

Industrial Policy: Political Considerations, Payoffs, and Peculiar Incentives

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The results on subsidized firms suggests that there are some positive effects on profits and productivity, but these diminish and disappear over time. The results of public loans are more positive with long lasting effects on productivity and sales but only for smaller firms. Public loans do not lead to an increase in the number of employees in the firms that receive them.

The third paper studies the selection of firms for subsidies and the incentives firms have to seek them. By modeling the decision to seek subsidies as a tradeoff between producing in the market and seeking grants, the results suggest that firms with low market productivity might self-select into seeking grants. The empirical results are in line with the theoretical predictions.

The final paper studies the incentives that politicians have to implement programs and policies that they know will be inefficient. Since a lack of political action can make the politicians look incompetent, incumbents have incentives to implement policies even though they know that these will be ineffective, to signal competence towards the voters.



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Anders Gustafsson

Industrial Policy: Political Considerations, Payoffs, and Peculiar Incentives

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Business School*

Doctoral Thesis

Industrial Policy: Political Considerations, Payoffs, and Peculiar Incentives

Anders Gustafsson

Jönköping University
Jönköping International Business School
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Industrial Policy: Political Considerations, Payoffs, and Peculiar Incentives

by

Anders Gustafsson

The Doctoral Thesis will be defended at a Dissertation defense on 21 September 2018 at 10 am. in B1014 at JIBS, for the degree of Doctor of Philosophy in Economics.

Faculty examiner/opponent: Professor John Earle, George Mason University, USA.

Abstract

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av

Anders Gustafsson

Akademisk avhandling som för avläggande av ekonomie doktorsexamen i national-ekonomi vid Internationella Handelshögskolan i Jönköping kommer att försvaras i sal B1014, Internationella Handelshögskolan, Jönköping, onsdagen den 21 september 2018 kl. 10.00.

Opponent: Professor John Earle, George Mason University, USA.

Sammanfattning

Denna avhandling består av 4 oberoende uppsatser. De studerar några aspekter av aktiv näringspolitik, mera bestämt effekten av offentliga lån och stöd som syftar till att öka tillväxten och innovationsförmågan i företag med hjälp av svenska data. Dessa åtgärder syftar till att lösa marknadsmisslyckanden på kapitalmarknaden, som annars kan leda till att företag saknar de finansiella resurserna som de behöver för att investera i fysiskt- eller humankapital. Om staten kan identifiera dessa företag och hjälpa dem med finansiering så kan dessa företag investera och växa, vilket i sin tur ökar den ekonomiska tillväxten. Två uppsatser studerar effektivitet i nu existerande svenska åtgärder genom att mäta effekterna av statliga bidrag samt lån till företag. En kombination av matchning och difference-in-difference regressioner används för att reducera problem som beror på selektering.

Resultaten visar att företag som får bidrag får ökade vinster och högre produktivitet, men bara på kort sikt. Resultaten för offentliga lån är mera positiva, med långvariga positiva effekter på produktivitet och försäljning, men bara för de mindre företagen. Offentliga lån leder inte till att företag anställer flera.

Den tredje uppsatsen studerar vilka incitamenten som företag som söker stöd har. Genom att modellera beslutet som ett val mellan att producera för marknaden eller söka stöd så visar modellen att företag med låg marknadsproduktivitet bör ägna mer tid åt att söka stöd eftersom de har lägre alternativkostnad. De empiriska resultaten är i linje med vad modellen förutsäger.

Den fjärde och sista uppsatsen studerar vilka incitamenten som politiker har att implementera åtgärder som de på förhand är ineffektiva. Ifall det är svårt att lösa ett samhällsproblem kan det fortfarande vara rationellt att införa ineffektiva åtgärder eftersom brist på aktivitet kan signalera inkompetens gentemot väljarna. Ifall väljarna har imperfekt information om olika åtgärders effektivitet kan själva handlingen i sig vara mera viktig än handlingens effektivitet.

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Business School*

Doctoral thesis

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Anders Gustafsson

Doctoral Thesis in Economics

Industrial Policy: Political Considerations, Payoffs, and Peculiar Incentives
JIBS Dissertation Series No. 125

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To Kaisa-Marie, who made it all worthwhile.

Yet somehow I don't remember being unhappy. Too busy, I guess.
There was never that psychological "hump" to get over; the one everybody hits in Basic; there was simply the ever-present fear of flunking out.
My poor preparation in math bothered me especially.

Starship Troopers - Robert A. Heinlein (1959)

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I would like to take the opportunity to express my gratitude towards those who have been exceptionally helpful during my four years as a PhD student. While this thesis bears my name, and my name only, it is obvious to anyone who has been in academia that a PhD thesis is not something you write all by yourself.

First, my supervisors professor Andreas Stephan, professor Patrik Gustavsson Tingvall, and professor Per-Olov Bjuggren have all contributed in their own way to educate me. Without them, this thesis would neither have been finished in time nor be of any quality. Thank you!

I was able to start my studies at Jönköping International Business School because I had external financing from the Ratio Institute. This was in turn possible due to professor Nils Karlson believing in me and giving me the opportunity to write this thesis. During this time, Nils has been a co-author as well as a boss in an extremely interesting work environment. Very few days are boring at Ratio due to its unique multidisciplinary environment. At Ratio, I would especially like to thank Dr. Daniel Halvarsson who has been of immense help in everything from solving equations to creating decent STATA-code. Karl Hatt and Joakim Rönnebeck have both helped me with communicating my results to the general public as well as providing good company during lunch.

I have spent most of my time at Ratio, and too little time in Jönköping. Despite this, I have always felt very welcomed there, thanks to both the staff and the scholars. Dr. Agostino Manduchi has always gone above and beyond to help me formulate various ideas into more structured thinking and not given up on my attempts to understand economic and game theory. Tina Wallin, now Dr. Wallin, and Toni Duras have kept me company and shared the burden of the mandatory courses we had to endure. Dr. Özge Öner and Dr. Johan P Larsson have been the best of friends, and, until their departure to the United Kingdom, a reliable source of housing whenever I have been in Jönköping. Monica Bartels and Marie Petersson have helped me with all administrative matters in a fantastic way.

Three of four papers in this thesis utilize data from The Swedish Agency for Growth Policy Analysis. Without the help and support from first Dr. Enrico Deiano and later on Director Carly Smith-Jönsson, I would not have been able to do any empirical analysis at all. I look forward to my future work with Growth Analysis in the upcoming year.

During my final seminar, professor Justus Haucap provided valuable comments in order to improve the three papers that were not published at the time. I hope I have been able to address most of the weaknesses he identified.

I attended my first course in microeconomics in the spring of 2007 with dr. Andreas Bergh as the teacher. That semester I decided that economics was to be

my field of study, rather than political science, chemistry or philosophy which had been my previous ideas. 11 years later, Andreas has been a teacher, a friend and a mentor. I look forward to adding the term colleague to the list as we work together.

My parents Eva and Bengt Gustafsson have never been too skeptical about my odd choices of careers, which (so far) have included me starting to study philosophy after high school, taking a leave from the Swedish Ministry of Finance in order to start reserve officers training at the age of 28, and later on leaving said safe and well-paid position for an uncertain career in academia. I strongly believe that I have benefited quite a lot from my mothers sense of order and structure, and my fathers curiosity and thirst for knowledge.

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And finally, Kaisa-Marie whom I met during my first year as a PhD student. With you, every day is both wonderful and punderful.

Stockholm and Jönköping, 5 July 2018
Anders Gustafsson

Abstract

This thesis consists of four independent papers. They deal with some aspects of industrial policy, namely public supports to firms that are intended to support innovation and growth at the firm level, using Swedish data. These policies aim to solve market failures in capital markets, failures that prevent firms from accessing to enough funding to invest in physical or human capital. If governments can identify these firms and help them with funding, the firms can use this money to innovate and invest, which in turn raises economic growth. Two papers study the efficiency of current Swedish policies by estimating the effects of subsidies and public loans to firms, respectively. A combination of matching and difference-in-difference regressions are used to reduce selection bias.

The results on subsidized firms suggests that there are some positive effects on profits and productivity, but these diminish and disappear over time. The results of public loans are more positive with long lasting effects on productivity and sales but only for smaller firms. Public loans do not lead to an increase in the number of employees in the firms that receive them.

The third paper studies the selection of firms for subsidies and the incentives firms have to seek them. By modeling the decision to seek subsidies as a trade-off between producing in the market and seeking grants, the results suggest that firms with low market productivity might self-select into seeking grants, since they have lower opportunity cost of doing so. The empirical results are in line with the theoretical predictions.

The final paper studies the incentives that politicians have to implement programs and policies that they know will be inefficient. Since a lack of political action can make the politicians look incompetent, incumbents have incentives to implement policies even though they know that these will be ineffective. If voters have imperfect information regarding the outcome of policies, signaling competence through action becomes more important than the causal outcome of said policies.

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Introduction and Summary of the Thesis

The curious task of economics is to demonstrate to men how little they really know about what they imagine they can design.

