Government intervention is often perceived as a constraint on market forces and thereby on economic growth. In particular, over the past three decades, increasing awareness that product and labor market liberalization enhances growth has led scholars and policy makers to also recommend a reduction in the role and size of governments. True, the recent global financial crisis showed the importance of the state as a regulator for the financial system. Indeed, when financial institutions are “too big to fail,” the state may have to intervene to preserve the stability of the whole system.¹

In the United States and other industrialized countries, fluctuations in current opinion show that doubts remain as to whether government intervention should go beyond this regulatory role. 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 chapter, the authors argue that it is not so much the size of the state that is at stake but rather its main functions and efficiency. To foster economic growth in our countries, we need not so much a reduced state but a “suitable” and noncorrupt state.
More specifically, this chapter points to two main growth-enhancing functions of governments in addition to regulating financial systems: as investors in the knowledge economy and as guarantors of the social contract.

**State as Investor in the Knowledge Economy**

A primary role of the state is as an investor in the growth process. This section explains why government can help foster growth by intervening through education policy, market liberalization, macroeconomic stabilization, and environmental (and more generally, sectoral) policy.

**Education Policy**

A primary area for growth-enhancing government intervention 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 too few of these investments, which, in turn, provides a justification for government intervention.

A difficult issue concerns the governance of that intervention: how can one make sure that government funds will be appropriately used? For example, regarding higher education, Aghion et al. (2009) argue that the closer a region is to the technological frontier, the more growth-enhancing the research education funding is, and the higher the growth externalities generated by that funding. But the same study also shows that the more autonomous the universities and the more competitive the overall university system (in particular, the more funding relies on competitive grants), the more effective the higher-education investments are. Figure 5.1 shows, for example, a positive correlation between European universities’ Shanghai rankings (of university output) and the autonomy index.²

**Market Liberalization**

Liberalization of trade or entry involves winners and losers (Aghion and Howitt 2009). In particular, increased trade and entry tend to foster productivity growth in firms and sectors that are closer to the technological frontier and inhibit productivity growth in firms or sectors that are further away from the frontier. In the former case, firms innovate to escape the increase in competition. In the latter case, the increased trade
or entry discourages innovation because lagging firms know they have little chance to win against potential entrants.

This unequalizing effect of liberalization, together with constraints that limit the scope for capital and labor reallocation from lagging 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 train workers who wish to relocate to more-advanced sectors, which, in turn, would help speed up the growth of those 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 toward policies that complement the liberalization and thereby help it become even more growth-enhancing.

**Macroeconomic Stabilization**

Macroeconomic volatility tends to be detrimental to innovation and growth in more credit-constrained firms or countries (Aghion et al. 2009).
2005). The underlying intuition is that growth-enhancing investments (in skills, research and development [R&D], and structural capital) need to be 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 is to partly circumvent credit market imperfections and thereby help firms to maintain their growth-enhancing investments over the cycle. More countercyclical fiscal policies—policies that increase public deficits in recessions and reduce them in booms—are thus more growth-enhancing in countries or sectors that are more credit-constrained (Aghion and Marinescu 2008; Aghion, Hemous, and Kharroubi 2009).

Although this argument provides some justification for stimulus packages during recessions, that justification—which emphasizes long-run growth effects, working primarily through the supply side of the economy—is quite distinct from the argument based on the Keynesian multiplier, which emphasizes short-run demand effects.

**Climate-Change Policy**

A laissez-faire economy may also tend to innovate in the wrong direction—that is, toward innovation favoring more-carbon-emitting industries and products. Thus, Aghion, Dechezlepretre, 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 in electric cars. Then they show that the larger the stock of past dirty innovations by a given entrepreneur, the dirtier the current innovations by the same entrepreneur. This correlation, together with the fact that most automotive innovations have been dirty so far, implies that in the absence of government intervention, economies would generate too many dirty innovations. Hence, government intervention has a role to “redirect technical change” toward clean innovations (Aghion, Dechezleprete, et al. 2010).

Assuming this “path dependence” in the direction of innovation, Acemoglu et al. (2009) show that the optimal policy to fight climate change should combine a carbon tax with direct subsidies for clean
innovations. More specifically, they develop an endogenous growth model whereby a consumption good can be produced using either a clean or a dirty input. Only the production of dirty inputs harms the environment. The environment, in turn, affects consumer utility. Inputs are produced with labor and machines, and innovation can improve the efficiency of production of either clean or dirty machines. Innovation results from the work of scientists who try to improve either the quality of dirty machines or the quality of clean machines. An important assumption is the “building on the shoulders of giants” effect, namely that technological advances in one sector make future advances in that sector more effective (Acemoglu et al. 2009).

