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SMART CHOICES FOR GROWTH

GEORG ZACHMANN

Highlights

- Recovery in Greece, Italy, Portugal and Spain is held back in part by structural barriers. Overcoming these requires structural reform and public investment. Given the limited availability of political and financial capital, prioritising reform efforts and spending is important, but difficult. The different success factors for individual sectors are complementary. Using the example of the high-tech industry, we make the case that only investing in one success factor (eg broadband infrastructure) without having a sufficient endowment of others (eg education) is unlikely to make the sector successful.

- One consequence of the complementarity of the different success factors is that public investment and reform efforts should be fine-tuned in order to match the endowment of other factors. This might imply an increase in efforts to tackle several structural barriers at the same time, but it might also imply reducing investment in less promising fields. This in turn requires strategic thinking about whether it is worthwhile pursuing development strategies that require investment in many success factors but that do not promise much success. Such a strategic approach to public investment and reform efforts might make the allocation of scarce public financial and political capital more efficient.

Georg Zachmann (georg.zachmann@bruegel.org) is a Research Fellow at Bruegel.
The author acknowledges excellent research assistance from Philine Schuseil and Amma Serwaah.

Telephone
+32 2 227 4210
info@bruegel.org

www.bruegel.org

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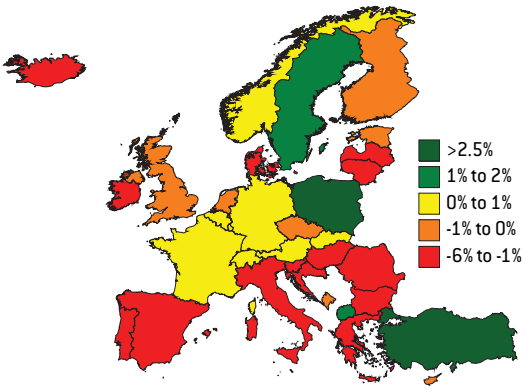
TOGETHER WITH OTHER EUROPEAN UNION COUNTRIES, Greece, Italy, Portugal and Spain saw negative average annual growth rates in 2008-11 (see Map 1). In contrast to most EU economies, however, they expect no or even negative growth to continue in 2013 (Figure 1). Restoring growth is essential for these countries to achieve the sustainable budgets that are necessary to maintain the integrity of the euro area in a manner that is both socially bearable and politically supportable[1]. Their economic decline is intrinsically tied to the European sovereign bond and banking crisis, which has affected various drivers of growth, by for example reducing aggregate demand. However, the crisis is itself partly caused by structural barriers to growth. Overcoming the crisis and restoring growth requires two strands of action: reforms targeted at the macro-economic and institutional dimension of the European sovereign bond and banking crisis[2], and the resolution of structural barriers to economic development. In this Policy Contribution we focus on the structural reform aspect.

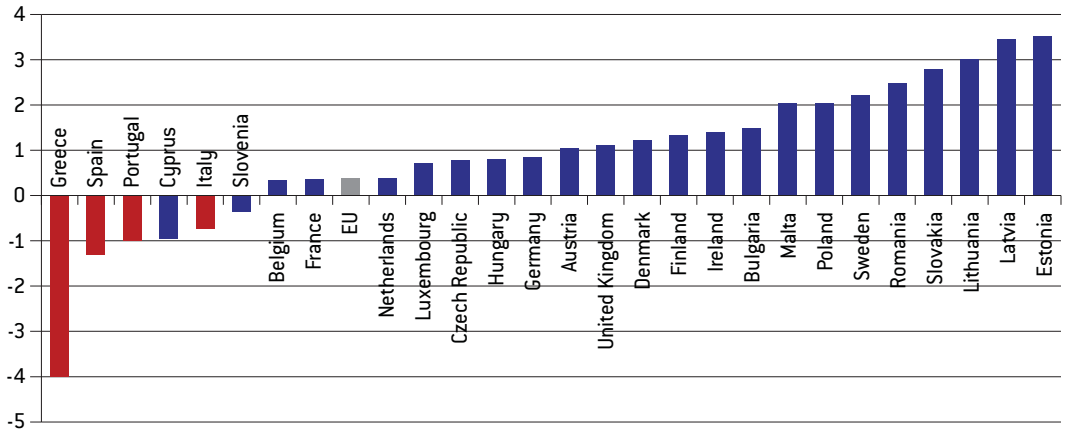
Countries' long-term growth prospects are fundamentally determined by structural factors such as infrastructure, human capital, financial sector development and the quality of regulation[3]. Table 1 on page 3 shows that the southern EU countries and those that joined the bloc in 2004 and afterwards continue to lag behind in several of these factors. The southern countries experienced pre-crisis growth for a number of reasons (eg convergence, cheap capital fuelling internal demand); however, their competitiveness substantially deteriorated[4] not least because the long-term structural determinants of their growth did not improve. In addition, structural barriers prevented quick adjustments in those countries to the changing economic environment during the crisis. This has proved particularly detrimental for

Map 1: Annual average GDP growth rate 2008-11



Source: Eurostat.

