Rethinking Growth and the State

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1   Introduction

Government intervention is often perceived as a constraint on market forces and thereby on economic growth. In particular, the fact that over the past three decades people have become increasingly aware of the growth-enhancing effects of product and labor market liberalization, has led number of scholars and policy makers to also recommend a reduction in the role and size of governments. True, the recent crisis showed the importance of the state as a regulator, however current opinion swings in the US and other industrialized economies show that doubts remain as to whether governments should go beyond maintaining law and order and regulating financial systems. At the same time, there is the striking example of Scandinavian countries, where governments remain big and yet markets have been liberalized and the rates of innovation and productivity growth have increased over the past two decades. In this paper we argue that it is not so much the size of the State which is at stake, but rather its main functions. It is not so much a reduced state that we need to foster economic growth in our countries, but of a "suitable" state. More specifically, in this paper we shall point to two main growth-enhancing functions of governments in addition to regulating financial systems. The first as an investor in the knowledge economy. The second is as a guarantor of the social contract.

2   State as an Investor

A primary role of the State is as an investor in the growth process.

2.1   Education

A case in point is (higher) education: to the extent that education investments involve knowledge spillovers, and therefore are not fully appropriated by private agents, a laissez-faire economy will tend to generate to little of these, which in turn provides a justification for government intervention. A difficult issue concerns the governance of government intervention: how can one make sure that government funds will be appropriately used? One illustrating example here is higher education: Aghion et al (2010) argue that the closer a region

is to the technological frontier, the more growth-enhancing research education funding is, and the higher the growth externalities generated by investments in higher education. But the same study also shows that higher education investments are more effective the more autonomous universities are (see Figure X) and the more competitive the overall university system is (in particular, the more funding relies on competitive grants).

2.2 Accompanying liberalization

As argued in Aghion and Howitt (2009, Ch 12), liberalization of trade or entry involves winners and losers. In particular, productivity growth in firms and sectors that are closer to the technological frontier tends to be fostered by increased trade and entry, whereas productivity growth in firms or sectors that are farther below the frontier tends to be inhibited. In the former case, firms innovate to escape the increase in competition. In the latter case, innovation is discouraged by increased trade or entry, as laggard firms know that have very little chance to win against potential entrants. This unequalizing effect of liberalization, together with the existence of constraints that limit the scope for capital and labor reallocation from laggard sectors to leading sectors under laissez-faire, suggests a role for government as an investor in reallocation. Here, government investment may typically include subsidies to training for workers who wish to relocate to more advanced sectors, which in turn would help speed up the growth of more advanced sectors following trade or product market liberalization. In other words, acknowledging the virtues of market liberalization does not mean reducing the role for government intervention, but rather redirecting government towards policies that complement the liberalization and thereby help it become even more growth-enhancing.

2.3 Macroeconomic stabilizer

As argued in recent work by Aghion, Angeletos, Banerjee and Manova (2009)[1], macroeconomic volatility tends to be detrimental to innovation and growth in more credit constrained firms or countries. The underlying intuition is that growth-enhancing investments (in skills, R&D, structural capital,..) need to maintained over the long run. However, maintaining such investments over the business cycle may be hard, particularly for firms that face credit constraints that prevent them from investing more than a fixed multiple of their current cash flows. Hence a potential role for government intervention, namely to partly circumvent credit market imperfections and thereby help firms maintain their growth-enhancing investments over the cycle. Thus Aghion and Marinescu (2007) and more recently Aghion, Hemous and Kharroubi (2010) have shown that more countercyclical fiscal policies, i.e policies that increase public deficits in recessions and reduce them in booms, are more growth-enhancing in countries or sectors that are more credit constrained. While this provides some justification for stimulus packages during recessions, this justification is quite distinct

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[1]See also Aghion, Askenazy, Berman and Cette, Eymard (2010).

from the argument based on the Keynesian multiplier: here we emphasize long-run growth effects working primarily through the supply side of the economy whereas the adepts of the multiplier emphasize short-run demand effects.

