WORKING PAPER NO. 3

Growth Policy and the State

Philippe Aghion

THE GROWTH DIALOGUE

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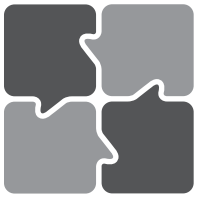

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Philippe Aghion is Robert C. Waggoner Professor of Economics at Harvard University, Programme Director in Industrial Organization at the Centre for Economic and Policy Research (CEPR), and Fellow at the National Bureau of Economic Research (NBER) and the Institute for Fiscal Studies (IFS).

Professor Aghion is one of the most prolific and influential economists of his generation. He focuses much of his attention on the relationship between economic growth and policy, particularly innovations as a main source of economic growth. Professor Aghion's approach is to examine how various factors interact with local entrepreneurs' incentives to either innovate or to imitate frontier technologies.

With Peter Howitt, Philippe Aghion developed the so-called 'Schumpeterian paradigm', and extended the paradigm in several directions. Much of the resulting work is summarised in the book he co-authored with Howitt entitled *Endogenous Growth Theory*.

In the process of trying to link growth and organisations, Professor Aghion has also contributed to the field of contract theory and corporate governance. His work concentrates on the question of how to allocate authority and control rights within a firm, or between entrepreneurs and investors.

In addition to his academic research, Professor Aghion has been associated with the European Bank for Reconstruction and Development (EBRD) since 1990. He is also managing editor of the journal *The Economics of Transition*, which he launched in 1992, and is co-editor of the *Review of Economics and Statistics.*

Philippe Aghion holds a PhD from Harvard University (1987). He was elected a Fellow of the American Academy of Arts and Sciences in 2009 and of the Economic Society in 1992. In 2001, he received the Yrjö Jahnsson Award of the European Economic Association, which rewards a European economist under the age of 45. He was associated with the Commission on Growth and Development and is active in the work of the Growth Dialogue.

Abstract

The importance of investing in research and development (R&D) and knowledge for innovation and growth is now commonly acknowledged. So is the role for structural reforms aimed at making product and labor markets more flexible. More controversial, however, is the role that the state should play in the growth process. The debate on the role of the state has been revived by the financial crisis to the extent that this crisis has turned into a public debt crisis.

One response to the public debt crisis is the neo-conservative approach of a minimal state. Public spending and taxes should be minimized, so that private firms would face low interest rates and low tax rates, which in turn would encourage them to hire and expand, thereby generating prosperity for the whole economy. However, this approach is not working too well in the United Kingdom, where it has been implemented. Conversely, in Scandinavian countries, where governments remain big, innovation and productivity growth rates remain high.

In this paper we argue for a strategic or "smart" state, rather than a reduced state. The strategic state would target its investments to maximize growth in the face of hard budget constraints. This departs both from the Keynesian view of a state sustaining growth through demand-driven policies, and from the neo-liberal view of a minimal state confined to its regalian functions.

Growth Policy and the State

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Introduction

The importance of investing in research and development (R&D) and knowledge for innovation and growth is now commonly acknowledged. So is the role for structural reforms aimed at making product and labor markets more flexible. More controversial however is the role that the state should play in the growth process. The debate on the role of the state has been revived by the financial crisis to the extent that this crisis has turned into a public debt crisis, thereby forcing governments to make difficult choices between the need to quickly reduce public debt and deficits on the one hand, and the need to support growth on the other hand.

One response to the public debt crisis is the neo-conservative approach of a minimal state. To reduce public deficits while stimulating growth and employment, governments should focus attention on the so-called "regalian" functions of the state, namely, to maintain law and order. Public spending and taxes should be minimized, so that private firms would face low interest rates and low tax rates, which in turn would encourage them to hire and expand, thereby generating prosperity for the whole economy.

However, this approach is not working too well in the United Kingdom, where it has been implemented. Conversely, in Scandinavian countries, where governments remain big, innovation and productivity growth rates remain high.