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, given the “building on the shoulders of giants” effect, the innovation machine will work in favor of the dirty technology. The clean technology may never take off unless the government intervenes. What Acemoglu et al. (2009) show is that the laissez-faire equilibrium will typically lead to environmental disaster, where environmental quality falls below the level at which 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 because the dirty technology is eventually priced out of the market. But even in this case, the innovation machine left on its own works suboptimally, favoring the dirty technology for too long.

A critical parameter for the effectiveness of policy intervention is the extent to which dirty and clean technology are substitutable. In particular, when they are sufficiently close substitutes, a temporary policy involving both a tax on dirty input production (a carbon tax) and a subsidy for clean research activities will be sufficient to avoid an environmental disaster and, thus, to guarantee long-run growth sustainability. Indeed, by redirecting technical change toward clean innovation, such a policy will make clean technologies catch up and eventually leapfrog dirty technologies, at which point—by virtue of the “building on the shoulders of giants” effect (which now plays in the right direction)—private firms will spontaneously choose to innovate in clean machines.

Thus, the optimal policy is targeted—directed toward clean production and innovation—but it also relies on a complementarity of roles
between the government and the private sector. Delaying such directed intervention leads not only to further deterioration of the environment but also to strengthening the lead of the dirty-innovation machine, making the dirty technologies more productive and further widening the productivity gap between dirty and clean technologies. This widened gap, in turn, requires a longer period for clean technologies to catch up and replace the dirty ones. Because this catching-up period is characterized by slower growth, the cost of delaying intervention, in terms of forgone growth, will be higher. In other words, delaying action is costly, as shown in table 5.1.

**Two-Instrument Policy.** Not surprisingly, the shorter the delay and the higher the discount rate (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 although the loss occurs in the future through more environmental degradation and lower future consumption.

Moreover, because there are two basic problems to deal with—the environmental one and the innovational one—using two instruments proves to be better than using one. The optimal policy involves using (a) a carbon price to deal with the environmental externality and, at the same time, (b) direct subsidies for clean R&D (or a profit tax on dirty technologies) to deal with the knowledge externality.

**One-Instrument Policy.** Of course, one could always argue that a carbon price on its own could deal with both the environmental and the

<table>
<thead>
<tr>
<th>Elasticity of substitution</th>
<th>10</th>
<th>3</th>
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<tr>
<td></td>
<td>0.001</td>
<td>0.015</td>
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<tr>
<td>Discount rate</td>
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<tr>
<td>Delay = 10 years</td>
<td>8.75</td>
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<td>Delay = 20 years</td>
<td>14.02</td>
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<td>Delay = 30 years</td>
<td>17.65</td>
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knowledge externalities simultaneously (that is, 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 forgone 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 Acemoglu et al. (2009) model allows one to calibrate the cost of using only the carbon price instead of a combination of a carbon price and a clean-R&D subsidy. This cost can be expressed as the amount of “lost” consumption in each period, expressed as a percentage of the level of consumption that would result from the optimal policy, which involves using both instrument types. 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 (that is, the carbon price) rather than a combination of carbon pricing and the more industrial-policy-like 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 model of Acemoglu et al. (2009) 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 is particularly critical 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 with their level when used in combination with a carbon price. In other words, here also the state has an important role to play to deter innovation in the wrong direction, which can be costly in terms of welfare.

**Industrial Policy**

Industrial policies had been implemented after World War II in a number of countries to promote infant industries and protect local traditional activities from competition against 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 such as Japan or the Republic of Korea, rather than advocate import substitution policies, would favor export promotion, which, in turn, would be achieved partly through tariffs and nontariff barriers and partly through maintenance of undervalued exchange rates. And in Europe, France engaged in so-called Colbertist policies of targeted subsidies to industries or to “national champions.”

For at least two or three decades after World War II, these policies remained fairly noncontroversial because the countries implementing them were growing at relatively fast rates. However, the slowdown in Latin America as of the 1970s, and then in Japan as of the late 1990s, contributed to growing skepticism 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 and development economists now advocate nontargeted 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” because it was primarily advocated by the International Monetary Fund, the World Bank, and the U.S. Department of the Treasury, all based in Washington, DC.