2.4   Climate

Second, a laissez-faire economy may tend to innovate in "the wrong direction". Thus Aghion et al (2010) explore a cross-country panel data set of patents in the automotive industry. They distinguish between "dirty innovations" which affect combustion engines, and clean innovations such as those on electric cars. Then they show that the larger the stock of past "dirty" innovations by a given entrepreneur, the "dirtier" current innovations by the same entrepreneur. This, together with the fact that innovations have been mostly dirty so far, implies that in the absence of government intervention our economies would generate too many dirty innovations. Hence a role for government intervention to "redirect technical change" towards clean innovations.

Making use of this "path dependence" in the direction of innovation, Acemoglu, Aghion, Bursztyn and Hemous (2009), or AABH, show that the optimal policy to fight climate change should combine a carbon tax with direct subsidies to clean innovations. More specifically, AABH, develop an endogenous growth model where a consumption good (or final good) can be produced using a clean and/or a dirty input. Only the production of dirty inputs harms the environment. The environment in turn affects consumers' utility. Inputs are produced with labour and machines, and innovation can improve the efficiency of production of either type of machines. Innovation results from the work of scientists who can try to improve either the quality of dirty machines or the quality of clean machines . An important assumption is what AABH refer to as the 'building on the shoulders of giants' effect, namely that technological advances in one sector make future advances in that sector more effective.

Innovators direct their efforts to the sector where the expected profits from innovation are the highest. Thus, under laissez-faire, when the dirty technology enjoys an initial installed-base advantage and given the 'building on the shoulders of giants' effect, the innovation machine will work in favour of the dirty technology. The clean technology may never take off unless the government intervenes. What ABBH show is that the laissez-faire equilibrium will typically lead to environmental disaster, where environmental quality falls below the level at it can be regenerated and therefore utility collapses. Where the dirty technology is based on exhaustible resources, this may help to prevent such a disaster, as the dirty technology is eventually priced out of the market. But even in this case, the innovation machine left on its own works sub-optimally, favouring the dirty technology for too long.

A critical parameter for the effectiveness of policy intervention is the extent to which the dirty and the clean technology are substitutable. In particular, when the clean and dirty technologies are sufficiently close substitutes, a temporary policy involving both, a tax on dirty input production (a "carbon tax") and a subsidy to clean research activities will be sufficient to avoid an environ-

mental disaster and thus to guarantee long-run growth sustainability. Indeed, by redirecting technical change towards clean innovation, such a policy will make clean technologies catch-up and eventually leap-frog dirty technologies, at which point by virtue of the 'building on the shoulders of giants' effect (but which now plays in the right direction) private firms will spontaneously choose to innovate in clean machines.

Thus the optimal policy is targeted, i.e it is directed towards clean production and innovation, but it also relies on a complementarity of roles between the government and the private sector. Delaying such directed intervention not only leads to further deterioration of the environment. In addition, the dirty innovation machine continues to strengthen its lead, making the dirty technologies more productive and widening the productivity gap between dirty and clean technologies even further. This widened gap in turn requires a longer period for clean technologies to catch up and replace the dirty ones. As this catching-up period is characterized by slower growth, the cost of delaying intervention, in terms of foregone growth, will be higher. In other words, delaying action is costly. This is illustrated in Box 1.

Box 1: Delaying action is costly

The AABH (2009) model shows the cost of delaying intervention. This cost is computed as the 'lost' consumption in each period expressed as a percentage of the level of consumption which would result from 'best-time' policy intervention.

Discount rate	1%	1.5%
Lost consumption, delay of 10 years	5.99%	2.31%
Lost consumption, delay of 20 years	8.31%	2.36%

Source: Calibrations from the AABH (2009) model

Not surprisingly, the shorter the delay and the higher the discount rate (i.e. the lower the value put on the future), the lower the cost will be. This is because the gains from delaying intervention are realized at the start in the form of higher consumption, while the loss occurs in the future through more environmental degradation and lower future consumption. Moreover, because there are basically two problems to deal with, namely the environmental one and the innovation one, using two instruments proves to be better than using one. The optimal policy involves using (i) a carbon price to deal with the environmental externality and, at the same time, (ii) direct subsidies to clean R&D (or a profit tax on dirty technologies) to deal with the knowledge externality.

Of course, one could always argue that a carbon price on its own could deal with both the environmental and the knowledge externalities at the same time (discouraging the use of dirty technologies also discourages innovation in dirty technologies). However, relying on the carbon price alone leads to excessive reduction in consumption in the short run. And because the two-instrument policy reduces the short-run cost in terms of foregone short-run consumption, it reinforces the case for immediate implementation, even for values of the discount rate under which standard models would suggest delaying implementation.