Figure 1: Expected growth rates for 2013 (%)



Source: IMF World Economic Outlook, October 2012.

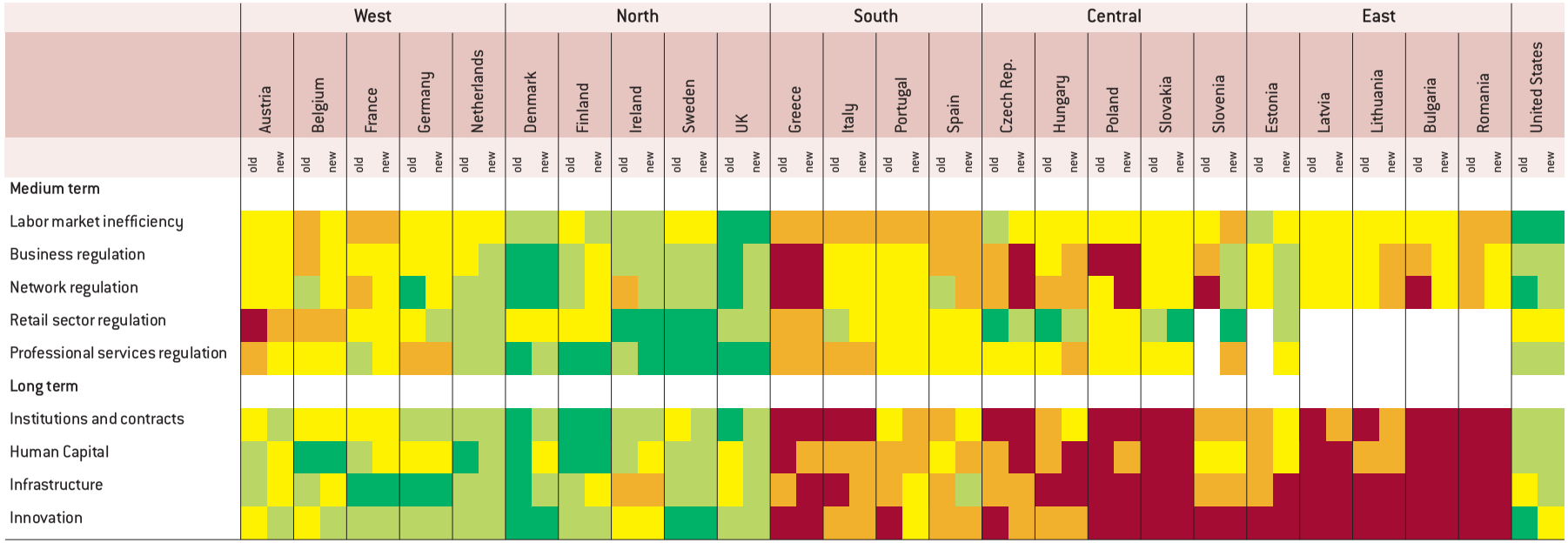
1. See Darvas and Pisani-Ferry (2011).

2. This includes legislation, formal institutions and actual governance. A discussion of the institutional deficits can be found in Pisani- Ferry, Jean (2010) 'Euro-area governance: what went wrong? How to repair it?' *Policy Contribution* 2010/05, Bruegel.

3. See for example Barro and Sala-i-Marin (1995).

4. For example, according to Darvas (2012b) 'Compositional effects on productivity, labour cost and export adjustment', *Policy Contribution* 2012/11, Bruegel, the unit labour cost in Greece, Italy and Spain increased by more than 30 percent between 2000Q1 and 2008Q1.