In this paper we argue that it is not so much the size of the state that is at stake, but rather its governance. In other words, it is not so much a reduced state that we need to foster economic growth in our countries, but a *strategic* state. The strategic state would target its investments to maximize growth in the face of hard budget constraints. This course departs both from the Keynesian view of a state sustaining growth through demand-driven policies and from the neo-liberal view of a minimal state confined to its regalian functions.

We spell out our view of the "smart state" and apply it to European growth policy.

The Schumpeterian Growth Paradigm

A useful framework within which to think about the role of the state in the growth process is the so-called Schumpeterian paradigm (see Aghion and Howitt 1992, 1998). It grew out of modern industrial organization theory and put firms and entrepreneurs at the heart of the growth process. The paradigm relies on two main ideas.

First idea: long-run growth relies on innovations. These can be process innovations, namely to increase the productivity of production factors (for example, labor or capital); product innovations (introducing new products); or organizational innovations (to make the combination of production factors more efficient). These innovations result from investments like R&D, firms' investments in skills, the search for new markets, and so forth that are motivated by the prospect of monopoly rents for successful innovators. When thinking about the role for public intervention in the growth process, an important consideration is that innovations generate positive knowledge spillovers (on future research and innovation activity) that private firms do not fully internalize. Thus private firms under laissez faire conditions tend to underinvest in R&D, training, and other knowledge-supporting activities. This propensity to underinvest is reinforced by the existence of credit market imperfections that become particularly tight in recessions. Hence an important role for the state is as a co-investor in the knowledge economy.

Second idea: creative destruction. Namely, new innovations tend to make old innovations, technologies, and skills obsolete. Thus, growth involves a conflict between the old and the new: the innovators of yesterday resist new innovations that render their activities obsolete. This also explains why innovation-led growth in OECD countries is associated with a higher rate of firm and labor turnover. And it suggests a second role for the state, namely as an insurer against the turnover risk and to help workers move from one job to another. More fundamentally, governments need to strike the right balance between preserving innovation rents and at the same time not deterring future entry and innovation.

This approach offers a natural framework for thinking about growth *policy.* For example, policies that have a potential effect on innovation incentives and therefore on long-run growth include new patent laws (like the Bayh-Dole Act in the United States), the introduction of a single market for goods and services in Europe (which affects the degree of product market competition), trade liberalization (which also affects competition), macroeconomic policy (which affects interest rates and firms' access to credit over the business cycle), and education policy (which affects the cost of R&D and training).

A Remark on Growth Policy and a Country's Stage of Development

Innovations may be either "frontier innovations," which push the frontier technology forward in a particular sector, or "imitations," which allow the firm or sector to catch up with the existing technological frontier. The more technologically advanced a country is, the higher the fraction of sectors that are already close to the existing technology frontier, and therefore require frontier innovation to develop further. On the other hand, growth in less-advanced countries, where most sectors lie farther behind the current frontier, will rely more on imitation.

This dichotomy first explains why countries like China grow faster than all OECD countries. Growth in China is driven by technological imitation, and when one starts far below the frontier, catching up with the frontier means a big leap forward. Second, it explains why growth policy design should not be exactly the same in developed and less-developed economies. In particular, an imitative economy does not require labor and product market flexibility as much as a country where growth relies more on frontier innovation. Also, bank finance is well adapted to the needs of imitative firms, whereas equity financing (such as venture capital) is better suited to the needs of an innovative firm at the frontier. Similarly, good primary, secondary, and undergraduate education is well suited to the needs of a catching-up economy whereas graduate schools focusing on research education are more indispensable in a country where growth relies more on frontier innovations. This in turn suggests that beyond universal growth-enhancing policies such as good property rights protection (and more generally the avoidance of expropriating institutions) and stabilizing macroeconomic policy (to reduce interest rates and inflation), the design of growth policy should be tailored to the stage of development of each individual country or region.