In fact the AABH model allows one to calibrate the cost of using only the carbon price instead of a combination of a carbon price and a subsidy to clean R&D. This cost can be expressed as the amount of 'lost' consumption in each

period expressed as a percentage of the level of consumption which would result from optimal policy, which involves using both types of instrument. Using a discount rate of 1 percent, this cost in terms of lost consumption amounts to 1.33 percent. An alternative way of showing the higher cost when using only one instrument (ie the carbon price) rather than a combination of carbon pricing and more industrial-policy looking subsidies is to express how high the optimal carbon price would have to be when used as a singleton relative to its optimal level when used in combination. Simulating this scenario in the AABH model reveals that the carbon price would have to be about 15 times higher during the first five years and 12 times higher over the following five years. The intuition behind the initial high differential is that the early period in particular is key to inducing the catch-up by clean technologies. By the same token, using only the subsidy instrument, while keeping the carbon-price instrument inactive, would imply that subsidies would have to be on average 115 percent higher in the first 10 years compared to their level when used in combination with a carbon price.

2.5   Industrial policy

Industrial policies had been implemented after WWII in a number a countries, with the purpose of promoting new infant industries and of protecting local traditional activities against competition by products from more advanced foreign countries. Thus several Latin American countries advocated import substitution policies whereby local industries would more fully benefit from domestic demand. East Asian countries like Korea or Japan, rather than advocate import substitution policies, would favor export promotion, which in turn would be achieved partly through tariffs and non-tariff barriers and partly through maintaining undervalued exchange rates. And in Europe, a country like France engaged in a so-called "Colbertist" policy of targeted subsidies to industries or to "national champions". For at least two or three decades after WWII, these policies remained fairly non-controversial as countries implementing them were growing at relatively fast rates. However, the slow down in Latin America as of the 1970s, and then in Japan as of the late 1990s, contributed to the growing scepticism about the role of industrial policy in the process of development. Increasingly since the early 1980s, industrial policy has raised serious doubts among academics and policy advisers in international financial institutions. In particular, it was criticized for allowing governments to pick winners and losers in a discretionary fashion, and consequently for increasing the scope for capture of governments by local vested interests. Instead, policy makers and growth/development economists now advocate non-targeted policies aimed at improving the "investment climate: the liberalization of product and labor markets, a legal and enforcement framework that protects (private) property rights, and macroeconomic stabilization. This new set of growth recommendations came to be known as the "Washington consensus", as it was primarily advocated by the IMF, the World Bank and the US Treasury, all based in Washington D.C.

However, we believe that industrial policy should not be systematically op-

posed to competition policy. In particular, current work by Aghion, Dewatripont, Du, Harrison and Legros (ADDHL), argues that targeted subsidies could be used to induce several firms to operate in the same sector, instead of escaping competition through excessive horizontal differentiation. This in turn may enhance innovation for two main reasons. First, it helps maintain a higher equilibrium degree of competition (i.e by reducing horizontal differentiation) which then induces firms to innovate vertically in order to escape competition. Second, inducing several firms to operate in the same sector favors technological progress because firms operating in the same sector are more likely to benefit from knowledge spillovers or communication among them. Of course, a lot depends upon the design of industrial policy. Such policy should target sectors, not particular firms (or "national champions"). This in turn suggests new empirical studies in which productivity growth, patenting, or other measures of innovativeness and entrepreneurship, would be regressed over some measures of sectoral intervention interacted with the degree of competition in the sector, and also with the extent to which intervention is each sector is not concentrated on one single firm, but rather distributed over a larger number of firms. Thus, using Chinese firm-level panel data, ADDHL show that sectoral subsidies tend to enhance TFP, TFP growth and new product creation, more if they are both, implemented in sectors that are already more competitive and also distributed in each sector over a more dispersed set of firms.

3 State and the Social Contract

One of the main role of the State is the one of guarantor of the social contract, i.e. of an economical and social pact on which all the citizens – and their government – agree. This pact has to allow the State to control public deficit in a post-crisis context while maintaining social peace, avoiding strikes and social protests. Indeed, the current economic context can be characterized by a weakening of public finances, a tightening of credit constraints, and a need to correct global imbalances. While government debts increase a lot during and after the crisis, it appears now necessary to reduce public deficits while investing in growth at the same time.