Table 1: Structural shortcomings in EU countries



Source: Bruegel (Darvas and Pisani-Ferry, 2011). Note: the scoreboard is relative to the 'advanced' OECD countries, ie OECD countries apart from Mexico and the central European member states. Colour codes: **Dark green:** the indicator is better by more than one standard deviation that the average; **light green:** better than the average but by no more than one standard deviation; **yellow:** worse than the average but by no more than one standard deviation; **orange:** worse than the average between one and two standard deviations; **red:** worse than the average by more than two standard deviations. For full information on sources and notes, see Darvas and Pisani-Ferry (2011).

euro-area countries that were unable to devalue to improve their competitive positions[5].

The different structural factors behind sectoral success are inter-related, and this should be taken into account when addressing structural weaknesses. Figure 2 illustrates that in some cases, where there are complementary relationships between success factors, shifting efforts between different policies might simultaneously reduce costs and increase benefits. This holds not only for public investment, but also for reforms that complement public investment, such as cutting red tape for innovative young companies.

General structural factors such as education, infrastructure and regulation encompass a wide range of sub-divisions. Infrastructure, for example, entails access to water, electricity, material and immaterial communication. Each of these sub-divisions features different dimensions that policy makers might influence, for example the speed, price and reliability of data connections. Individual sectors require different sets of structural strengths to be successful. Consequently, unleashing sectoral growth potentials requires addressing structural factors relevant for the individual sector. Thereby, the individual structural strengths are complimentary. To illustrate this point we will in the following focus on the high-tech sector. The motivation for this choice is that this sector is a typical target for sectoral development policies because, as Eurostat puts it, *"high-tech sectors and enterprises are key drivers of economic growth, productivity and social protection, and generally a source of high value-added and well-paid employment"*.

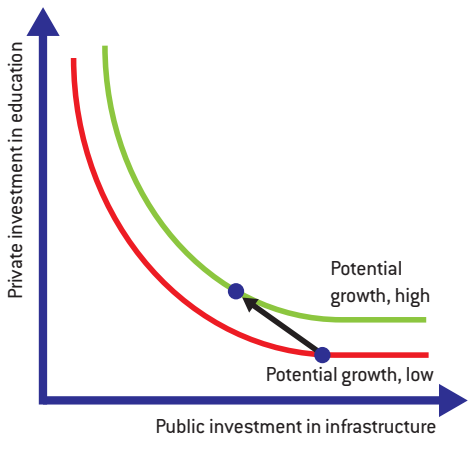
In this Policy Contribution we will describe the complementary relationship between different types of reforms and public investment for success in the high-tech sector. Subsequently, we discuss the implications of this complementarity for the mix of public investments and reform policies in times of scarce fiscal resources and limited political capital.

COMPLEMENTARITY OF REFORMS AND PUBLIC INVESTMENT

Success in high-tech industries builds on various factors including specialised education, the presence of communication infrastructure, and good regulation. Map 2 indicates that the peripheral countries of the south and east are less equipped in terms of an educated workforce (ie PISA scores[6]). Maps 3 and 4 illustrate weaknesses in modern communication infrastructure and network regulation (ie broadband connections in households,) relative to other countries in the EU. Map 5 demonstrates that these countries also spend relatively little on R&D. These indicators correspond to these countries' below average employment in high-tech sectors and below average high-tech exports, as shown by Maps 6 and 7.

Table 2 on page 6 highlights the structurally different developments in northern and southern Europe by comparing the performances of Italy, Greece, Spain and Portugal to those of Finland and Sweden. The four southern countries have high education drop-out rates. In most of their regions more than 15 percent of students leave education or formal training early. In some Spanish and Portuguese regions, this figure is greater than 20 percent. In contrast, fewer than 5 percent of Finnish and Swedish students are considered early leavers. In terms of the scholastic performance of 15-year-olds as measured by PISA (see footnote 6), results are more balanced. While Finland (>525) and Greece (<475) are the positive and negative outliers, Italy, Spain, Sweden and Portugal are close to the European average (scores between 475 and 500).

Figure 2: Complementarity of public policies for potential growth of the high-tech sector

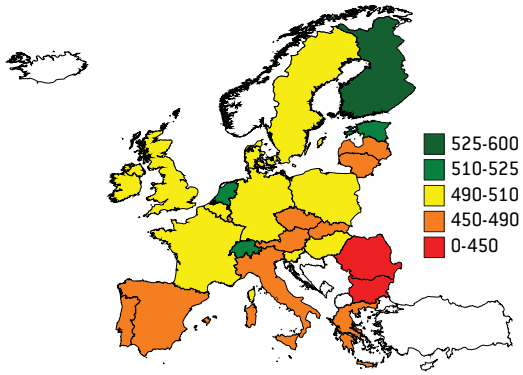


Source: Bruegel.