Friedrich A. Hayek - *The Fatal Conceit* (1988)

Why some countries are richer and some poorer, and what can be to to increase economic growth, is perhaps the most essential question in economics. Indeed, as Lucas (1988) has said: “*The consequences for human welfare involved in questions like these are simply staggering: once one starts to think about them, it is hard to think about anything else.*”. While this question goes back to Adam Smith and the founding of economics as a social science, the building blocks of more formal economic modeling of growth is due to Solow (1956) and Swan (1956). While formal modeling of such complex issues naturally becomes overly simplistic, such models have helped in clarifying and shaping later research. These early models, so called exogenous models, did not really explain why economies grew, but instead explained the way one can think about economic growth. Since the positive effect on human welfare from growth is so enormous, understanding what causes economic growth and what can be done to increase the rate of growth has generated an impressive amount of research.

Later models of economic growth more directly tried to model how growth is achieved from within the model, so called endogenous growth models. These models started with a simple point regarding how ideas affect innovation. Since ideas, by their very nature, are non-rivalrous goods they tend to produce positive externalities. My knowledge of calculus does not hinder you from learning calculus as well. Rather the opposite: if we both know calculus then we can both use it together, increasing our probability of coming up with new ideas. The so called endogenous (endogenous in the sense that the explanation for growth comes from within the model) and Schumpeterian growth theories therefore stress the importance of new ideas and innovations replacing older and more less efficient ideas

as a key to growth (Romer, 1986; Lucas, 1988; Romer, 1990; Aghion and Howitt, 1992). These theories build on Schumpeter's old idea of creative destruction, that old firms in a drastic and radical process are replaced by new and more productive firms. Although old firms are destroyed and some value is lost, new firms will create enough value to offset the destruction (Schumpeter, 1934).

This thesis focuses on how economic growth can be increased in developed countries with policies that remove or improve market inefficiencies, especially in capital markets. These types of action are often called Industrial Policy, since the focus previously has often been manufacturing industry. Nowadays, industrial policy often targets all kinds of firms, including the service sector (Rodrik, 2004). While this focus might seem somewhat limited, improving markets is often considered to be of key importance and substantial amounts of government funding is spent each year on such issues.

If we want to understand what governments can do to increase economic growth, one important aspect is to understand why capital markets might not work perfectly for firms (Azariadis and Drazen, 1990). In theory, capital markets should ensure that capital flows from firms and individuals with excess amount of money, and into firms and individuals with good ideas and projects that can generate a profit. If capital markets were perfect, there would be no project that could generate a risk-adjusted profit in the economy that did not receive sufficient funding. No idea would be left to waste, and the investors would get the maximum possible return on their investments. Imperfect capital markets, on the other hand, means that there are projects and ideas that do not get funding even though they would be profitable. Frictions and information asymmetries create a space that government might be able to fill in order to increase economic activity. Government funding could in this sense plug the gaps left by the imperfect markets and therefore increase firm and economic growth.

A note on terminology is needed. In this chapter, the term "efficient capital markets" refers to the role of capital markets in allocating capital to project with a positive net present value. It does not, as is common in finance, refer to the theory that the security price of a firm reflects all available information (Fama, 1970, 1991). If markets are inefficient, this means that projects do not get the capital that they need to generate a profit and not that there can be economic gains from active stock trading.

Due to market failures and positives externalities, a myriad of government programs and subsidies exists to increase firms' access to capital. In a nutshell, proponents of government subsidies to firms argue that (a) capital markets are inefficient and (b) government can remedy these inefficiencies. This thesis is mainly dedicated to answer the question in (b) since we still lack a good understanding of the effectiveness of these interventions. While it seems reasonable to assume

Introduction

that there are some market failures in capital markets, we do not know how large these problems are. Market failures can be anything from a very minor deviation from Pareto-optimality to complete breakdowns of the market. At what point on this spectrum do we find financing of firms, especially small and medium sized enterprises (SMEs)? The correct public interventions are radically different if the market is almost perfect compared to when there is no market at all.

Although a substantial amount of empirical research exists already, there is still no consensus on how effective existing public interventions are in increasing firm and economic growth. The reason for this lack of consensus is that these programs are seldom designed in such a way that makes them easy to evaluate. Subsidies and grants are seldom allocated randomly, and sometimes information is not available at all. This makes it hard to draw causal conclusions from any observed correlations. We also lack sufficient knowledge of any potential negative side effects from these interventions, such as firms spending more time to seek public funding for innovation rather than producing in the market. Previous research has often found crowding-out of private money from public interventions, which decreases the efficiency of these interventions. Furthermore, SMEs and even more so young SMEs, are notoriously hard to study. Even in a small country such as Sweden, thousands of new firms are started every year, many without any ambition to grow. A majority will disappear in a few years, and most will never grow to become larger than one or two employees. This creates a large amount of heterogeneity and noise that makes any empirical analysis difficult.

We also lack knowledge on the political complexities surrounding the creations of public interventions. This is not only something that affects innovation and industrial policy, but also areas such as labor and education policy. Policies and programs do not arise in a vacuum, but are crafted in a political environment. Individual politicians have their own agendas and incentives. These incentives are in turn shaped by the institutions of the political process, and the existence of a political opposition and media. In a democracy, politicians need to win elections in order to achieve their agenda, and collecting the benefits that come from being in office. This in turn shapes how policies and programs are designed and how effective they are in practice.

The purpose of my research is twofold: First, to study the efficiency of various Swedish programs that aim to increase innovation, firm productivity and entrepreneurship, and how firms select themselves into these programs. This has previously not been done to the same extent as e.g. labor market policies, mainly due to a lack of good data, although more and more research is being produced using data from other countries (Criscuolo et al., 2012; Takalo and Toivanen, 2017).

However, thanks to the newly created MISS-database¹ by Swedish Agency for Growth Policy Analysis (Growth Analysis), more data is now available. Three out of four papers in this thesis uses data from MISS along with registry data on firms and their employees. This combination of data created the possibility to both study selections as well as the effects of the subsidies and loans. Second, can we understand why politicians in developed countries, such as the OECD-members, spend money on industrial policies such as direct subsidies, soft loans and R&D deductions by using theories of vote maximization and strategic political behavior? And how do firms adapt their behavior when they face incentives to receive public subsidies?

More formally, the point is to merge the literature of industrial and innovation policy with the political economy and public choice literature in order to both evaluate the efficiency, produce a deeper understanding of why current policies are designed the way they are and understand how policies might change firm behavior in unintended ways.

I contribute to this literature in several ways. In two papers, I study the effects of public subsidies and loans on firms and estimate this both in the short and the long run. These two papers relate to the discussion on market failure and public policy, and how governments can improve market outcomes with various tools. In one paper, I study the incentives for firms to apply for subsidies as well as which firm receive subsidies in practice. This paper relates to the discussion on how firms can engage in rent-seeking in order to earn profits that are larger than what they could achieve in the market. In the final paper, I study the incentives for politicians in implementing policies that are known to be inefficient, which might shed some light on why there seems to be a substantial amount of inefficient policies even in non-corrupt countries, which in turn relates to the discussion on political failures. Taken together, these essays provides both an increased understanding on how current policies work and how they might be improved.

1.1 Innovation, market failures and public policy response

Every year governments in OECD-countries invest substantial amounts of money in order to increase innovation in private firms, which in theory should increase economic growth (Becker, 2015). This includes direct subsidies, public loans, public venture capital and other measures. These funds are intended to increase firms' access to capital, capital that might be lacking due to inefficient capital mar-

¹ Mikrodatabas över Statliga Stöd till Näringslivet, Micro database of public grants to private firms.

kets. Inefficient capital markets in turn mean that new and potentially innovative firms lack access to sufficient capital to grow. Capital is needed in almost all stages in a firm's life to finance investments, wages and to smooth income when revenue might be lacking. But if capital markets are not efficient, firms that should receive funding will not. Investments and ideas that could be put to productive use do not see the light of day, which in turn has large negative effects on growth, productivity and wages. Indeed, some scholars suggest that these subsidies are vital in order to achieve economic growth (Mazzucato, 2013).

A short digression is needed on why firms exist at all before we can discuss how they innovate, since the optimal design of policy might depend on how firms function (Aghion et al., 1997). Interestingly, there is no single answer to why firms exist in a market economy, and different scholars have suggested different explanations. One of the earliest suggestions from Coase (1937), is that firms exist since there are transaction costs in the market, and by organizing ventures into firms these costs can be reduced. When firms organize workers and reduce these transaction costs, the division of labor can be increased and therefore productivity can also be increased (Stigler, 1951). Firms also allow for control over workers and reduction of shirking, further increasing the possibility of specialization (Alchian and Demsetz, 1972; Williamson, 1973). This specialization can therefore lead to R&D and innovations, as firms compete to produce new products that will generate a profit (Aghion et al., 2005). Firms therefore play an important role in a market economy, both as producers and as innovators, and the effects of public policies on firm behavior is the central focus of this thesis.

1.1.1 Asymmetric information, moral hazard and positive externalities

The literature regarding market failures for firm financing is substantial. One of the most important functions of a market economy is to spread and structure information amongst its participants (Hayek, 1945). When information is handled in an efficient way by markets, real outcomes become more efficient. When markets fail to deliver information to both buyers and sellers, the gains from trade are reduced. The literature of the economics of information has expanded rapidly and is now an integrated part of mainstream economics.²

Beginning with the seminal contribution of Akerlof (1970), it is clear that when information is asymmetric there can be inefficient equilibria in credit markets. A borrower, especially an entrepreneur, knows more about his or her project than the

²For a summary, see e.g. Arrow (1996) and Stiglitz (2000). For a standard textbook description, see Bikhchandani et al. (2013).

lender, and this might lead to an inefficient market outcome. The asymmetric information in turn increases the risk for the lender. Since it is impossible to perfectly price risk, and since increases in the interest rate charged may affect both incentives and lead to adverse selection, the equilibrium in the credit market may very well include rationing. Adverse selection arises since an increase in the interest charged will lead to the choice of more risky business projects, which might lower the banks expected profits and in return lead to a vicious cycle of higher interest rates, even more risky projects and so on (Stiglitz and Weiss, 1981).