But such a reduction effort won't be easy, and for it to be accepted by everybody, it will have to be fairly shared in order to maintain a peaceful social climate. This supposes that the State chooses (i) first to invest in trust; (ii) second, to promote redistributive policies while reducing deficits; and (iii) third, too fight against corruption.

3.1 Investing in Trust, a Necessity

To understand why it seems so necessary that the State invests in trust, one could remember the following statement made by the Nobel Prize Kenneth Arrow in 1972: *"Virtually every commercial transaction has within itself an element of trust, certainly any transaction conducted over a period of time. It*

can be plausibly argued that much of the economic backwardness in the world can be explained by the lack of mutual confidence."

This has given rise to a recent literature that studies the links between trust and various economic outcomes: financial development (Guiso et al., 2004), entrepreneurship (Guiso et al., 2006), economic exchanges (Guiso et al., 2009). Trust appears positively correlated with all these outcomes. Moreover, trust is also closely linked to institutions, as shown by Bloom et al. (2007), Algan and Cahuc (2009), Tabellini (2010), Aghion et al. (2010a, 2010b). We want to underline here the fact that trust is particularly important for economic growth and innovation.

3.1.1 Trust, Innovation and Growth

Various studies have shown that trust and a good social climate in firms are related to growth and innovation La Porta et al. (1997), Knack and Keefer (1997) and Tabellini (2009) have shown for example a strong empirical correlation between trust and growth. More importantly for us, it has been shown recently that not only trust is correlated with growth, but that is an essential and causal factor of growth. For example, Algan and Cahuc (2010), focusing on the inherited component of trust and its time variation, have shown a causal effect of trust on economic growth. Figure (1) (reproduced from their paper) reports a scatterplot of the changes in income per capita between 1935 and 2000 against the changes in inherited trust between the same periods, relative to Sweden. It appears clearly that there is a strong positive correlation between both things: the higher the increase in inherited trust, the higher the increase in income per capita.

Moreover, the impact of inherited trust that they found is economically sizeable: they estimate that GDP per capita in 2000 would have been increased by 546 percent in Africa if the level of inherited trust had been the same as inherited trust from Sweden. This effect is not only strong for developing countries, but also for more developed ones.

3.1.2 What Could the State Do in Order to Increase Trust?

Trust thus appears to be a crucial factor for innovation and economic growth. Which raises the following question: how can trust be increased by the State? Indeed, if growth depends on inherited trust and no policies can increase trust, then the State seems to be useless. On the contrary, we argue that much can be done in order to increase trust of the citizens toward the State (we come back to this point below when dealing with corruption), between them and to improve the social climate in the firms. If the social capital literature is today a mature and influential sub-field in economics, very few studies explore the mechanisms through which social capital accumulates (a recent exception being Jacob and Tyrell, 2010). Here, we draw some avenues for future research on this crucial topic. It seems of first importance to us.

