of partisanship and of ideological readers make the implementation of optimal policy easier, not harder. This opens up a reconsideration of the tensions and relationships between ideology and good governance: while common sense would say that in order to have a good society, a society where the optimal policies get always implemented and the maximum social welfare is assured to its members, it is sufficient to have open-minded citizens, free of any ideological commitment, these results show that while this is a necessary condition, it is by no means the only prerequisite one society needs. Indeed, together with a certain number of non-ideological citizens, the presence of a large number of partisan readers make possible and easier for the non-ideological citizens to express themselves. Ideology does not impede welfare maximization, but it is conducive to it, although not by itself.

The third essay has endeavoured to show that a simple agency model of bribes involving three players (the Firm, the civil service Employee and the Government) can help explain the corruption and bribery, especially in countries which have a limited capacity of running the public sector, and the perverse effects this has on business startup. The findings show that in a situation where the Government has limited instruments, public sector wages must provide some sort of insurance to the Employee and bribes cannot be eradicated completely. However a benevolent Government, which has a limited ability in managing the public sector, limits the extent of business taxation as it anticipates that Firms will have to pay an additional tax in form of bribes in order to be able to start
operating quickly in the market.

I have analysed three possible reforms to improve the governance of the public sector regarding business start up and to limit or suppress the extent of the corruption in this sector: performance wages, privatisation and liberalisation. I have highlighted how different reforms have different impacts not only on social welfare but, crucially, on each player’s utility and I have derived the conditions such that it is possible to rank the reforms in the preferences of each players. Apart from the specific results, this exercise stresses an important principle which was discarded in the 90s and has been brought back to the attention since then, in scientific research as well as in the political implementation of social and economic reforms: any reform, although welfare enhancing for the collectivity, has its own losers and winners. In order to assure a successful implementation, any reformist government has to assess the number and the power of these groups and verify whether those in favour of the reform (“the winners”) are stronger than those opposing it (“the losers”). Only in this way reforms can be implemented and lead to an advance of the societies in their totality.
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