However, the authors believe that industrial policy should not be systematically opposed to competition policy. In particular, current work 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 (Aghion, Dewatripont, et al. 2010). This approach, in turn, may enhance innovation for two main reasons. First, it helps maintain a higher equilibrium degree of competition (that is, by reducing horizontal differentiation), which then induces firms to innovate vertically to escape competition. Second, it favors technological
progress because firms operating in the same sector are more likely to benefit from knowledge spillovers or communication among them.

Of course, much depends upon the design of industrial policy. Such policy should target sectors, not particular firms (or “national champions”). This, in turn, suggests a need for new empirical studies in which productivity growth, patenting, or other measures of innovativeness and entrepreneurship would be regressed over some measures of sectoral intervention and interacted with the degree of competition in the sector and with the extent to which intervention in 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, Aghion, Dewatripont, et al. (2010) show that sectoral subsidies tend to enhance total factor productivity (TFP), TFP growth, and new product creation—more so if they are implemented in sectors that are already more competitive and also distributed in each sector over a more dispersed set of firms.

**The State and the Social Contract**

Beyond the state’s role as investor in the knowledge economy, one of its main roles is as guarantor of the social contract—an economic and social pact on which all citizens and their government agree. This pact has to allow the state to control the public deficit in a postcrisis context while maintaining social peace and 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.

Although government debts increased greatly during and after the crisis, it now appears necessary to reduce public deficits while investing in growth at the same time. But such a reduction effort won’t be easy, and to be accepted by everybody, it will have to be fairly shared to maintain a peaceful social climate. This result supposes that the state (a) invests in trust, (b) promotes redistributive policies while reducing deficits, and (c) fights corruption.

**Investing in Trust—a Necessity**

To understand why the state needs to invest in trust, remember the following statement by Nobel Prize-winning economist 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.”

Recent literature has studied the positive correlations between trust and various economic outcomes: financial development, entrepreneurship, and economic exchanges (Guiso, Sapienza, and Zingales 2004, 2006, 2009, respectively). Trust is also closely linked to institutions (Aghion, Dechezlepretre, et al. 2010; Aghion, Dewatripont, et al. 2010; Algan and Cahuc 2009; Bloom, Sadun, and Van Reenen 2009; Tabellini 2010). This chapter emphasizes that trust is particularly important for economic growth and innovation.

**Trust, Innovation, and Growth.** Various studies have shown that, on the firm level, trust and a good social climate are related to growth and innovation. For example, there is a strong empirical correlation between trust and economic growth (Knack and Keefer 1997; La Porta et al. 1997; Tabellini 2010).

More important for this discussion, trust is not only correlated with growth but is also 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 5.2 shows 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: the higher the increase in inherited trust, the higher the increase in income per capita.

Moreover, the impact of inherited trust is economically sizable: income per capita in 2000 would have been increased by an estimated 546 percent in Africa if the level of inherited trust had been the same as in Sweden (Algan and Cahuc 2010). This effect is strong not only for developing countries but also for more developed ones.

**How Can the State Increase Trust?** Trust thus appears to be a crucial factor for innovation and economic growth. This raises the following question: how can the state increase trust? Indeed, if growth depends on inherited trust and if no policies can increase trust, the state would
seem to be useless. On the contrary, much can be done to increase citizens’ trust in the state (a point to be readdressed below concerning corruption), as well as among each other, and to improve the social climate in the firms. If the social capital literature is today a mature and influential subfield in economics, few studies explore the mechanisms through which social capital accumulates (a recent exception being Jacob and Tyrell 2010). Future research on this crucial topic seems of first importance.

**Limit Regulation.** One important way the state can increase trust is to refrain from overregulation, in the sense that it does not have to substitute itself for social actors (which is the case, for example, in France where trust is low compared with other European countries and the United States [Algan and Cahuc 2007; Ehrenberg 2010]).

On the contrary, the state has to favor the emergence of social actors and collective negotiations with labor unions. Indeed, in a cross-section...
of countries, government regulation is strongly negatively correlated with measures of trust, and not only does distrust increase the demand for regulation but regulation also influences trust (Aghion, Algan, et al. 2010). Figure 5.3 illustrates the strong positive correlation between the regulation of entry (as measured by the number of steps to open a business) and a country’s level of distrust.

*Catalyze Social Relationships.* This is not to say that the state has no role to play; for example, in Scandinavian countries, where trust is high, the state plays a central role. However, rather than substituting itself for social partners, the state has to be the catalyst of social relationships to increase trust between employers and employees. Hence, it has to favor the emergence of mass unions in all firms that are not yet unionized (see, for example, Cahuc and Zylberberg

![Figure 5.3 Relation between Distrust and Extent of Entry Regulation](image)


*Note:* $R^2 = 0.32$. Regulation of entry is measured by the (ln) number of procedures to open a firm. Distrust is normalized between 0 and 1.
2009). It also has to gain unions’ agreement before implementing important reforms.