First, one important thing that the State has to do in order to increase trust
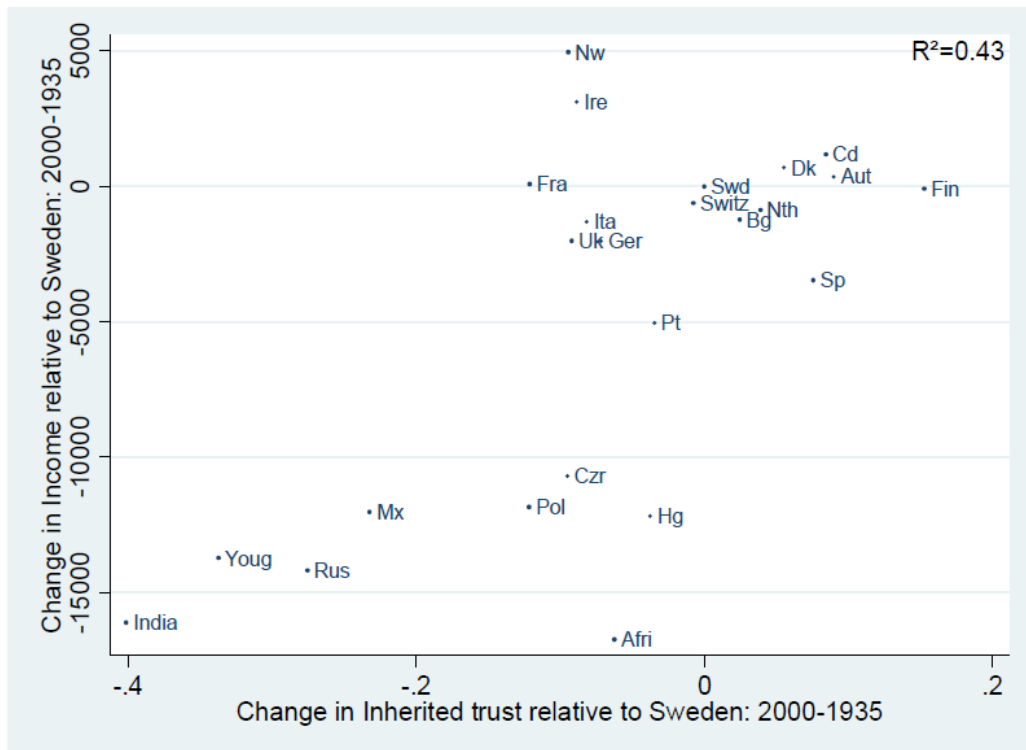
Figure 1: Changes in inherited trust and changed in income per capita. (Note: reproduced from Algan and Cahuc, 2010).

is not to regulate too much, in the sense that it does not have to substitute itself to social actors (which appears to be the case for example in France where the level of trust is very low, compared to other European countries and to the United States (see Algan and Cahuc, 2007, and Ehrenberg, 2010)). On the contrary, it has to favour the emergence of social actors and collective negotiations with labor unions. Indeed, Aghion et al. (2010) have shown that, in a cross section of countries, government regulation is strongly negatively correlated with measures of trust and that not only distrust increases the demand for regulation but that regulation influences trust. Figure (2) (reproduced from their paper) illustrates the strong positive correlation between the regulation of entry as measured by the (ln) number of steps to open a business, and the country level of distrust.
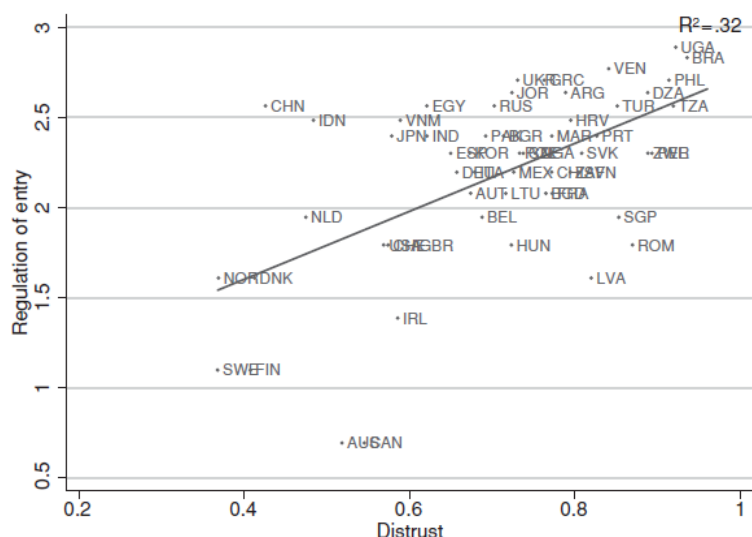

Figure 2: Regulation and distrust. (Note: reproduced from Aghion et al., 2010).

This is not to say that the State has no role to play, on the contrary (in Scandinavian countries for example, where trust is very high, the State plays a central role). But that, rather than substituting itself to social partners, it has to be the catalyst of social relationships in order to increase trust between employers and employees. Hence, it has to favour the emergence of mass unions in all the firms where it is still not the case (see for example Cahuc and Zylberberg, 2009). It also have to favour negotiations between itself and unions before implementing important reforms.