5. Note that for example the Czech Koruna, the Hungarian Forint and the Polish Zloty significantly depreciated compared to the euro compared to their peak in summer 2008.

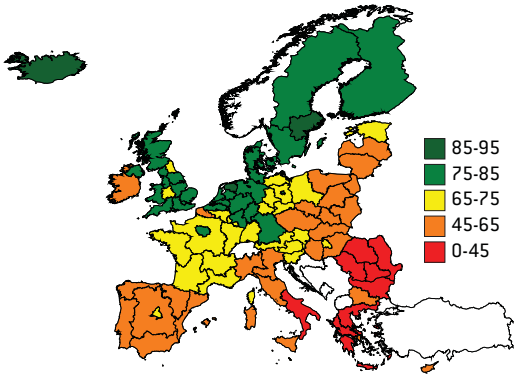
6. The Programme for International Student Assessment (PISA) is a worldwide study by the Organisation for Economic Co-operation and Development (OECD) in member and non-member nations, of 15-year-old school pupils' mathematics, science and reading attainment.

Map 2: PISA average scale including reading, mathematics and science, 2009



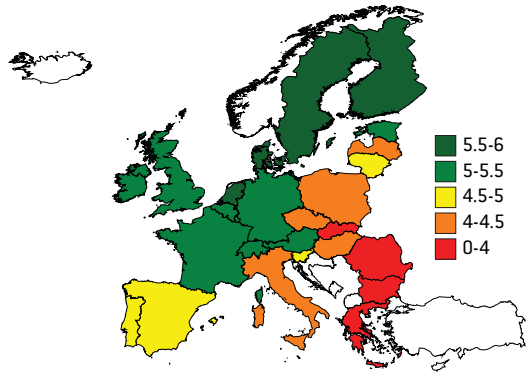
Source: Eurostat.

Map 3: Broadband connections in households as % of households, 2011



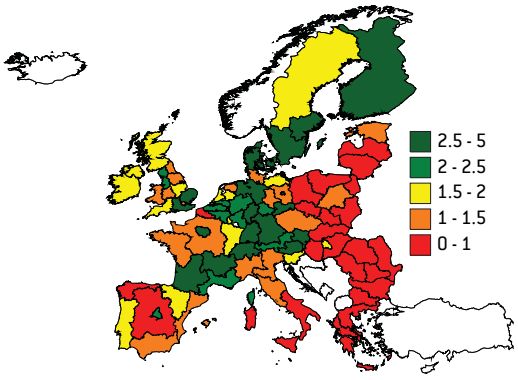
Source: Eurostat.

Map 4: Political and regulatory environment (network regulation), scale of 1-7 (7=best), 2012



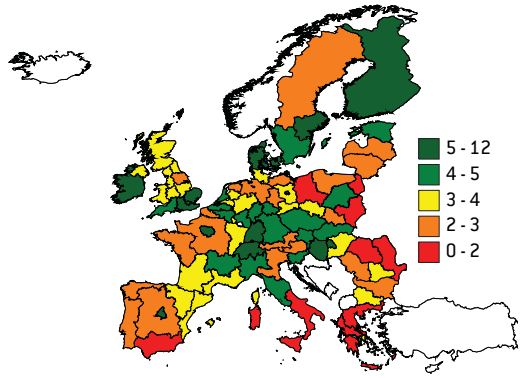
Source: Network Readiness Index 2012 of the World Economic Forum.

Map 5: Total R&D intramural expenditure as % of GDP, 2010



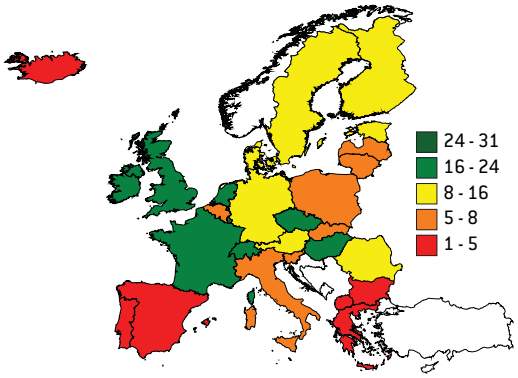
Source: Eurostat.

Map 6: High-tech Employment as % of total employment, 2011



Source: Eurostat.

Map 7: High-tech exports as % of total exports, 2009



Source: Eurostat.