This in turn offers responses to the view of Easterly (2005) that policy does not matter for growth once controlling for institutions; to the Washington Consensus view; and to the Growth diagnostic approach of Hausmann, Rodrik, and Velasco (2002) whereby observed prices can help identify the binding constraint on growth. To Easterly, an answer is that he looked at the effect of policies independently from the countries' stage of development. However, the positive effects of a particular policy in some countries (for example, in more advanced countries) may well be counteracted by its negative effects in other countries. Instead, our approach calls for growth regression exercises where policy is interacted with other variables such as the degree of technological or institutional development in the country. To the advocates of the Washington Consensus, our answer is that while macroeconomic stability and property right protections appear to be universally growth-enhancing factors, there are other

factors to consider. When we go further and assess the growth impact of competition policy, of various ways of designing education systems, of the choice of exchange rate systems, or of the design of labor or credit markets, knowing a country's level of technological or institutional development appears to be key. To Hausmann, Rodrik, and Velasco, our answer is that growth regressions (particularly when also performed at more disaggregated levels, like industry or firm levels, or at the regional level) appear to do a better job than observed prices at encompassing possible intertemporal knowledge externalities involved in the various types of investments.

Growth-Enhancing (Supply-Side) Policy in Developed Economies

The above discussion suggests that supply-side policies aimed at increasing growth potential are appropriate in developed economies where growth is primarily driven by frontier innovation. A first lever of growth in developed economies is investment in the knowledge economy, particularly in in higher education and research. Innovation-driven growth requires the development of high-performing universities, particularly at the graduate school level (university performance is measured both in terms of the volume and quality of publications and in terms of students' subsequent labor market success); it also requires firms to invest more in R&D. A second lever is increasing product market competition and labor market flexibility: the idea is that innovation-based growth goes along with a higher degree of firm and job turnover. This in turn results directly from creative destruction as discussed above. Product market competition ensures that entry by new innovators will not be deterred by incumbent firms. Whereas labor market flexibility reduces the hiring and firing costs faced on the labor market by new entrants, and it also helps existing firms to start new activities while closing some old activities.

Some of these policies—for example, the enhancement of higher education or the provision of subsidies and other inducements to R&D investment by private firms—appear to require public support on a long-term basis. Examples of such policies include the excellence initiatives for universities in Germany or France, the small business acts in the United States and other OECD countries, and sectoral policies aimed at fostering innovation in selected sectors. Other policies, such as the liberalization of product and labor markets, seem to require more targeted and transitional support from governments. Examples of such policy actions include setting up flexsecurity systems or partial employment schemes and the transition to new labor or product market rules.

Investing in Growth while Reducing Public Deficits: The Strategic State

A main issue facing countries in the euro area, particularly in its southern part, is how to reconcile the need to invest in the long-run growth levers mentioned above with the need to reduce public debt and deficits. To address the challenge of reconciling growth with greater budgetary discipline, governments and states must become *strategic*. This first means to adopt a new approach to public spending: in particular, they must depart from the Keynesian policies aimed at fostering growth though indiscriminate public spending, and instead become selective as to where public funds should be invested. They must look for all possible areas where public spending can be reduced without damaging effects on growth and social cohesion. A good example is potential savings on administrative costs. Technical progress in information and communication makes it possible to decentralize and thereby reduce the number of government layers, for similar reasons as those that allowed large firms to reduce the number of hierarchical layers over the past decades. Decentralization makes it also easier to operate a high-quality health system at lower cost, as shown by the Swedish example.

Second, governments must focus public investments and policies on a limited number of growth-enhancing areas and sectors. This state support could include investment in education, universities, and innovative small and medium enterprises (SMEs); policy support for labor and product market flexibility; and investment in industrial sectors with high growth potential and externalities.