Moral hazard affects almost all decisions where the negative effects from an action on an actor are insulated or removed. Classical examples includes all kinds of insurances. Since the insurance company pays when, say, your bike get's stolen you are less likely to make sure that you have locked it correctly. In a classic article, Peltzman (1975) showed that the introduction of seat belts made drivers drive faster. A more recent example is the introduction of Naxalone, a medicine to treat overdoses from opioids, which lead to more riskier. Since addicts knew that they could be treated, they took larger doses (Doleac and Mukherjee, 2018). Since moral hazard is an unwanted side effect of otherwise positive regulations, services, and products, several methods have been introduced to reduce the effects. For example, most insurance contracts include a deductible in order to make the insured feel some pain from their (bad) behavior. Governments monitor their citizens and prosecute those who claim sick leave without being sick etc. Social norms are valuable in preventing moral hazards, since norms ensure that individuals do not free-ride even when they have a chance to do so. Internal monitoring from one's own conscience might be as effective as external control and strong social norms seem to be important in upholding welfare states' arrangements (Lindbeck et al., 1999; Bergh and Bjørnskov, 2011). In capital markets, moral hazard means that a firm uses their new capital for something other than productive use (Millon and Thakor, 1985; Besanko and Kanatas, 1993). A firm can for example consume their new bank loan rather than use it for productive investments. Depending on the legal arrangements, a firm might avoid consequences by going bankrupt to avoid repaying the loan.³ This leads banks to demand collateral, demand that entrepreneurs take personal responsibility for their loan (rather than lending to a limited liability stock company), monitor the firms behavior, and only lend to individuals that have a reputation of honesty. Venture capitalists especially monitor the firm they invest in to ensure that they get as large a return as possible on their investment (Kaplan and Strömberg, 2001, 2004). But since monitoring is costly, and seldom perfect, the risk for negative behavior is seldom completely eliminated.

³Banks themselves might create moral hazard since they sometimes are "too big to fail". This makes them engage in reckless behavior since they know governments will help them out if their investments go sour (Hellmann et al., 2000).

Introduction

Public loans could remedy the failures in the private loan market, especially if public loans do not need to generate a profit. Then public loans could either be more risky, hopefully increasing innovation by funding firms with viable but risky ideas and accepting higher credit losses in return. Public banks could also lend to firms who need smaller loans. Generally, private banks avoid smaller loans, since transaction costs regarding evaluations make these less profitable. If two firms require the same number of hours in vetting etc. and the screening is equally efficient, but one only wants to borrow 100 000\$ and the other 1M\$, the latter is clearly more profitable. The Swedish state owned bank Almi, for these exact reasons, both lends to more risky firm and accepts loans without collateral. Likewise, it also lends smaller loans than private banks.

Venture capitalists, VC, try to overcome moral hazard and information problems by taking shares in the firms they invest in. But only a minority of all firms receive VC, and while VC is important for these firms they do not impact the majority of firms (Gompers and Lerner, 2001). Some firms may not want to relinquish control of their firms and want to remain in control even if this hampers the firm's growth. Indeed, even when offered more than the market value of their firm, many firm owners do not want to sell even parts of their firm (Bornhäll et al., 2016). Also, since VC have high fixed costs from screening, they are reluctant to invest small amounts of money. For young and small firms, the amount of capital needed might be lower than what is necessary for the VC-firm to compensate for the high fixed costs. It should be carefully noted that a small amount of VC in the market does not necessarily mean that there is a market failure. The view of VC is often quite negative, with some people calling it "vulture capital" suggesting the venture capitalists plunder the value of a firm. If few firms receive VC financing, this might reflect a lack of demand rather than supply.

The positive externalities from innovation also means that the producer of an innovation does not reap the full benefits from this innovation. More formally, there is not full appropriability from an innovation, and hence the first welfare theorem, which states that markets can deliver the socially optimal allocation, is no longer valid (Arrow, 1962). The extent of these external effects is, of course, an empirical question. Some estimates show that an innovator is only able to capture as little as 2% of the economic value of innovation (Nordhaus, 2004). If this is correct, the social surplus of ideas and innovation that are not profitable in the market might be substantial and there is too little innovation by firms compared to the social optimum (Färnstrand Damsgaard et al., 2017).

Subsidies to promote R&D seem to be in line with the theoretical arguments from endogenous growth theory and the importance of R&D spending has been highlighted in recent research. R&D creates innovation, which produces positive spill-overs. R&D is also associated with large risks and it is common that projects

and ideas do not work or generate sufficient profits. Information on R&D is also asymmetric, which makes it hard for creditors to evaluate the quality of a project before it has been tested in the market. A new idea can be extremely profitable, but this information is hard to forward to creditors. Depending on the legal arrangements in an economy, it might even be risky to do so. Without proper legal arrangements, sometimes even with proper legal arrangements, it can be risky for an entrepreneur to tell their creditors exactly what their project is about, since the creditor might steal the project. This creates what Cooter and Schäfer (2012) calls a double trust dilemma. The entrepreneur must trust their creditor enough to give them sufficient information regarding their project without being afraid that the creditor will steal their idea. The creditor on the other hand must trust the entrepreneur to use their money in a productive way and repay them. While good corporate legislation helps, the dilemma does increase risk and difficulties, especially for funding R&D projects. For smaller firms, the risks of research might therefore be too high to justify the money spent, and firms might invest nothing or too little into R&D. If governments therefore put money into firms for the direct purpose of increasing their R&D-budget, this could in turn increase output (Hall, 2002; Hall and Lerner, 2010). The big question is to separate firms with potential and lack of resources from those without potential or without a lack of capital. This lack of funding is especially pronounced in the case of R&D, since it is so risky. A large proportion of all R&D-projects fails, creating losses for firms. But since those who succeed might produce such large gains for both the firm and for society, it might be worthwhile for governments to subsidize firm R&D. Indeed, most governments in e.g. the OECD does subsidize R&D by for example making any expenses deductible. Further, many governments, including the Swedish, give grants to especially small firms that want to engage into R&D. The literature regarding government subsidies is enormous, and expanding. Increased spending in R&D should translate into higher growth rates but this seems not to be the case empirically. Indeed, if anything growth rates in the OECD seem to be falling despite large investments (Erixon and Weigel, 2016; Bloom et al., 2017). Some economist even talk about a secular stagnation, a long term slowdown of the economic growth rate especially in the U.S (Gordon, 2017; Cowen, 2017). This thesis does not delve too much into firms R&D decisions due to data limitation. Most small firms do not report any R&D expenses for accounting reasons, even if they might perform R&D. That makes it harder to study R&D decisions compared to real outcomes such as revenue or number of employees.

Information could, interestingly, be asymmetric in the opposite direction if entrepreneurs are over-confident (Koellinger et al., 2007). Over-confidence in entrepreneurs could therefore make the problem of asymmetric information less pressing, since a disinterested financier could have a more neutral view of the

firms possibilities. Individuals self-select into becoming entrepreneurs, and it is no coincidence that people with high confidence become entrepreneurs. From a societal point of view, this might be beneficial. If all individuals were risk averse, few would start new businesses for example. Still, it might not be good policy to encourage more people to become entrepreneurs beyond those who already self select, since efficient markets are harsh and new firms do not survive long. Reviewing the evidence for policies that promote people to become entrepreneurs Acs et al. (2016), find limited evidence: *"Reviewing established evidence we find that most Western world policies do not greatly reduce or solve any market failures but instead waste taxpayers' money, encourage those already intent on becoming entrepreneurs, and mostly generate one-employee businesses with low-growth intentions and a lack of interest in innovating."* A similar opinion is held by Shane (2009). Indeed, a large share of self-employed individuals is not a sign of a well functioning market but rather the opposite (Henrekson and Sanandaji, 2014). Returning to capital markets, this means that policies that expand the access to credit might not be as successful as one would think. When access to credit increased in Denmark due to a mortgage reform, entrepreneurship increased but the new entrants were of lower quality than the incumbents (Jensen et al., 2014). In terms of banking finance, this could lead to over-lending, which in turn has negative effects both on the allocation of credit and on the borrower (De Meza and Southey, 1996; De Meza and Webb, 2000; De Meza, 2002). Depending on how strict bankruptcy laws are, the cost for the individual might be substantial.⁴

1.1.2 Empirical evidence: a mixed message

Based on this theoretical background, it is clear that markets alone are not always sufficient. As Stiglitz (1985) has pointed out: *Sometimes the Invisible Hand may be invisible, because it simply is not there.* But how important is it for markets to be perfect? Perfect markets means that markets are Pareto optimal, i.e. it is not possible to make anyone better off without making someone else worse off. Pareto optimality is in turn an extremely strict criteria, perhaps too strict (Demsetz, 1969). Economists have often been vague on the exact scope of the market failures that they study. This relates to the discussion of statistical versus economic significance: Even if a coefficient is statistically different from zero it does not mean that it matters, since the coefficient is too small to have any real world effect (McCloskey, 1985; McCloskey and Ziliak, 1996). We need to study both the size and the significance of the variables we are interested in. A statistically significant but small effect warrants a different response than a larger effect, for a given policy.

