

From Growth Theory To Growth Policy Design

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Introduction

In this note we argue that growth theory can help guide growth policy design. We also discuss how one can reconcile growth-enhancing policy and investment with governments' obligation to reduce public debt, and we shall revisit the debate on the role of the state in light of this problem.

The idea that policy should affect long-run growth is not unanimously acknowledged. For example Easterly (2002) argues that once we control for "institutions" (e.g. measured by the expropriation risk instrumented by settlers' mortality as in Acemoglu et. al (2002)), policy variables do no longer come out significant in cross country panel regressions.

And among those who believe in a role for growth policy, the debate on how to think about the appropriate growth policy design, and on how to use theory for that purpose, is not settled either. Advocates of the so-called "Washington Consensus" argue that the combination of macroeconomic stabilization, market liberalization, and privatization, should lie at the heart of any growth package no matter the country's level of technological or institutional development. On the other hand, in their paper on "Growth Diagnostics", Hausmann, Rodrik and Velasco (2002) argue that Asian countries have achieved fast growth without (fully) conforming to the Washington Consensus recommendations. They instead propose to use the combination of an AK growth model and observed factor prices to try and identify the binding constraints on growth in the various countries they consider.¹ More recently, the Spence Commission (see Spence (2009)) takes a more pragmatic approach to evaluate the growth effects of various policies in different types of countries, developed or emerging, endowed in natural resources or not. They point at education and inclusive growth being as important as market flexibility.

¹ For example, they use Mincerian equations to evaluate the returns from education, and whenever these returns appear to be small, they conclude that education is not a binding constraint on growth. Or if interest rates turn out to be low, they conclude that credit is not a binding constraint on growth.

In this note we develop a different approach to think about growth policy design and the role of the state. Our approach is based on the Schumpeterian growth model which we briefly summarize below.

But before we get there, to help identify the main determinants of growth or of long-term income differences across developed or emerging market economies, two classes of models have been developed over the past sixty years. First, the growth models based on capital accumulation. Second, growth models with endogenous innovation.

Growth models with capital accumulation

The primary reference in growth economics is the neoclassical model, developed by Solow (1956). The success of this model owes a lot to its elegance and parsimony: the growth process is described by only two equations: (1) a production function that expresses the current flow of output goods as a function of the current stocks of capital and labor; (2) a law of motion describing how capital accumulation depends positively on investment (equal to aggregate savings) and negatively on capital depreciation. An important assumption is that the production function exhibits decreasing returns with respect to capital (i.e., the more capital has been accumulated, the lower the marginal productivity of an additional unit of capital). In the absence of technical progress (which this model cannot explain), capital accumulation is the only source of growth but it is also a source of growth that tapers off over time precisely because of the decreasing returns of capital in producing final output. These decreasing returns eventually choke off all growth in the long run.

The only way to enhance growth in this model (however with no chance of making it sustainable in the long run absent technical progress) is to increase the savings rate. This indeed increases the investment rate, and therefore the rate of capital accumulation for given level of final output. For example, this is how countries like the Soviet Union managed to increase their growth rates, however without long-lasting effect: the reason being that apart from the defence sector (the only sector subject to foreign competition), the Soviet Union was not innovating.

A second class of growth models with capital accumulation are the so-called AK models. In these models, although production functions at the firm level may entail decreasing returns to capital, yet at the aggregate level this may no longer be the case, for example if there are sufficiently large knowledge externalities among firms who accumulate capital. Whenever knowledge externalities exactly offset the decreasing returns to individual capital accumulation, the economy grows at a positive long-run rate which depends positively upon the savings rate (the Harrod-Domar rate). These models have been used in the early 1990s (e.g. by King, Rebelo, and others) to analyse the effects of taxation and other types of public policy. However, they have not survived the criticism of not predicting convergence. Also, these models emphasize the role of savings rates which does not appear to be paramount, particularly in developed economies, and they neglect the importance of firms' entrepreneurial incentives and of how these incentives are affected by the institutional and policy environment.