Third, governments must link public financing to changes in the governance of sectors they invest in: how can one make sure that government funds will be appropriately used? For example, public investments in education must be conditional upon schools taking concrete steps to improve pedagogical methods and to provide individual support to students. Similarly, the necessary increases in higher education investments must be conditional upon universities going for excellence and adopting the required governance rules. For example, Aghion et al. (2010) show that investments in higher education are more effective the more autonomous universities are and the more competitive the overall university system is (in particular, the more funding relies on competitive grants).

Another area where governance matters is that of sectoral investments ("industrial policy"). Such investments must preserve if not improve competition within the targeted sectors, and not reduce it (see Aghion et al. 2012). We discuss this industrial policy issue in more detail in the next section.

Industrial Policy

Since the early 1980s industrial policy has come under disrepute among academics and policy advisers. In particular, it has been attacked for preventing competition and for allowing governments to pick winners and losers—and, consequently, for increasing the scope for capture of governments by local vested interests.

However, three new considerations have gained importance over the recent period, which invite rethinking the issue. First, there is increasing awareness of climate change and of the fact that without government intervention aimed at encouraging clean production and clean innovation, global warming will intensify and generate all kinds of negative externalities (droughts, deforestations, migrations, conflicts) worldwide. Second, the recent financial crisis has revealed the extent to which laissez faire policies in several countries (particularly in southern Europe) promoted uncontrolled development of nontradable sectors (in particular real estate) at the expense of tradable sectors that are more conducive to long-term convergence and innovation. Third, China has become prominent on the world economic stage, thanks in large part to its constant pursuit of industrial policy.

The existence of knowledge spillovers supports a major theoretical argument for growth-enhancing sectoral policies. For example, firms that choose to innovate in dirty technologies do not internalize the fact that current advances in such technologies tend to make future innovations in dirty technologies also more profitable. More generally, when choosing where to produce and innovate, firms do not internalize the positive or negative externalities this might have on other firms and sectors. A reinforcing factor is the existence of credit constraints which may further limit or slow down the reallocation of firms towards new (more growth-enhancing) sectors. Now, one can argue that the existence of market failures on its own is not sufficient to justify *sectoral* intervention. On the other hand, there are activities—typically high-tech *sectors*—that generate knowledge spillovers on the rest of the economy, and where assets are highly intangible. Such intangibility makes it more difficult for firms to borrow from private capital markets to finance their growth. In such cases there might indeed be a case for subsidizing entry and innovation in the corresponding sectors, and to do so in a way that guarantees fair competition within the sector. Note that the sectors that always come to mind are always the same four or five sectors, including energy, biotech, information and communication technology (ICT), and transportation.

To our knowledge, the most convincing empirical study in support of properly designed industrial policy is by Nunn and Trefler (2009). These authors use microdata on a set of countries to analyze whether, as suggested by the "infant industry" argument, the growth of productivity in a country is positively affected by tariff protections biased in favor of activities and sectors that are

"skill intensive"—that is, using highly skilled workers. They find a significant positive correlation between productivity growth and the "skill bias" due to tariff protection. Of course, such a correlation does not necessarily mean there is causality between skill bias due to protection and productivity growth: the two variables may themselves be the result of a third factor, such as the quality of institutions in countries considered. However, Nunn and Trefler show that at least 25 percent of the correlation corresponds to a causal effect. Overall, their analysis suggests that adequately designed (here, skill-intensive) targeting may actually enhance growth, not only in the sector being subsidized but also the country as a whole. Below we will stress the importance of sectoral policies that are not only adequately targeted but also properly governed.[1]

Thus, using Chinese firm-level panel data, Aghion et al. (2012) show that sectoral subsidies tend to enhance total factor production (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. In particular, sectoral investments should target sectors, not particular firms (or "national champions").