⁴For an overview of Swedish bankruptcy laws for entrepreneurs, see SOU (2014).

Since theory alone cannot exactly say how efficient subsidies or other policies targeting firms might be, a look at the empirical literature is needed. Beginning with studies related to export subsidies, there is a case to be made for interventions in order to promote exports. Exporting firms are often more productive than non-exporting firms. Exporting might also require some fixed entry cost in order to get proper licenses, establish connections etc. If a government grant can help the firm overcome this entry barrier, some positive effects should be visible. However, both older and more recent work finds a lack of effects when it comes to public interventions to promote exports (Grossman, 1986; Kokko et al., 2015). This literature is interesting not because it addresses capital market failures per se, but because the arguments in favor of export subsidies is so similar to the literature on how support can help firms overcome the difficulties they encounter on financial markets.

Starting with the work by Jaffee and Modigliani (1969) there has been a large number of empirical studies on the extent of credit rationing. Finding an effective, and empirically useful, measurement of credit constraints, despite previous efforts, is not simple. Following Fazzari et al. (1988), investments and cash flows have been used as measurements of credit constraints. Firms that have lower cash flows also have lower investments, which could suggest that they cannot get access to credit to invest. However, this method has been criticized by Kaplan and Zingales (1997), and the ensuing debate has not yielded conclusive results on whether this method is useful or not (Fazzari et al., 2000; Kaplan and Zingales, 2000). Another way of measuring capital constraint is via Tobin's Q. Tobin's Q is the market value of a firm's assets divided by the replacement value. In practice, it is standard to use the firm's equity and liabilities market value divided by their equities and liabilities book value. If the firm has a Tobin's Q above 1, this means that the firm has some unmeasured value that is not captured by the market, in turn suggesting that the firm should invest more into capital since they earn more than they spend on it. If a firm has a high Tobin's Q but does not invest in capital, this could suggest that the firm is capital constrained. Since they should invest in capital but are not doing so, they might lack access to credit. A problem with Tobin's Q however is that it requires market valuation of a firm, which is often missing in practice. Private firms, whose stocks are not traded in a market, do not have a market valuation. Similarly, when using anonymous registry data, it is not possible to link the market value of a publicly traded firm with its stock value.

Interestingly, Farre-Mensa and Ljungqvist (2016) finds that all current measurements of credit constraints do not predict real world behavior. They use exogenous tax increases, which increase the benefits of holding debt, to measure how firms that should be constrained according to prevailing measurements react and therefore test the predictive power of these measurements. Their results do not find any connection between the behavior of the firm corresponding to the mea-

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surements of credit constraints. Firms which the indicators of capital constraints deems to be constrained increase their debt just as much as the non-constrained firms. This in turn means that is hard to know which firms are genuinely credit constrained, and which should be subsidized or not.

Turning to how subsidies are used in practice, the empirical results for R&D subsidies is mixed, where Bronzini and Iachini (2011) and González et al. (2005) find positive effects of R&D subsidies for small firms while Koski and Pajarinen (2013) does not. Some studies document crowding-out of private money when firms receive public money, particularly in the case of large firms (Wallsten, 2000; Lach, 2002; Görg and Strobl, 2007). This leads to smaller, or non-existent, effects compared to when there is no crowding out, since the net increase in firm capital is smaller when public money replaces private money. Other studies do not find crowding-out effects and, instead, find positive effects of subsidies to firms with innovative ideas but insufficient financial resources (Hussinger, 2008; Hottenrott and Peters, 2012). A recent study by Howell (2017) finds a positive effect for support of R&D subsidies in the energy sector. David et al. (2000) and Klette et al. (2000) surveys the literature and find a lack of consensus as to whether public R&D is a complement or a substitute for private R&D; the authors suggest matching techniques and randomized experiments as fruitful avenues for future research. Martin and Scott (2000) provide several suggestions for efficient subsidies and are skeptical of a direct approach: *Because governments typically have a poor record of identifying ultimately successful lines of technological development in advance, public support for innovating SMEs should not take the form of direct grants. Nor should it take the form of government debt or direct equity financing.* It should be noted that government indirectly funds firm R&D via universities and research institutes, something that most economist approve of due to the public good nature of such research. Ideas from universities are often commercialized by private firms, especially when scientists can profit from it (Jensen and Thursby, 2001).

A survey of 77 empirical papers on public R&D subsidies and private spending finds considerable heterogeneity of the effects (Zúñiga-Vicente et al., 2014). This lack of consensus comes mainly from the difficulties in finding causal methods. There is especially a lack of understanding of the effects of multiple subsidies and how they might affect each other and targeted firms. There is also a lack of studies on the self-selection of firms, i.e. which firms choose to apply for a subsidy.

There are two important papers that specifically use Swedish data in their evaluation of subsidies. Söderblom et al. (2015) evaluate the effect of subsidies from Vinnova on acquiring additional human and financial capital, and find positive results. However, their approach is likely to lead to biased treatment effect estimates since they compare firms that were rejected at the last stage of the application process to firms that were not rejected. Their claim that their identification strategy

corresponds to a regression discontinuity design is not valid unless the decision made at the final stage was random. However, if Vinnova has the competence to select the better firms at the final stage, then the approach of Söderblom et al. (2015) leads to treatment effect estimates that are upward biased. The other study of note is Tillväxtanalys (2014), which uses coarsened exact matching to address the issue of selection bias. It finds no significant results from subsidies on firm growth, the skill level of employees, or firm productivity when evaluating two specific programs from Vinnova.

Government owned banks, or private bank loans that receive special public credit guarantees is an important policy in many countries. Aggregate results using cross-country data shows non-existent or negative effects from state owned banks (Galindo and Micco, 2004). A large share of government owned banks in 1970 is associated with less future growth and less financial development in 1995 (La Porta et al., 2002). German local banks with a public mandate are less, and sometimes even counter-, cyclical than private banks, which is positive for financial stability and firms access to finance during a business cycle (Behr et al., 2017). Similar results are found by Bertay et al. (2015), who, despite this, questions the usefulness of state banks due to their inefficiency in allocating credit. It is also unclear if the pro-cyclical lending is directed to the firms that will benefit the most from it, or if it is targeted at firms with political connections. A recent study from the US, using a combination of propensity score matching and instrumental variables, found that firms who received loans from the Small Business Administration (SBA) increases their number of employees compared to the control group (Brown and Earle, 2017). Increasing the number of employees is the main goal behind SBA loans, and the study shows that the cost of SBA loans, from default losses and administration, is low enough to make them fairly efficient.

One explanation for a lack of positive results might be that state owned banks lend money to firms with political connections or to firms in areas where voters support a certain political party, or to secure political influence and distribute rents (La Porta et al., 2002; Sapienza, 2004). This effect is found even in Germany, which is otherwise a country with little corruption. Elite networks allocate both public and private bank money to their friends, rather than to those firms would benefit most from them, and public banks are worse than private banks in this respect (Haselmann et al., Forthcoming). Even without corruption there is still a risk that public loans are used for reasons other than generating the maximum amount of firm growth. Public money might instead be used for issues such as compensation to less well off regions or help industries that politicians currently favor. While these are legitimate concerns, if they are not clearly stated, it makes evaluation more difficult when the stated objective is different from the intended objective. If the stated aim is to increase firm growth, but the unofficial goal is to

decrease regional inequality, than evaluations might not be measuring the correct outcome.

Evaluation of government funded VC (GVC) is somewhat more positive than other policies, with positive effects found in the US and internationally (Lerner, 1999, 2002; Brander et al., 2015). Still, in his overview of international experiences, Lerner (2009) is negative to the overall effects from GVC in mature markets. GVC might however play a role when VC-markets are underdeveloped. In Canada, public venture capital crowded out private venture capital to such a degree that the total supply actually decreased (Cumming and MacIntosh, 2006). While governmental venture capital in Sweden quite closely follows private venture capital and hence make decent profits, it also invests more into failing projects than private venture capital (Engberg et al., 2017). It is unclear if this is optimal or not, and the Swedish Audit Office criticized the current system for not investing in early phases where the market failure is more likely to be great (Riksrevisionen, 2014).

There is an substantial difference between government supports and subsidies that are permanent in nature and those that are temporary crisis relief. For example, during the Asian crisis in the late 1990:s, South Korea implemented credit guarantees to prevent firms from failing since they could no longer get any credit due to the crisis. This policy seems to have been helpful in preventing otherwise profitable firms from going bust due to an temporary chock (Kang and Heshmati, 2008). If firms access to credit varies with the business cycle, as it seems to be doing (Becker and Ivashina, 2014), there can be gains from smoothing this credit access. Since none of the policies that are studied in this theses are temporary reliefs, their exact nature and design are not studied further here.

1.1.3 The Swedish innovation and industrial policy system

The Swedish public innovation system is somewhat complex and confusing. Excluding the direct support to universities and education, and focusing solely on the parts that is directed to firms, there is still a myriad of policies. Firms can get access to direct subsidies from several different agencies at the state level and sometimes also on a local level. There is a state owned bank, Almi, which lends directly to SME's as well as several state owned venture capital funds. This diverse nature has been criticized by many, and the OECD calls it fragmented (OECD, 2016).