More recent models have explicitly modelled firms' innovative investments as key inputs to the growth process. These are referred to as the idea-based models of endogenous growth (see Romer (1990) and Aghion and Howitt (1992)). In what follows we concentrate on the Schumpeterian paradigm.

The Schumpeterian growth paradigm

The Schumpeterian paradigm, developed by Aghion and Howitt (1992) and subsequently elaborated in Aghion and Howitt (1992), grew out of modern industrial organization theory and put firms and entrepreneurs at the heart of the growth process. The paradigm relies on three underlying ideas.

First idea: long-run growth relies on innovations. These can be process innovations, namely to increase the productivity of production factors (e.g. labor or capital); or product innovations (introducing new products); or organizational innovations (to make the combination of production factors more efficient).

Second idea: innovations result from investments like research and development (R&D), firms' investments in skills, search for new markets that are motivated by the prospect of monopoly rents for successful innovators.

Third idea: creative destruction. Namely, new innovations tend to make old innovations, old technologies, and old skills, become 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. This third idea opens up the interesting field of political economy of growth: in particular, how should one design constitutions so as 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, new patent laws (like the Bayh-Dole Act in the US), 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), education policy (which affects the cost of R&D and training), all these policies have a potential effect on innovation incentives and therefore on long-run growth.

A fourth idea (see Aghion and Howitt (2005) and Acemoglu, Aghion and Zilibotti (2006)) allows us to enrich the analysis of how to design growth policy in different types of countries. Namely, innovations may be either "frontier innovations" which push the frontier technology forward in a particular sector, or "imitations" which allows 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 in 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 (venture capital...) are 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 right 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 approach offers responses to Easterly's view that policy does not matter for growth once controlling for institutions, to the Washington Consensus view, and to Hausmann, Rodrik and Velasco's Growth Diagnostic approach whereby observed prices can help identify the binding constraint on growth. To Easterly, the 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 (e.g. 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, once we try to go further and assess the growth impact of competition policy, of various ways of designing education systems, of the choice of exchange rate systems, of the design of labor or credit markets, knowing a country's level of technological or institutional development appears to be key. To Hausmann et al, our answer is that growth regressions (particularly when also performed at more disaggregated levels, like industry or firm levels, or at 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) in developed economies

The above discussion suggests supply side policies aimed at increasing growth potential in developed economies where growth is primarily driven by frontier innovation. A first lever of

growth in developed economies is that of investing in the knowledge economy: in particular in higher education and research: innovation-driven growth requires the development of performing universities, particularly at the graduate school level (university performance is in turn 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 that of 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 among 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: the excellence initiatives for universities in Germany or France, the small business acts in the US and other OECD countries, 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 (e.g. the setting up of flexsecurity systems or partial employment schemes, 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 above long run growth levers with that of reducing public debt and deficits.

This in turn introduces a third lever of growth policy design: namely, the organization of the state. 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 through 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 are the 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 on a limited number of growth-enhancing areas and sectors: education, universities, innovative SMEs, labor market policies and support to labor and product market flexibility; industrial sectors with high growth potential and externalities. Third, governments must link public financing to changes in the governance of sectors they invest in. 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. Investment in universities must be conditional upon universities going for excellence and adopting the required governance rules, in particular involving adequate outside monitoring (see Aghion et al, 2010). Sectoral investments (“industrial policy”) must preserve if not improve competition within the targeted sectors, not reduce it (see Aghion et al, 2012).

But this 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). In any case, tax rates cannot become excessive otherwise private investment, innovation and growth end up being discouraged. Additional funding could come from EU institutions, both, to foster structural reforms (in education and universities or in labor or product markets) or to help governments support public and private research and R&D.

This idea of a strategic state that targets its investments to maximize growth in the face of hard budget constraints, 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 (essentially that of maintaining law and order).

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. And the large fraction of the market is European, even for Germany where more than half of its exports are to other EU countries. Thus, if all EU countries were to embark in austerity policies, the resulting effect on aggregate demand within the EU might end up deterring innovative activities by firms across member states. Hence the role of automatic stabilizers aimed at sustaining consumption demand across EU countries over the business cycle. The implementation of such stabilizers is in turn facilitated by EU countries pursuing countercyclical fiscal policies. The ability to pursue such policies is itself facilitated if the country manages to reduce its 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 US credit markets affected economic activity mainly through reducing households' access to credit, which in turn impacted negatively on firms' market size.