Encourage Decentralization. Finally, the state should not be too centralized. (France suffers so much from distrust in part because of its high degree of hierarchical centralization, especially as to state decision making [Algan and Cahuc 2007].)

On the contrary, the state has to encourage decentralization policies and give more power to local governments, which can take advantage of their better knowledge of local issues. In a sense, one can apply the conclusions of Acemoglu et al. (2007)—about the decentralization of the firm—to the state: if firms closer to the technological frontier are more likely to choose decentralization, the same may be true for developed countries. Indeed, decentralization is the best way to elicit local information and thus to implement policies that better fit local realities. In other words, it is the best way for the state to be more efficient.

Reducing Deficits—While Promoting Redistributive Policies

Closely linked to the trust question, the social contract has to rely on redistribution. Indeed, a too-unequal society cannot be one in which people trust one another. 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, innovate, and move up the social ladder.

Concerning deficit reduction, public finances have weakened significantly during and since the recession, as illustrated in figures 5.4 and 5.5. Such a situation is not sustainable in the long run, as illustrated by the current Greek crisis.

Deficit reduction will be costly for everybody, and to make it acceptable (without giving rise to violent social protests), the effort will have to be shared equally—which supposes a fair (that is, progressive) tax increase without excessively cutting social expenditures targeted toward those who need them the most (especially, in the crisis context, unemployment benefits). Moreover, the citizens will be more willing to accept tax increases if
Figure 5.4 General Government Balances of Selected Countries, 2007 vs. 2009

Source: OECD 2010.
Note: GDP = gross domestic product.
Figure 5.5 Gross Government Debt of Selected Countries, 2007 vs. 2009

Source: OECD 2010.

Note: GDP = gross domestic product.
they know the government will use fiscal resources efficiently and is not corrupt. Again, this supposes that citizens trust their government.

Let’s consider the relevant example of Sweden, which in the 1990s—in only four years—reduced its public deficit from 16 percent to less than 3 percent of its gross domestic product (GDP). And it did so without reducing public education and health services to the Swedish population (services that remain greater today in Sweden than in many other European countries), mainly because of its efficient and progressive tax system.

**Fighting Corruption**

Finally, an important point to underline is that an efficient state that can guarantee the social contract is one that is noncorrupt and must fight corruption. It is a state that uses the taxpayers’ money efficiently and transparently.

The authors’ own current research (Aghion et al. 2011) illustrates this dimension of the question. Indeed, the link between taxation and

![Figure 5.6 Relation between Taxation and Growth in High-Corruption OECD Countries](image)

Sources: Aghion et al. 2011.

Note: Countries are designated as “high-corruption” based on the corruption index of the International Country Risk Guide.
economic growth is a function of the level of government efficiency or of its degree of corruption. For example, among OECD countries, there is a positive correlation between a country’s growth rate and the tax burden as measured by top marginal tax rates (on both corporations and individual earned income) in low-corruption countries, and a negative correlation in high-corruption countries, that is robust to the use of different indexes of corruption. In other words, taxation is growth-enhancing for low-corruption countries but not for high-corruption countries. Figures 5.6 (high-corruption countries) and 5.7 (low-corruption countries) illustrate this point.3

The authors are now developing this research agenda at the firm level in the United States and find encouraging results going exactly in the same direction. Hence, one has to take this corruption-trust dimension into account to properly evaluate the impact of state intervention on economic growth.
Conclusion

One positive outcome of the recent crisis is to have relegitimized the state’s role as a fundamental actor in the growth process—as a regulator that can thereby prevent or limit the effects of financial crises and also as a catalyst of market and firm growth by investing in the knowledge economy and by fostering trust as a guarantor of the social contract. Thus, in our quest for higher economic growth, one should not necessarily think of “more state” versus “less state” but rather of where and how the state should—or should not—intervene.

Notes

1. At the same time, such an intervention must be designed to minimize moral hazard considerations, hence, the importance of introducing further regulations on banks, the financial structure, and also the compensation schemes of employees in the financial sector—as was done, for example, with U.K. Prime Minister Gordon Brown’s bailout of English banks in October 2008.
2. See also Aghion et al. (2008).
3. Here, we use the International Country Risk Guide index as a measure of corruption. However, the findings are robust to the use of Transparency International’s Corruption Perception Index or the World Bank’s Worldwide Governance Indicators.

References