Three large government agencies are responsible for handing out direct subsidies to SMEs. These are subsidies that firms can apply for e.g. in order to increase their R&D spending, buy new machinery or invest in human capital. The responsible agencies are Tillväxtverket, The Swedish Agency for Economic and Regional Growth (SAERG), Vinnova and the Swedish Energy Agency. In short, SAERG promotes entrepreneurship in general and provides EU-based regional subsidies,

while Vinnova focuses on projects related to innovation and R&D that could be classified as more high-risk, whereas the SEA focuses on projects in the energy sector.

Almi provides loans to firms both in conjunction with commercial banks and by themselves. Commonly, a firm that receives a bank loan from Almi also has a bank loan from a commercial bank, with Almi providing the more risky part of the loan. In that sense, Almi is similar to a second mortgage in the market for private mortgages. Almi charges a higher interest rate than commercial banks, but offers riskier loans and does not necessarily take collateral from the firm to which it lends. Almi also lends to firms that do not have a private bank loan. In that sense, Almi lends both on the intensive margin (extra money to firms who have a commercial loan) and the extensive margin (firms who do not receive a commercial loan).

There are several government owned venture capital funds (GVC) that invests in both to smaller and medium sized firms. For a better description of Swedish GVC, see e.g. Engberg et al. (2017).

1.2 Politics without romance: difficulties in crafting efficient policy

Sometimes it is said that man can not be trusted with the government of himself. Can he, then, be trusted with the government of others? Or have we found angels in the forms of kings to govern him? Let history answer this question.

Thomas Jefferson - Inaugural Address (1801)

Since 1960s economists have increasingly abandoned the view of government being a benevolent dictator who's sole purpose is to maximize a social welfare function. This perspective of government is however older, going all the way back to the Swedish economist Knut Wicksell in the nineteenth century (Wicksell, 1896; Buchanan, 1987). The notion that mankind is flawed is, of course, much older than Wicksell and Immanuel Kant poetically formulated it as: "*Out of the crooked timber of humanity, no straight thing was ever made.*" ⁵

⁵In German, the quote reads: "*Aus so krummem Holze, als woraus der Mensch gemacht ist, kann nichts ganz Gerades gezimmert werden*" (Idee zu einer allgemeinen Geschichte in weltbürgerlicher

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With this perspective, politicians are seen as rational and egotistical, maximizing their own utility and especially their chances of being re-elected and the rents they can extract from being in office (Persson and Tabellini, 2000; Mueller, 2003). Special emphasis is on the strategic interaction between politicians, special interest groups, voters and economic outcome. Politicians aim to maximize the number of votes they receive in order to be able to win elections, and act in the way that they believe will achieve this goal. This could of course be in line with maximizing the total utility of the country, as in pursuing efficient policies that everyone benefits from, but could also mean that the government bribes a majority on the minorities expense.

The different theories in public choice and political economics are important when we try to understand real world politics rather than theoretical constructions. As Buchanan (1984) has eloquently said: *this is politics without romance*. It is only possible to craft efficient policies when one have a realistic view of the political, and bureaucratic, process through which policies are constructed.

1.2.1 Rent-seeking

In an honest service there is thin commons, low wages, and hard labour. In this, plenty and satiety, pleasure and ease, liberty and power; and who would not balance creditor on this side, when all the hazard that is run for it, at worst is only a sour look or two at choking? No, a merry life and a short one shall be my motto.

Bartholomew Roberts

A major topic in the political economy and public choice literature is rent-seeking. A rent is defined as a profit above the competitive equilibrium, which in theory can be both positive or negative. In the entrepreneurship literature, an entrepreneurial rent is the profit associated with a new venture or idea, such as selling cheap furniture which the customer needs to assemble themselves. These profits are often substantial in well-functioning economies (Sanandaji and Leeson, 2013). These rents are positive for society, since they inspire firms and entrepreneurs to innovate and come up with new ideas. They also make innovation possible, since these rents

Absicht, Akademische Ausgabe, Band 8, page 23, 1784.).

are able to compensate for the fixed costs that were involved in coming up with the product or service.

However, beginning with the seminal works of Tullock (1967) and Krueger (1974), the term rent-seeking is more associated with unproductive behavior. Firms and other organizations spend time and resources in order to increase their profits via governments rather than markets. This includes everything from getting direct subsidies, monopoly licenses, imposing tariffs on competing goods as well as pure theft. In the terminology of Baumol (1990), this is unproductive or destructive entrepreneurship rather than productive. The goal is to generate a profit that is larger than can be gained in a competitive market. Firms can of course seek rents as part of their ordinary business as well as only rely on rent-seeking for their income.

The actions taken in order to capture a rent can take a number of different forms. Perhaps the most studied is lobbying, where firms and special interest groups actively try to convince politicians to create laws and regulations according to their interests (Grossman and Helpman, 2001; Baldwin and Robert-Nicoud, 2007). Special interests might convince politicians using a combination of campaign financing, good arguments, other supports or outright bribes. Lobbying is often seen as a problem in democracies, and in the U.S. lobby groups need to be registered with the federal government. However, in practice, lobbying cannot be too effective. As pointed out by Tullock (1972), given the huge gains at stake, there is too little lobbying going on assuming that lobbying was efficient. A firm that could acquire a monopoly license in the US or EU market would make enough profits from this license to warrant much larger bribes or campaign contributions than is currently observed (Buchanan et al., 1980). If firms are rational, this suggests that the expected profits from lobbying are low, not because the gains are low but because the chances of success are low. It cannot be too easy to gain a monopoly or regulation from politicians just by lobbying them, otherwise there would be more regulations and more lobbying than we currently observe.

Another form of rent seeking involves regulatory capture, meaning that firms or other special interests are able to change regulations in their favor. An example could be an automobile firm that prevents stricter regulations on car safety, since new regulations would increase their costs (Peltzman, 1976; Laffont and Tirole, 1991). Another way could be to actually increase regulation, in order to keep out potential competitors. If the new regulation increases the fixed costs associated with entry, this will reduce competition in the long run. The problem of regulatory capture has been highlighted since the 2008 financial crises, where several scholars claim that the financial industry had captured the regulatory agencies, bending the regulations to their will (Carpenter and Moss, 2013). This in turn led banks to take too much risk and contributed to the severity of the crisis.

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Taking political limitations into account, a trade off between market failures and corruption becomes apparent. If markets are left unregulated, given the problems outlined previously, they might fail to deliver a social optimum. On the other hand, when politicians regulate markets they create winners and losers, opportunities for corruption and a need for a bureaucracy that upholds laws and legislation. The political failure created when solving market failures might outweigh the benefits of solving the market failure (Richard Jr and Zerbe, 1999; Acemoglu and Verdier, 2000). This must be taken into consideration when designing policy. Even in Sweden, where corruption is not considered a major problem by most scholars, rent seeking is still a problem, although not a major one (Svaleryd and Vlachos, 2009; Folke et al., 2017). Rent-seeking and corruption can impose substantial costs on society and the costs from corruption in terms of lower growth seems to be extremely high (Murphy et al., 1993; Tollison, 2012).

Of major importance for any economic growth is therefore that rent-seeking is limited, so that productive entrepreneurship is the norm more so than unproductive or destructive entrepreneurship. While pirates such as Bartholomew Roberts, also known as Black Bart, make for interesting stories they do not contribute to a good and prosperous society. Containing violence is perhaps the most important goal for politics, a goal that economists often overlook (North et al., 2009). By containing violence, talented individuals do not consider piracy to be the best option for their careers. While this might seem to be a drastic point, violence can of course take more benign forms as in minor theft or fraud. Still, this form of violence is a major obstacle to economic growth, even in stable democracies.

1.2.2 Voting models: median and margin

The historian Thomas Carlyle named economics the dismal science, perhaps to object to the gloomy predictions of Reverend Malthus.⁶ It is therefore perhaps not so surprising that when economists analyze politics, their view is often slightly pessimistic. Still, the problems of politics need to be addressed and not shoved aside. It is not enough to respond in the same way as Jean-Charles de Borda, who, when confronted with the possibility of manipulation of his suggested voting system is said to have responded: *"My scheme is intended for only honest men"*. Alas, there are more than just honest men in the world. If politicians are interested in maximizing the number of votes they receive in election the design of correct policies becomes more trick than if politicians are motivated only with maximizing the social welfare. For example, another risk when fighting market failures is not corruption, but the side effects from vote maximizing. When trying to solve the

⁶Malthus predicted that any increase in economic output would be offset by increasing birth rate, dooming man to perpetual poverty unless birth rates were reduced.

market failure in housing credit via government sponsored enterprises (GES) there is a risk that politicians will make the terms and conditions too loose in order to win political sympathy. In the case of Fannie Mae and Freddie Mac in the USA, there was too much risk taking. This risk taking did benefit poorer households that did get access to credit to an extent that they would not have been able to without public intervention. However, this extra risk taking ultimately contributed to the 2008 financial crisis which in turn led to major social problems (Glaeser, 2012).