Macroeconomic policy

Recent studies (see Aghion, Hemous, and Kharroubi, 2009; Aghion, Farhi and Kharroubi, 2012) performed at cross-country/cross-industry level, show that more countercyclical fiscal and monetary policies enhance growth. Fiscal policy counter-cyclicality refers to countries increasing their public deficits and debt in recessions but reducing them in upturns. Monetary policy counter-cyclicality 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 to pursue innovative investments (R&D, skills and training,...) over the cycle in spite of credit tightening during recessions, and it also helps maintain aggregate consumption and therefore firms' market size over the cycle as argued in the previous section (see Aghion and Howitt, 2009, Ch. 13). Both contribute to encouraging 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.

Taxation

There is a whole theoretical literature on how capital and labor income should be optimally taxed. However, somewhat surprisingly, very little has been done on taxation and growth, and almost nothing in the context of an economy where growth is driven by innovation. 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 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".

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, checks and balances on governments become even more indispensable: first, to make sure that the selection of sectors or activities is not driven by interest groups activism and lobbying; second, to make sure that sectoral state investments that turn out to be unsuccessful will not be pursued; third, to guarantee that state intervention does not deter competition and entry of new firms. Hence the importance of having 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).

Conclusion

In this short note we tried to argue that policy matters for growth and that theory can help guide growth policy design. We also argued that policy must adapt to a country's institutions and level of technological development. Finally, we argued that a successful innovation-led economy requires, not only the investment in the knowledge economy, not only to liberalize markets, but also to reform the governance of the state to make it become more strategic. While 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, there is what we refer to as the strategic state: the state that acts primarily on the supply side of the economy and which 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. In this respect the example of Germany or Scandinavian countries, which have reacted to past crises by implementing structural reforms, both in labor and product markets and in the organization of the state, and now show an unemployment rate lower than in many other OECD countries and growth rates close to 3%, is worth meditating.

References

- Acemoglu, D, Aghion, P, and F. Zilibotti (2006), "Distance to Frontier, Selection, and Economic Growth", *Journal of the European Economic Association*, 37-74
- Aghion, P, Dewatripont, M, Du, L, Harrison, A, and P. Legros (2012), "Industrial Policy and Competition", mimeo Harvard
- Aghion, P, Dewatripont, M, Hoxby, C, Mas-Colell, A, and A. Sapir (2010), "The Governance and performance of Universities: Evidence from Europe and the US", *Economic Policy*, 25, 7-59.
- Aghion, P, Hemous, D, and E. Kharroubi (2009), "Countercyclical Fiscal Policy, Credit Constraints, and Productivity Growth", forthcoming in the *Journal of Monetary Economics*

- Aghion, P, Farhi, E, and E. Kharroubi (2012), "Monetary Policy, Liquidity and Growth", mimeo Harvard
- Aghion, P and P. Howitt (1992), "A Model of Growth through Creative Destruction", *Econometrica*, 60, 323-351.
- Aghion, P and P. Howitt (2006), "Appropriate Growth Policy", *Journal of the European Economic Association*, 4, 269-314.
- Aghion, P and P. Howitt (2009), *The Economics of Growth*, MIT Press
- Aghion, P, and A. Roulet (2011), *Repenser l'Etat*, Editions du Seuil, Paris.
- Easterby, W (2005), "National Policies and Economic Growth", in P. Aghion and S. Durlauf (Eds.) *Handbook of Economic Growth*, Elsevier, North-Holland.
- Hausmann, R, Rodrik, D, and A. Velasco (2005), "Growth Diagnostics", Mimeo, Harvard University.
- Romer, P (1990), "Endogenous Technical Change", *Journal of Political Economy*, 98, 71-102.
- Spence, M (2009), "The Growth Report: Strategies for Sustained Growth and Inclusive Development", World Bank.
- Solow, R (1956), "A Contribution to the Theory of Economic Growth", *Quarterly Journal of Economics*, 70, 65-94.