Taxation

Targeting investments may not be enough to square the circle of reconciling growth investments with budgetary discipline and additional funding may have to be found. Some countries can use the fiscal capacity they already have to raise additional taxes to finance growth investments. Other countries may have to try and increase their fiscal capacity (although in this case the effects on growth will be more long term). There is a whole theoretical literature on how capital and labor income should be optimally taxed. However, somewhat surprisingly, very little work has been done on taxation and growth, and almost nothing in the context of an economy where growth is driven by innovation.[2] Absent growth considerations, the traditional argument against taxing capital is that this discourages savings and capital accumulation, and amounts to taxing individuals twice: once when they receive their labor income, and a second time when they collect revenues from saving their net labor income. Introducing endogenous growth may either reinforce this result (when the flow of innovation

[1]An adequately targeted policy is, in principle, one that targets a particular market failure (such as knowledge externalities and financial market imperfections). A particularly interesting case arises in markets that suffer from imperfect competition. By subsidizing its domestic industries, a government may give a strategic advantage to domestic firms, and allow them to gain market shares over foreign competitors. This approach, suggested by Brander and Spencer (1985), suffers from serious limitations, but could in principle be used to target "key" industries by looking at their structure. See Brander and Spencer (1985) for a seminal contribution and Brander (1995) for further insights.

[2] See Aghion, Akcigit and Fernandez-Villaverde (2012) for a first attempt.

is mainly driven by the capital stock) or dampen it (when innovation is mainly driven by market size which itself revolves around employees' net labor income). Excessive redistribution may deter innovation and thus growth. However, some redistribution can help enhance competition by preventing the emergence of an income-based fractionalization of society with exclusion of individuals at the bottom and the top of the wealth-income distribution. This in turn relates to the notion of "inclusive growth."

Demand versus Supply Side

While governments should focus primarily on the supply side when deciding how to target their investments in the growth process, they should not completely disregard the demand side. Indeed, firms' innovation incentives depend upon the size of the market they serve. The large fraction of the market is European—even for Germany, half of whose exports are to other EU countries. Thus, if all EU countries were to embark on austerity policies, the resulting effect on aggregate demand within the EU might end up deterring innovative activities by firms across member states. This underscores the important role of automatic stabilizers aimed at sustaining consumption demand across EU countries over the business cycle. These stabilizers are implemented by EU countries as countercyclical fiscal policies, and the ability to pursue such policies is enhanced if countries can reduce their public debt. Hence also the importance of subsidizing credit access for households wishing to purchase innovative manufactured products: recent work by Mian (2012) shows that the tightening of U.S. credit markets affected economic activity mainly by reducing households' access to credit, which in turn had a negative impact on firms' market size.

Macroeconomic Policy

Recent studies (see Aghion, Hemous, and Kharroubi, 2009; Aghion, Farhi, and Kharroubi, 2012), performed at cross-country and cross-industry levels, show that more countercyclical fiscal and monetary policies enhance growth. Fiscal policy countercyclicality refers to countries increasing their public deficits and debt in recessions but reducing them in upturns. Monetary policy countercyclicality refers to central banks letting real short-term interest rates go down in recessions while having them increase again during upturns. Such policies can help credit-constrained or liquidity-constrained firms pursue innovative investments (such as R&D, skills development, and other training) over the cycle in spite of credit tightening during recessions, and it also helps maintain aggregate consumption and therefore firms' market share over the cycle as argued in the previous section (see Aghion and Howitt, 2009, ch. 13).

Both countercyclical fiscal and monetary policies encourage firms to invest more in R&D and innovation. Once again, this view of the role and design of macroeconomic policy departs both from the Keynesian approach of advocating untargeted public spending to foster demand in recessions, and from the neo-liberal policy of just minimizing tax and public spending in recessions.

Climate

A laissez faire economy may tend to innovate in "the wrong direction." This insight is supported by Aghion et al. (2010), who explore a cross-country, panel-data set of patents in the automotive industry. They distinguish between "dirty innovations," which affect internal 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 observation, 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, there is a role for government intervention to "redirect technical change" towards clean innovations.

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.

Not surprisingly, the shorter the delay and the higher the discount rate (that is, 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 losses occur in the future through more environmental degradation and lower future consumption. Moreover, because there are basically two problems to deal with (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.