Before we further study the problems of vote maximizing, we need a model on how elections are won in democracies. The median voter theorem has been the workhorse in public choice and political economy since the seminal contributions of Hotelling (1929), Black (1948) and Downs (1957). According to the model, voters are aligned on a right-left axis, and a majority is needed to win. There are only two parties. With those assumptions, the median voter on the left-right axis will be pivotal, and both parties will therefore present programs that are exactly in line with the median voters preferences. Although the model is simple, it has remained influential since it only requires single peaked preferences and that political preferences can be ordered on a single-dimensional axis such as a right-left wing scale. However, as of lately the median voter model has often been substituted for the more complex probabilistic voting model. This model gives similar conclusions with a few exceptions; the equilibrium is no longer razor sharp at the median, marginal or swing voters are now an important group and there is room for political ideology (Lindbeck and Weibull, 1987, 1993). With the citizen candidate model, where politicians are chosen from ideological citizens, even more scope is left for ideology (Osborne and Slivinski, 1996; Besley and Coate, 1997). These models are backed up with the empirical studies that do find that the ideology of parties matter for outcome. Still, the difference between different parties in terms of actual policy is often surprisingly limited, indicating that the median voter theorem is a useful rule of thumb (Levitt, 1996; Pettersson-Lidbom, 2008; Ferreira and Gyourko, 2009).

Since swing voters are important for increasing the probability of winning an election, spending money on these group can be efficient. Earlier studies did not find any large effects of spending on the probability of winning elections. However, as was pointed out by Levitt and Snyder Jr (1997), these studies missed a fundamental aspect of the logic behind campaign spending. From the politicians view, it is only necessary to spend money on election campaigns if is uncertain that you will win. Hence, spending should have a downward bias in empirical estimations. An U.S. senator that recently has been involved in a scandal will be spending more in order to counter the negative shock on the chances of being re-elected. When taking this endogeneity problem into account, campaign spending do seem to have a positive effect on the probability of winning a election (Levitt and Snyder Jr,

1997).

Politicians are aware of this, and respond accordingly. Actual spending such as infrastructure grants can be targeted to areas or groups with many swing voters, in order to increase the number of expected votes for a given sum of money (Dahlberg and Johansson, 2002; Cadot et al., 2006). While this spending might be worthwhile, the objective of maximizing the number of votes per project is different than maximizing growth per project. This creates a tradeoff between two goals: on the one hand, politicians in a democracy should of course act in their voters interests. On the other hand, it is not optimal that politicians use public money to win votes rather than act in the interest of the majority.

1.2.3 Time inconsistency, institutions and political commitment

In the late 1960:s the psychologist Walter Mischel performed test on children to measure their willpower. The children were given the choice between one marshmallow now, or two if they could wait a few, unspecified, minutes. They were then placed in a room where they could be watched, and the psychologist's measured if, or how long, they could wait before eating the marshmallow. Afterward, the researcher have followed these children and found an interesting pattern: the children who had greater self control also became more successful as adults. Self discipline increases the probability that an individual will finish their education, have a successful career, stay married etc. On the other hand, a lack of self discipline can lead to higher rates of substance abuse and other negative behavior (Mischel, 2015). While his results have recently been criticized for not taking differences in the children's parents income into consideration, the notion of self discipline being important remains correct (Watts et al., 2018). Self discipline is equally important for individuals as well as for politicians crafting policies. If policies are short-sighted, they risk being inefficient and more motivated by the upcoming election rather than what is good in the long run.

The insight that policies must give correct incentives for politicians is a mainstream opinion in modern macroeconomics (Kydland and Prescott, 1977; Bisin et al., 2015). Without time consistency, and given the incentives of self interested politicians, there is room for manipulation in order to increase the likelihood of a re-election. This in turn leads to so called political business cycle, where fiscal and monetary decisions are made to maximize the chances of re-elections rather than maximize social welfare (Rogoff, 1990). For example, increasing inflation or increasing public debt before an election can temporarily increase growth. These cycles are intentional, in order to increase voters appreciation of the ruling party due to the booming economy. Politicians relay on voters being myopic enough to not be able to predict that their will be a slump afterward, when the debt needs to

be repaid. Indeed, debt can even be used strategically, in order to bind the hands of future politicians (Persson and Svensson, 1989). This insight has contributed to several OECD countries enacting central bank independence reforms, which seems to have been positive for price stability, since politicians can no longer print money right before an election (Alesina and Summers, 1993). While the importance of commitment goes back Odysseus, who tied himself to his ship's mast to avoid the call of the sirens, the game theoretical foundation is due to Schelling (1960).

Forgetting to take the political incentives and lack of human perfection into account is not unique to the industrial and innovation research field. One survey found that 95 % of all papers in behavioral economics that proposed a paternalistic policy in order to correct for individual "bad behavior" failed to take into account for politicians being human and hence susceptible to cognitive biases themselves (Berggren, 2012). It might be the case that this lack of understanding of the policy process leads researchers to suggest policies that will not work in practice.

All is not lost though. When reading research in political economy and public choice, one often becomes quite pessimistic about the possibility to solve any problem via the democratic system. Still, democracies seem to be able to produce decent results, both regarding economic living standards as well as solving common pool problems (Wittman, 1989). In the same way as self discipline is important for individuals, it is important for politicians and the political system. Individuals can use rules of thumb to boost their self discipline and institutions provide a similar service in policy by shaping the incentives and motivations of politicians. Institutions shape the way elections are carried out, and the scope that politicians have to hand out money to special interest groups and marginal voters, the possibilities for media to scrutinize etc. Well functioning institutions therefore affect both politics and the functioning of the economy (Buchanan and Tullock, 1962; Rodrik et al., 2004). To quote North (1991): *Institutions are the humanly devised constraints that structure political, economic and social interaction*. By restraining politicians, voters and firms from taking certain actions, better outcomes can be produced. Just as an individual can balance her diet better by, say, only eating candy on Saturdays, so can politicians govern a country by, say, having constraints on the total amount that can be borrowed a given year. Constitutions that lay out the rules of the political game can reduce the scope for rent-seeking by preventing special favors to certain groups.

The amount of corruption in an economy can also be decreased with sufficient accountability, limiting politicians' ability to divert resources for themselves (Maskin and Tirole, 2004; Prat, 2005). Here, media plays an important role in limiting the possibility of "backroom deals". In Brazil exposing corrupt politicians not only lowers the probability of them winning an election, but also increases the probability that honest politicians will be re-elected (Ferraz and Finan, 2008,

2011). This indicates that voters were expecting some corruption and hence rewarded politicians that were more honest than they had expected.

To sum up, while the political process is far from perfect, and one should not expect that the stated aim of a policy to be the same as the true aim of said policy, there is no reason to despair. Well designed rules and institutions that create transparency and accountability can ensure that outcomes are at least somewhat in line with the common good. With a more nuanced view of politics and how policies are crafted, the chances that an economist will be able to give better policy recommendations might increase.

1.3 Causal evidence without randomization: the main problem in empirical social science

How can we determine if our actions on an object affect it or not? The question might sound downright stupid, but has been a longstanding question in philosophy. David Hume described our limited understanding of cause and effect, and how we can only understand it due to past experience (Hume, 1748/2000). When we see a billiard ball strike another ball and move it, the reason we know that it was the impact that caused the ball to move is because of previous experience on balls and impacts. If we had never before seen a ball hit another ball, we would not know what kind of effect the impact would have had. The philosophical debate on causality is still not settled. Despite these difficulties, a pragmatic consensus exists that an action X on object Y causes an effect if and only if the effect would not have happened without X .

1.3.1 The baseline model of causality

In mathematical terms, the causal effect can be described as

$$\begin{aligned} Y(i) &= \begin{cases} Y_{1i} & \text{if } D_i = 1 \\ Y_{0i} & \text{if } D_i = 0 \end{cases} \\ &= Y_{0i} + (Y_{1i} - Y_{0i})D_i \end{aligned}$$

where Y_i is the effect on the subject and D is whether or not the subject has been treated. The best way to determine the treatment effect would be to first treat the subject i and observe the effect i.e. $D_i = 1$. Then, travel back in time and ensure that the exact same i does not receive a treatment, $D_i = 0$, and measure the effect of not being treated. Then and only then can we determine the genuine effect on

the same individual, $Y_{1i} - Y_{0i}$ (Angrist and Pischke, 2008). Alas, without access to Dr. Brown's DeLorean, no such experiment can be undertaken.⁷

Turning instead to groups of individuals that self-select into the treatment, a comparison between the treated group and the control group can be described in the following equation

$$Y(i) = E[Y_i | D = 1] - E[Y_i | D = 0]$$

this equation in turn consists of two parts, the causal effect of the treatment and the selection bias

$$[E[Y_{1i} | D_i = 1] - E[Y_{0i} | D_i = 1]] + [E[Y_{0i} | D_i = 1] - E[Y_{0i} | D_i = 0]]$$

where the second part of this expression captures the selection bias. It is unlikely that the group that is treated is identical to the group that was not treated. A simple measurement of outcomes will therefore both measure the selection bias and the causal effect of the treatment (if there is one). This presents a major problem for practical empirical work.