Finally, the State does not have to be too centralized (Algan and Cahuc, 2007, show that it is in part because of its high degree of hierarchical centralization, especially as to the State decision taking, that France suffers so much from distrust). On the contrary, it has to encourage decentralization policies

and to give more power to local governments which can take advantage of their better knowledge of local issues. In a certain way, one can apply the conclusions of Acemoglu et al. (2007) on the decentralization of the firm to the State: if firms closer to the technological frontier are more likely to choose decentralization, it may be the same for developed countries. Indeed, decentralization is the best way to have more information and so to implement policies that better fit the local realities. In other words, it is the best way for the State to be more efficient.

3.2 Reducing Deficit but... Promoting Redistributive Policies

Closely linked to the trust question,we want to underline that the social contract has to rely on redistribution; and this for two main reasons. First, States will have to reduce strongly their public deficits. Indeed, as illustrated in Figures (3) and (4) (reproduced from the OECD), public finances have weakened significantly during and since the recession. Such a situation is not sustainable in the long run, as illustrated by the recent Greek crisis.
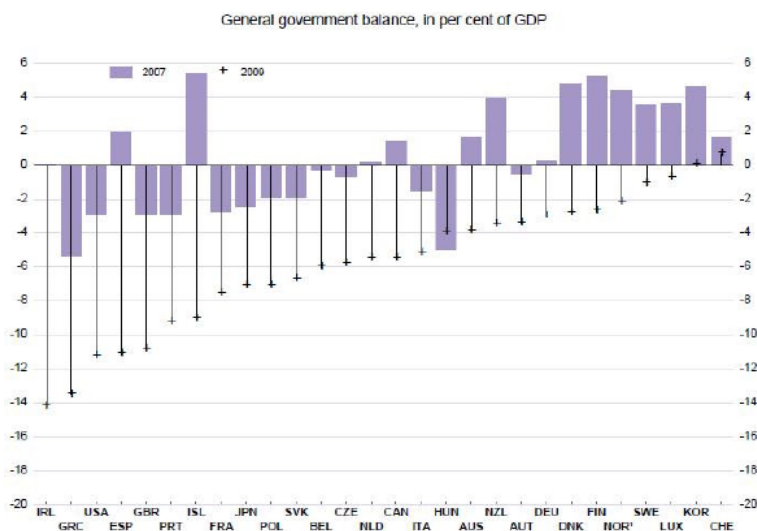

Figure 3: General Government Balance. (Note: reproduced from the OECD).

Such a reduction will be costly for everybody, and if we want it to be accepted (and not to give rise to violent social movements of protestation), the effort will have to be shared equally. Which supposes to increase taxes in a fair (i.e. progressive) way. And which supposes also not to cut too much in social expenditures targeted towards those that necessitate them the more (especially in the crisis context, unemployment benefits). Moreover, the citizens will be
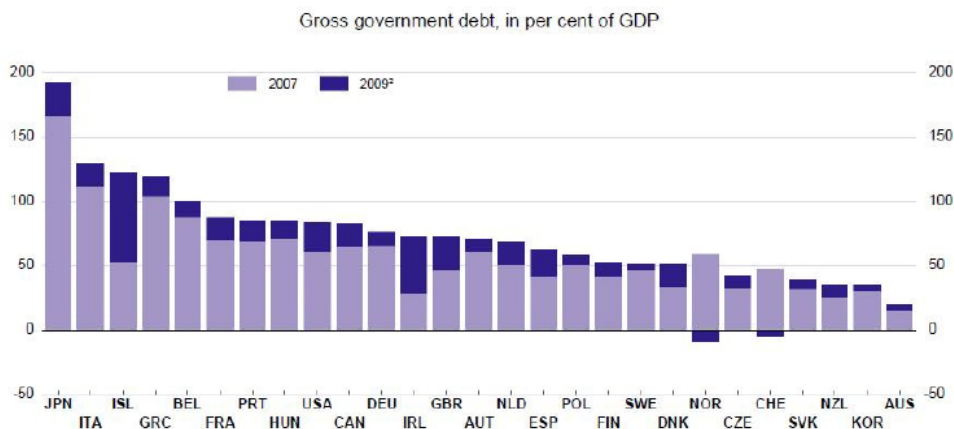
Gross government debt, in per cent of GDP

200   ■ 2007   ■ 2009²   200

150   150

100   100

50   50

0   0

-50   JPN   ISL   BEL   PRT   USA   DEU   GBR   NLD   POL   SWE   NOR   CHE   NZL   AUS   -50
           ITA   GRC   FRA   HUN   CAN   IRL   AUT   ESP   FIN   DNK   CZE   SVK   KOR

Figure 4: Gross Government Debt. (Note: reproduced from the OECD.)

more willing to accept tax increases if they know that the fiscal resources will be used in an efficient way by the government (which does not have to be corrupt, but we come back to this point later). Again, this supposes that citizens trust their government.