The State and the Social Contract

One of the main roles of the state is as the guarantor of the social contract—that is, an economical and social pact on which all the citizens and their government agree. This pact has to allow the state to control public deficits in a post-crisis 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. While government debts increased a lot during and after the crisis, it now appears necessary to reduce public deficits while investing in growth at the same time.

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 will choose to (i) invest in trust, (ii) promote redistributive policies while reducing deficits, and (iii) fight against corruption.

To understand why it is necessary for the state to invest 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."[3]

This speech has given rise to a recent literature that studies the links between trust and various economic outcomes.[4] Trust appears positively correlated with all these outcomes. Moreover, trust is also closely linked to institutions.[5] We want to underscore here the fact that trust is particularly important for economic growth and innovation.

Closely linked to the trust question is the redistributive nature of the social contract. Reducing public deficits involves increasing taxes and reducing public spending in various sectors as discussed above. However, to make this pain acceptable (and to avoid violent social movements of protestation), the effort will have to be shared equally. Taxes will have to be increased in a fair (that is, progressive) way and social expenditures targeted towards the poorest not cut too much. Moreover, citizens will be more willing to accept tax increases if they

[3] http://www.nobelprize.org/nobel_prizes/economics/laureates/1972/arrow-lecture.html.

[4] See, for example, Guiso et al. (2004) on financial development, Guiso et al. (2006) on entrepreneurship, and Guiso et al. (2009) on economic exchanges.

[5] See Aghion et al. (2010, 2011).

know that the fiscal resources will be used in an efficient way by the government (hence the importance of democracy).

Consider the relevant example of Sweden. Over only four years in the 1990s, Sweden was able to reduce its public deficit from 16 percent to less than 3 percent of GDP. This was done without reducing the level of public education and health services provided to the Swedish population (indeed, these services are still higher today in Sweden than in a lot of other European countries). This success was mainly the result of Sweden's efficient and progressive tax system.

Democracy

Our view of the state as a strategic growth investor, with priority sectors and a concern about governance of those sectors, calls for a reexamination of how states organize their own governance. In particular, once subsidies become targeted to particular sectors or activities, then checks and balances on governments become even more indispensable. First, checks and balances are needed to make sure that the selection of sectors or activities is not driven by interest groups activism and lobbying. Second, they are needed to make sure than sectoral state investments that turn out to be unsuccessful will not continue to be pursued. Third, they are needed to guarantee that state intervention does not deter competition and entry of new firms. To this end, it is importance that media producers and the judiciary system remain truly independent from the government. Equally important it is to have good and well-funded institutions to evaluate the effects of government policies and legislations. In this respect, a country like France still lies too far behind its counterparts in northern Europe (see Aghion and Roulet 2011).

Free media minimize the scope for corruption as shown by recent studies. This in turn reduces entry barriers for new businesses and increases trust in society, both of which enhance innovation and growth in modern societies

Implications for the Design of a European Growth Package

The above discussion suggests at least three complementary directions for a new growth package for the EU and in particular eurozone countries: First, structural reforms can be implemented, starting with the liberalization of product and labor markets. Here we will argue that an important role can be played by structural funds provided the targeting and governance of these funds is suitably modified. Second, industrial investments can be made along the lines suggested by our above discussion on the role and design of industrial policy. Here, a recapitalized European Investment Bank (EIB) together with the project bonds suggested by

the European Commission should play a leading role. Third, a more countercyclical macroeconomic policy can be implemented within the eurozone, in particular by always relying on structural (that is, corrected for cyclical variations) measures of public debts and deficits.

1. Structural Reforms and the Role of Structural Funds

There is a broad consensus among European leaders regarding the importance of structural reforms, in particular product and labor market liberalization and higher education reform, to foster long-run growth in Europe. In this section we first assess the potential increase in growth potential from having all eurozone countries converge fully or partly to the best standards with regard to product or labor market liberalization, and also with regard to higher education. Then we discuss the role that structural funds might play in encouraging such reforms.