Without access to a time machine, the second best solution for determining causal effects from interventions is a randomized control trial (RCT). In RCTs, the treated group is randomly selected from the total pool of potential individuals, and the control group in turn becomes randomized. The randomization process should ideally eliminate any significant differences between the two groups. In turn, any effect from the intervention should be only due to the intervention. This simplifies the analytic process drastically, and RCTs are often described as the "gold standard" in empirical science. To see why RCT is so effective, consider the following expression

$$\begin{aligned} E[Y_i | D_i = 1] - E[Y_i | D_i = 0] &= E[Y_{1i} | D_i = 1] - E[Y_{0i} | D_i = 0] \\ &= E[Y_{1i} | D_i = 1] - E[Y_{0i} | D_i = 1] \end{aligned}$$

since Y_{0i} and D_i are now independent of each other. We can simplify further and get

⁷In the movie series *Back to the Future* Dr. Emmett Brown and his assistant Marty McFly travel back and forward in time with the help of a modified DeLorean DMC-12.

$$\begin{aligned} E[Y_{1i} \mid D_i = 1] - E[Y_{0i} \mid D_i = 1] &= E[Y_{1i} - Y_{0i} \mid D_i = 1] - E[Y_{0i} \mid D_i = 0] \\ &= E[Y_{1i} - Y_{0i}] \end{aligned}$$

with randomization, the observed outcome is equal to the causal outcome.

Given this, why don't all social scientists just do RCTs to study the effects of, say, labor market policy, industrial policy or pedagogical methods? RCTs are actually quite uncommon in practice, outside the scope of medicine and natural science. RCTs can be expensive, and often controversial. To randomize what school a child should attend is not a popular method, although it does allow for direct measurement if, say, lectures are more effective than case based learning. It can also be impossible when the subjects which we want to study have a will of their own. If some students are, say, forced to attend lectures this does not mean that they will listen. They can attend the lecture but e.g. daydream instead. This makes it hard to draw any conclusions on the efficiency of lectures, even if the students attendance was randomized.

1.3.2 Causality without randomization

Since there is almost no access to RCTs in social science, there is a need for other methods than just simple OLS regressions. Selection bias therefore remains a problem for all but a few social scientists. Over the last 25 years, several different techniques have been developed to try and tackle this problem. Some claim success, and this development has been called the "casual revolution" in econometrics (Angrist and Pischke, 2010; Heckman, 2010). The usage of methods such as matching, regression discontinuity design and instrument variables increases the probability of finding true causality. Although it is hard to find data that allows for these types of methods, progress is being made every day.

In recent years, a substantial amount of previously held ideas have been questioned by better research design, and new knowledge has been produced. This includes work in such as diverse fields as criminology (Levitt, 2004; Sariaslan et al., 2013, 2014) and sociology (Lyngstad et al., 2017). In all these examples, clever methods to separate correlations from causation, and taking into account omitted variable bias, has been the key to success.

Problems still exist though. A lack of statistical power might be a problem, especially with small sample sizes (Ioannidis et al., 2017). The so called replication crisis, the fact that a large part of all empirical results cannot be replicated, have mainly affected psychology but also economics. A recent review of laboratory economics papers shows that about two thirds can be replicated with greater sample

size (Camerer et al., 2016). One third could not. While this is a serious problem, at least the number of papers that could be replicated in economics is higher than in psychology, where only one third could be replicated (Collaboration, 2015)⁸. A major explanation for the lack of repeatability is due to too small sample sizes, resulting in low power and large standard errors. Since large samples can be hard to find, or expensive in the case of RCTs, this is a major problem for social science. A lack of power cannot be addressed with only randomization but require sufficiently large samples.

When using instrumental variables (IV), there is a problem if the instrument is weak i.e. does not correlate to a sufficient degree with the variable which one wishes to estimate. In that case, IV can lead to misleading results, since the error term in the first stage multiplies in the second (Young, 2017). When collecting instrumental variables, measurement errors can have large effects on the validity of the overall result. An important example is the study by Albouy (2012), who found large errors in the instruments in a famous paper on the effects of colonialism on institutional quality. When these errors were corrected, the estimated effect disappeared.

The focus on causality might lead researchers to only look at questions they can answer, rather than questions that are interesting or important. In an interesting opinion article, the economist and writer Noam Scheiber criticized the obsession with causality.⁹ It has lead economists to chase randomness without thinking why the question was interesting in the first place. Especially, he criticized Steven Levitt, the author of *Freakonomics*, who has made a career of studying strange questions that can be causally estimated, such as cheating in Sumo wrestling (Levitt and Dubner, 2005). While cheating Sumo wrestlers are interesting, perhaps they are not the most pressing social issue. Scheiber's article is at the time of writing 10 years old, but the debate is still not settled and continues to be interesting.

Two papers in this dissertation use matching as a way to reduce the selection bias that is created by non-randomized treatments. Matching is a way to reduce bias by, out of a large pool of non-treated individuals, select those who are most similar to the treated group. Similar means that they are similar based on certain parameters that we can observe in our data, for example firms with the same number of employees. This is why this technique is called matching on observables, since we can only match on variables that we can observe in the data. The method is old, going back to Rubin (1974), but has increased in popularity due to greater access to data and computing power. Especially in countries where one can ac-

⁸There is some debate regarding how bad the lack of reproducibility really is, see the discussion in e.g. Gilbert et al. (2016).

⁹<https://newrepublic.com/article/62561/freaks-and-geeks-how-freakonomics-ruining-the-dismal-science>

cess registry data, and hence have a huge pool of non-treated subjects that forms the control group, matching can be useful. More specifically, the two papers use a fairly new matching method that is called Coarsened Exact Matching (CEM) (Iacus et al., 2009, 2011). CEM matches treated individuals based on a number of chosen variables. It then coarsens these variables into bins, and then matches treated and non-treated exactly on these bins. These bins can be chosen by an algorithm or manually defined. Any number of variables can be chosen as matching variable, but too many variables reduces the likelihood of finding good matches and increases computing time drastically.

While matching can only be used on variables that we can observe, and hence cannot take into account unobservable factors such as motivation, it is still better than using a non-matched control group when there are reasons to suspect large selection bias.

1.4 Data and limitations

The data in this thesis comes from Growth Analysis and consists of two different data sets: The MISS-database on public subsidies and loans to firms from Swedish agencies as well as registry data from Statistics Sweden. The registry data is what provides the background information on all the firms that are studied by linking data on employer and employees. The employer data contains information on the firms studied, e.g. their capital stock, debt levels, number of employees, industry and regional classification. The employee data contains information on wage sums and the skill level of the employees in that firm. This data is what allows all formal outcome studies as well as the variables that are used when matching the treated firms to the control firms. All registry data and the MISS data is anonymous, meaning that the firms ID have been replaced by a non-public ID. This allows me to follow the firms during the panel, but I do not know the names of the firms. This in turn protects the firms' privacy and business secrets, but it does hinder me from linking a publicly traded firm to its stock market value.

Some caveats are needed. The available data sets lack information on why firms stop their activity and disappear from the panel. Since a firm exit can be both a buyout, which most firm owners might consider a positive event, as well as a bankruptcy, which is always a bad event, it is hard to understand why firms leave the economy. Many firm owners also choose to close down their firm, perhaps because they have received a new job that is more lucrative, or in order to prevent a bankruptcy if they were to continue. This means that it is not possible to see if public subsidies or loans have led to fewer firm closures, which could be an important outcome variable otherwise. I also lack data on patents. This means that it is not

possible to see if the subsidies lead to increased innovation via patenting, but only possible to see if the innovation has real effects on the firm such as increased sales. This is a major obstacle, since it is possible that a firm can produce an innovation without being able to capitalize on it themselves. Instead the innovation, via the patent, is used by another firm that buys the right to use it, or buys the firm (the buyout of the firm is also impossible to observe, as mentioned above). Since patents are often involved in new innovations, the lack of patent data is troublesome.¹⁰ Still, if the innovations were successful, there should be some effects on the real variables such as increased sales due to the new ideas in the firm that we can observe.

The papers in this dissertation only studies the direct effects and does not look at any spillovers or positive externalities on other firms. While spillovers is an important concept in economics, and especially in innovation, they are notoriously hard to measure. It is possible that even though there are no direct on the firms that we study, they do produce positive spillovers. That could be the case if the innovation or products they produce to not benefit the firm itself, but is used in some other firm which can extract more economic profit from it. Still, it is unlikely that there can be large spillovers if there are no direct effects in the targeted firms.

1.5 Summary and contribution of respective chapters

The rest of this thesis consists of four independent papers. Two of them deal with direct effect evaluation of subsidies and loans. One studies the selection of firms into seeking subsidies and how different characteristics affects their decisions. The final papers discusses under what circumstances politicians would be willing to implement a policy that they know would not be efficient but might increase the probability of winning a re-election.

The first paper, *The "Sugar Rush" from Innovation Subsidies: a Robust Political Economy Perspective*, studies the effect of firm subsidies in Sweden from three different agencies. It utilizes a unique data set on subsidies and innovation grants to firms in Sweden from the three largest agencies. In order to be able to study the direct effects from a grant without any problems of repeated interactions, only firms that receive one subsidy during the panel is included in the study. The combination of this detailed information on the subsidies, as well as registry data on the targeted firms and all other firms that did not receive a subsidies allows for

¹⁰For an interesting discussion on why patents might not be beneficial or important, see Boldrin and Levine (2002, 2008).