Let's consider the relevant example of Sweden. This country, in the 1990S, in only four years, has been able to reduce its public deficit from 16% to less than 3% of its GDP. And did so without reducing the level of public services provided to the Swedish population as to education and health (indeed, these services are still higher today in Sweden than in a lot of other European countries). If it has been the case, it is mainly because of its efficient and progressive tax system.

Secondly, the social contract has to rely on redistribution because a too unequal society cannot be a society in which people trust one in each other. Inequalities create rigidities and the willingness to protect social status, impeding social mobility. On the contrary, in a society in which the tax system is sufficiently progressive and redistributive, people are more willing to take risks, to innovate and move along the social ladder.

3.3 Fight Against Corruption

Finally, an important point that we wanted to underline, is that an efficient State that can guarantee the social contract, is a non corrupt State – and a State that has to fight against corruption. A State that uses the taxpayer money in an efficient and transparent way. Our own current research (join with Ufuk Akcigit and William Kerr) is very illustrative as to this dimension of the question. Indeed, we show that the link between taxation and economic growth is a function of government efficiency, i.e. of its degree of corruption. For example, for OECD countries, we find a positive correlation between country growth rates and tax burden measured by top marginal tax rates (both on corporations

and on individual earned income) for low-corruption countries, and a negative correlation for high-corruption countries, which is robust to the use of different indexes of corruption. In other words, we find that for low-corruption countries tax is growth-enhancing while it is not for high-corruption countries. Figures (5) (high-corruption countries) and (6) (low-corruption countries) illustrate this point[2].
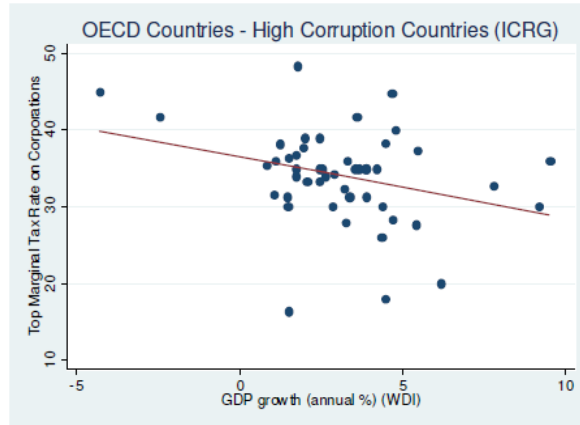

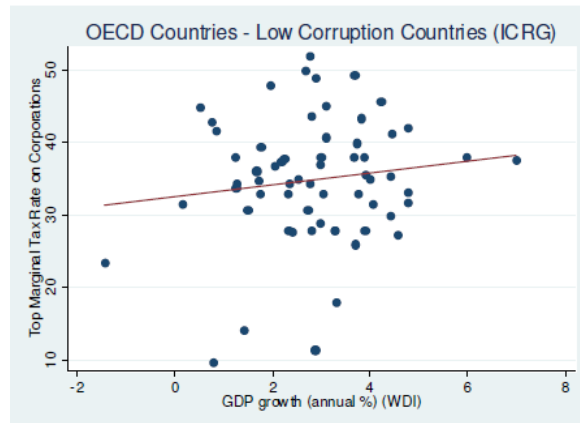Figure 5: Tax and Growth in High Corruption Countries

Figure 6: Tax and Growth in Low Corruption Countries

We are now developing this research agenda at the firm-level in the United

[2]Here, we use the ICRG (International Country Risk Guide) index as a measure of corruption. However, the findings are robust to the use of the CPI (Corruption Perception Index of Transparency International) or of various Word Bank Governance Indicators (WGI).

States and find very encouraging results going exactly in the same direction. Hence, we think that one has to take this corruption / trust dimension into account to properly evaluate the impact of State intervention on economic growth.

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