Assessing the Growth Effects of Structural Reforms

Using the data from Aghion, Hemous, and Kharroubi (2009), we look at the effect of structural policies using cross-country panel regressions across 21 European countries. Our structural indicators are the following:

- For higher education system: the share of population 25–64 years old having completed tertiary education (SUP)
- For the product market: an OECD index assessing product market regulation (PMR)
- For the labor market: an OECD index assessing the strictness of employment protection (LPE).

In fact we focus on the interaction between these two rigidities, namely the variable PMR*LPE, in the analysis of labor market and product market reforms.

We can look at the short- and long-run growth effects of converging towards the performance levels of "target countries." The *target groups* include those countries that are found to be the best performers in terms of education, product market, and labor market regulations. In order to determine these groups, we rank countries according to the variables SUP and PMR*LPE and we come up with two target groups: (i) *Non-European target group*: United States and Canada; (ii) *European target group*: United Kingdom, Ireland, and Denmark. The advantage of these two target groups is that they allow comparisons between countries within the EU as well as with non-European counterparties. Interestingly, we found the same target groups both for the higher education and the labor and product market regulation. We could then assess the average effect of converging towards best practice for the eurozone (European Monetary Union) as a whole. Our results show that converging towards the best practice in terms of product and labor market liberalization generates a growth gain of between 0.3 and 0.4 percent in the short run. Converging towards the best

practice in terms of higher education enrollment generates a growth gain that is initially smaller (if we take the United Kingdom, Ireland, and Denmark as the reference countries), but grows up to 0.6 percent by 2050. Altogether, a full percentage point in growth can be gained through structural convergence towards those three countries.

Rethinking the Role and Design of Structural Funds

Here we argue that structural funds can be partly reoriented towards facilitating the implementation of structural reforms. So far, these funds have been used mainly to finance medium-term investment projects and to foster socioeconomic cohesion within the EU. Moreover, these funds are allocated ex ante based on recipient countries' GDP relative to the EU average, population, and surface area.

We argue in favor of an alternative approach to the goals, targeting, and governance of structural funds. On the goals of structural funds: these funds should become *transformative.* In other words, they should help achieve structural reforms in the sectors they are targeted to. In our above discussion, we identified some main areas and sectors where structural reforms are needed: labor markets, product markets, and education. Structural funds should aim at facilitating changes in the functioning of these sectors in the various countries. The allocation of funds should generally be made on an individual basis: in other words, they should mainly target schools, employment agencies, individual workers, but not so much countries. The funds would help finance *transition costs.* The allocation of funds should be to well-specified deliverables, such as provision of better tutorship in education, improvements in the organization of employment agencies, transition to portable pensions rights across two or more countries, and setting up of diploma equivalence for service jobs. Allocation should be also conditional upon the country or region not having put in place a general policy that contradicts the purpose of the fund allocation.

Regarding the governance of structural funds, the allocation of funds should be made by European agencies on the model of the European Research Council: a bottom-up approach with peer evaluation ex ante and ex post.

2. A New European Investment Policy

Growth also requires more European investments in growth-enhancing activities. Aghion, Boulanger, and Cohen (2011) survey recent studies suggesting that sectoral aid is more likely to be growth-enhancing if (i) it targets sectors with higher growth potential, one measure of it being the extent to which various industries are skill-biased; and (ii) it targets more competitive sectors and enhances competition within the sector.

In that research, we first compare various sectors/activities in terms of their degree of skill-biasness and also according to the relative importance of SMEs in these sectors (a larger fraction of SMEs can in turn be interpreted as reflecting the scope for increasing competition in the sector). A main finding is that the energy

sector is particularly skill-biased. Then, we look at the EIB's investment portfolio, and conclude that growth-maximization considerations should lead the EIB to invest more in the energy sector compared to the less skill-intensive construction/infrastructure sectors. Finally, we look in more detail at the energy sector.