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an econometric analysis for the effects from the grants. A major issue is selection bias, since it is not random which firms apply for, and in the end receive, grants. In order to address this selection bias, a combination of matching and difference-in-difference regressions is used. We use coarsened exact matching (CEM) and match the treated firms on number of employees, log capital stock, regional and industry code. This reduces the heterogeneity between the firms that receive subsidies and those who do not. We run regressions on four different outcome variables: wage expenditures, gross investments, labor productivity and profits. We find that the subsidies have positive effects, but only in the short run. Rather than creating long lasting positive effects, the subsidies creates a "sugar rush" in the targeted firms. We use a robust political economy framework to explain this lack of effect. By searching the documents that the responsible agencies have to guide them in their decisions, we study if the agencies have understood the problems of incentives and information that they face. The incentives problem is mainly associated with the public choice school of James Buchanan and Gordon Tullock (Buchanan and Tullock, 1962; Buchanan and Tollison, 1984). The information problem is mainly connected to Hayek's point regarding how efficient markets handle information (Hayek, 1945). If government agencies want to be successful in addressing market failures, such as firms lack of access to credit, they need to overcome the problems of information and incentives. We find no evidence that the responsible agencies have considered these problems and taken any actions to address them. This could explain the lack of success that we observe. The paper is published in the journal *Empirica*.

The second paper, *Take it to the (Public) Bank: The Efficiency of Public Bank Loans to Private Firms*, studies the effects of public loans to Swedish firm using a similar method as the first paper. The state owned bank in Sweden, Almi, lends to SMEs both in conjunction with private banks and by themselves. When Almi lends to a firm with a private bank this means that their loan is quite similar to a second mortgage for a individual. To compensate for their higher risk taking, and to avoid competing directly with private banks, Almi charges a higher interest rate than private banks. Using firm level data on firms who has borrowed from Almi, I study the effects of these loans on firm performance. Since firms decide themselves if they want to borrow from Almi or not, this creates a selection bias that needs to be addressed. I use CEM matching on debt-to-capital ratio, number of employees, sales growth, industry and regional code to create a more balanced control group. Since I want to study the effects of the loan on the numbers of employees in the targeted firms, I run a separate matching where the number of employees is replaced by log of wage per employee and total value added is used instead, to avoid post-treatment bias. The combination of matching and difference-in-difference regressions reduces the problem of selection bias. I study the effects of the loan on

gross investments, net sales, labor productivity and number of employees. The results show a short term effect on investments, but no long term effects. There are some positive effects on net sales and labor productivity, but only for firms with 10 or fewer employees. There are no effects on the number of employees, which suggests that the main obstacle for firm employment growth is not access to external credit.

The third paper, *Subsidy Entrepreneurs*, studies the selection of firms into subsidies. We develop a model based on the classical Tullock rent-seeking contest. Unlike the standard contest models where the contestant pays a monetary price to enter, the cost for firms to apply for subsidies is the time they need to spend filling in applications and not a monetary cost. This time comes at the expense of producing in the market. Therefore, firms with higher market productivity should expend more resources on producing in the market compared to filling out applications and vice versa. Firms with low market productivity should spend all their effort in seeking subsidies, and highly productive firms do not bother to spend any time at all in seeking subsidies. This model can be tested by looking at firms that receive zero, one or multiple subsidies, utilizing the same data set as in paper 1. While most firms have one or two subsidies, a few have more than 5 or 10. We run various probability regressions such as logit, ordered logit and pseudo Poisson maximum likelihood (Silva and Tenreyro, 2006) on what determines if firms will receive subsidies in the future. In line with our model, we find that firms who have low productivity in the market are more likely to receive subsidies in the future. These firms also have a high skilled labor force and high wages. These results become more pronounced as we move from studying firms that will receive a single subsidy to those that will receive multiple, in line with the theoretical model. Our results suggest that some firms have specialized in seeking subsidies rather than producing in the market, a behavior that we term subsidy entrepreneurship.

The fourth paper, *Busy doing nothing: Why politicians implement inefficient policies*, studies under what conditions politicians would like to implement policies that they know beforehand are inefficient. It is often not easy to solve problems such as unemployment, either because of budget restrictions or because resistance from vested interests. While previous literature has suggested that these difficulties lead to stagnation and status quo, this seems to not be the case when looking at real world outcomes. This could be because politicians can be tempted to introduce policies even though they know that these are inefficient, in order to avoid being exposed doing nothing. This is due to inactivity risk being a signal of incompetence, a problem that is missing in previous literature on policy failures. Along with stylized evidence on the large amount of government activity, the paper presents a simple signaling model that could explain why a politician's re-election chances are improved by implementing policies and programs which they know beforehand

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are inefficient. Depending on the politicians' competence, they have an easier or harder time to implement efficient policies. Competent and incompetent politicians might therefore want to implement policies regardless, in order not to risk voters believing them to be incompetent. The model can explain inefficiencies that are not due to rent-seeking nor redistribution, something that has previously been missing in the literature.

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Paper 2

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Subsidy Entrepreneurs

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Paper 4

Busy Doing Nothing: Why Politicians Implement Inefficient Policies

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Paper 1

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Karlson

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The “Sugar Rush” from Innovation Subsidies - A Robust Political Economy Perspective

Anders Gustafsson, Andreas Stephan, Alice Hallman & Nils Karlson

Abstract

The governments of most advanced countries offer some type of financial subsidy to encourage firm innovation and productivity. This paper analyzes the effects of innovation subsidies using a unique Swedish database that contains firm level data for the period 1997–2011, specifically information on firm subsidies over a broad range of programs. Applying causal treatment effect analysis based on matching and a diff-in-diff approach combined with a qualitative case study of Swedish innovation subsidy programs, we test whether such subsidies have positive effects on firm performance. Our results indicate a lack of positive performance effects in the long run for the majority of firms, albeit there are positive short-run effects on human capital investments and also positive short-term productivity effects for the smallest firms. These findings are interpreted from a robust political economy perspective that reveals that the problems of acquiring correct information and designing appropriate incentives are so complex that the absence of significant positive long-run effects on firm performance for the majority of firms is not surprising.

Paper 2

Take it to the (Public) Bank: The Efficiency of Public Bank Loans to Private Firms

Anders Gustafsson



Take it to the (Public) Bank: The Efficiency of Public Bank Loans to Private Firms

Anders Gustafsson

Abstract

Incomplete capital markets and credit constraints are often considered obstacles to economic growth, thus motivating government interventions in capital markets. One such intervention is governmental bank loans targeting credit-constrained small and medium-sized enterprises (SMEs). However, it is less clear to what extent these interventions result in firm growth and whether governmental loans should target firms that are not receiving private bank loans (the extensive margin) or work in conjunction with private bank loans (the intensive margin). Using a unique data set with information on state bank loans targeting credit-constrained SMEs with and without complementary private bank loans, this paper contributes to the literature by studying how these loans affect the targeted firms. The results suggest that positive effects are found on firm productivity and sales for firms with 10 or fewer employees, while no evidence is found of employment effects. This lack of employment effect suggests that a lack of external credit is not the main obstacle to SME employment growth.

Paper 3

Subsidy Entrepreneurs

Anders Gustafsson, Daniel Halvarsson & Patrik
Gustavsson Tingvall



Subsidy Entrepreneurs

*Anders Gustafsson, Daniel Halvarsson & Patrik Gustavsson
Tingvall*

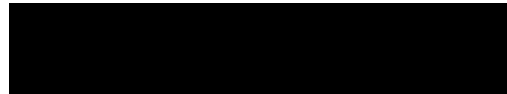
Abstract

In this paper, we study the selection, incentives, and characteristics of small and medium sized firms (SMEs) that apply for and eventually receive one or multiple governmental grants intended to stimulate innovation and growth. The analysis departs from a rent-seeking model in which firms are free to allocate their effort between production and rent-seeking. We show that highly productive firms choose not to seek grants, while moderately productive firms allocate a share of their effort to rent-seeking, and low-productivity firms are incentivized to allocate most, if not all, of their effort to seeking grants and can thus be called *subsidy entrepreneurs*. Due to their large efforts in seeking grants, these low-productivity firms also have a relatively high probability of receiving grants. Using detailed data over all grants administered by the three largest grant-distributing agencies in Sweden, the empirical analysis suggests that supported firms have relatively low productivity, high wages, and a larger share of workers with higher education than non-supported firms. These characteristics become further pronounced as we move from single- to multiple supported firms, thus providing support for the notion of subsidy entrepreneurs.

Paper 4

Busy Doing Nothing - Why Politicians Implement Inefficient Policies

Anders Gustafsson



Busy Doing Nothing - Why Politicians Implement Inefficient Policies

Anders Gustafsson

Abstract

A substantial body of literature suggests that politicians are blocked from implementing efficient reforms that solve substantial problems because of special interest groups or budget constraints. Despite the existing mechanisms that block potentially efficient reforms, real-world data show that a large number of new programs and policies are implemented every year in developed countries. These policies are often selective and considered to be fairly inefficient by ex post evaluation, and they tend to be small in size and scope. With this background, this paper studies the reasons why a rational politician would implement an inefficient public policy that is intended to obfuscate the difficulties in achieving reforms. The paper uses a simple competence signaling model that suggests that if an effective reform is impossible, engaging in strategic obfuscation through an inefficient program increases the probability of winning a re-election compared to doing nothing at all. This is because an inefficient reform does not lead voters to believe that the politician is incompetent, which a lack of action risks doing. Intentional inefficiency aiming to obfuscate the difficulty of efficient reforms can therefore complement the previous theories' explanations of political failure.

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