The argument for unregulated market operation seems nowadays less convincing than it might have been in the 1980s, for a number of reasons. First, the European single market has been associated with a reallocation of production from the tradable to the nontradable sector, depressing growth prospects. This may not be related to laissez faire as such but to the fact that the single market is in fact incomplete and that other important rigidities remain on both product and labor markets. However, it is still necessary to support adjustment in the transition and until the single market will be truly complete. Second, climate change will come with important negative externalities if the costs of the transition are not at least partly supported from outside.

As we argued above, the new investment policy should not pick individual winners, but rather should target sectors, in particular those that are more skill-intensive (Nunn and Trifler 2010) and/or those that are more competitive (Aghion et al. 2012). As it turns out, within the EU skill intensity is particularly low in the manufacturing and wholesale and retail sectors. An industrial policy picking these sectors would be ill-advised, for example, if not accompanied by effective liberalizing measures. By contrast, as suggested by Nunn and Trefler (2010), an effective industrial policy should focus on the "electricity" sector of the International Standard Industrial Classification (ISIC) listings, mainly composed of energy production, processing, and transport activities.

However, if we look at the composition of the EIB's investment portfolio within the European Union, we find that the EIB invests about twice as much in the Transport sector as it does in the Energy sector. This suggests that EU countries should not only increase the scope of EIB activities, both by recapitalizing it and by using the European budget as a leveraging device mobilize additional co-financing, but also they should make sure that the EIB and the EU agencies in charge of investment policy, target sectors like energy with higher growth potential.

3. More Countercyclical Macroeconomic Policies

In previous sections we argued that more countercyclical macroeconomic policies can help (credit constrained) firms maintain R&D and other types of innovation-enhancing investments over the business cycle. One implication of this for European growth policy design is that all the debt and deficit targets (both in the short and in the long term) should be corrected for cyclical variations; in other words, they should always be stated in structural terms. For example, if a country's current growth rate is significantly below trend, then the short-run budgetary targets should be relaxed so as to allow this country to

maintain its growth-enhancing investments. However, while the fiscal compact specifies long-term objectives that are stated in structural terms, the short- and medium-term targets agreed between the European Commission and member states last year are in nominal terms. This inconsistency is can be damaging to growth.

Conclusion

A successful innovation-led economy requires a combination of policies, including investment in the knowledge economy, liberalization of markets, and governance reform to make the state more strategic. Although the old welfare states are not well suited to the needs of an economy where growth is driven by frontier innovation, the minimal state advocated by neo-liberals may not be the solution either. Between these two extreme solutions is what we refer to as the strategic state. It acts primarily on the supply side of the economy and targets its investments on the sectors or activities with higher expected growth potential. It is a state that tries to reconcile the need to invest in growth with the need to achieve budget balance. And it is a state that looks carefully at governance, both of the sectors it invests in and of itself as investor. Germany or Scandinavian countries are noteworthy signposts to the strategic state. They reacted to past crises by implementing structural reforms, both in labor and product markets and in the organization of the state, and they now have unemployment rates lower than many other OECD countries and growth rates close to 3 percent. These lessons should not be lost on us.

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The importance of investing in research and development (R&D) and knowledge for innovation and growth is now commonly acknowledged. So is the role for structural reforms aimed at making product and labor markets more flexible. More controversial, however, is the role that the state should play in the growth process, a debate that has been revived to the extent that the financial crisis has turned into a public debt crisis. One response to the public debt crisis is the neo-conservative approach of a minimal state. However, this approach is not working too well in the United Kingdom, where it has been implemented. Conversely, in Scandinavian countries, where governments remain big, innovation and productivity growth rates remain high. In this paper we argue for a strategic or "smart" state, rather than a reduced state. The strategic state would target its investments to maximize growth in the face of hard budget constraints. This course departs both from the Keynesian view of a state sustaining growth through demand-driven policies, and from the neo-liberal view of a minimal state confined to its regalian functions.

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