Similarly, in terms of modern communication network infrastructure measured by broadband connections in households as a percentage of total households, Portugal and Greece are negative outliers, with less than 45 percent connectivity, while more than 75 percent of Finnish and Swedish households have access to broadband connections. The contrast is even starker when comparing country scores given by the World Economic Forum's political and regulatory environment index (for network regulation)[7]. Greece's score is in the lowest category; Portugal ranks slightly better, but still performs poorly compared to other nations,

7. World Economic Forum (2012).

whereas Spain achieves the EU median. Again, Finland and Sweden achieve the highest ranks in the index.

In line with the low network connectivity indicator, Greece has the largest percentage of population who have never used a computer. By contrast, fewer than 20 percent of the Finnish and Swedish populations have never used a computer. We find a corresponding distribution when comparing total R&D intramural expenditure. This figure is between 3 percent and 4 percent for Finland and Sweden. It is less than 0.5 percent for Greece, and between 0.5 percent and 2 percent for various regions of Spain and Portugal.

The disparities described above are reflected in the final statistics which consider high-tech employment as a percentage of total employment and high-tech exports as a percentage of total exports. High-tech industries account for less than 2 percent of total employment in Greece, between 2 and 4 percent for parts of Spain, Portugal and Italy, and more than 7 percent in Finland. Sweden is not a top performer in this instance, but nonetheless scores above the EU median.

The contrast is less pronounced when considering high-tech exports. Here, both Finland and Sweden are closer to the EU median.

This comparison indicates that Italy, Greece, Spain and Portugal on one hand and Finland and Sweden on the other are experiencing contrasting developments. At least four hypotheses attempt to explain the origin of such divergent patterns: (1) the countries are at different stages of economic development, (2) the pattern is the natural result of specialisation, (3) the differences are due to locational or cultural factors, (4) the countries are locked into different varieties of capitalism (Hall and Soskice, 2001).

It is impossible to determine which effect is the main cause of the divergent patterns, though evidence suggests that the southern economic model has failed to generate the foundations for sustainable growth. Thus the question is whether some of the north European success factors can be transposed to the south European countries in order to reproduce north European success. In the following, we argue that reproducing success is difficult because it hinges not only on the average level of structural factors but also on their interaction. In particular, sectoral success cannot be quickly engineered by just improving some easy-to-fix structural factors.

The interaction of different factors is confirmed at the country level by the correlation exercise shown in Table 3 (page 7). Even after controlling for different levels of GDP per capita, countries with better education, broadband access, network regulation, higher penetration of computers or higher R&D intensity, have a higher share of high-tech employment and exports. Causality is undetermined, yet sectoral strength appears to be conditional on the interaction of these factors.

When looking at specialisation in high-tech industries (as measured by high-tech exports) we find that several factors are complementary. As

Table 2: Indicators linked to success in high-tech industries

	Structural factors						Specialisation	
	Early leavers from school and training, as % of corresponding population	PISA average scale	Broadband connections in households as % of households	Political and regulatory environment	Individuals who have never used a computer as % of population	Total R&D intramural expenditure as % of GDP	High-tech employment as % of total employment	High-tech exports as % of total exports
Italy								
Portugal								
Spain								
Greece								
Finland								
Sweden								

Source: Bruegel based on: Eurostat, World Economic Forum, OECD. Note: time period: 2008 - 2012. Colours indicate performance in comparison to other European countries: dark green (top performer) – light green – yellow – orange – red (bottom performer).

Table 3: Are there significant correlations between structural factors?

	High-tech exports	High-tech employment	Network Readiness	R&D expenditure	PISA score	Broadband	Non-usage of computer
High-tech employment	0.23*						
Network readiness	0.53***						
R&D expenditure	0.24**	0.50***	0.50***				
Pisa score	0.23**	0.19*	0.58*	0.27*			
Broadband connectivity	0.58***	0.17*	0.88***	0.44***	0.73***		
Non-usage of computer	-0.58***	-0.38***	-0.84*	-0.49***	-0.67*	-0.91***	
Early leavers from education	-0.317***	-0.29***		-0.22**	-0.21**	-0.36***	0.39*

Source: Bruegel based on Eurostat, Network Readiness Index. The factors are made orthogonal to the level of economic development by using the residuals of a regression on per capita GDP. The variables are the same as used in maps 2-7. Green indicates a significant (* 10%, ** 5%, ***1%) positive correlation, red a significant negative correlation, all others are not significant at the 5% level.

the regression results below demonstrate, scoring in the lowest 30 percent in terms of PISA score, broadband connections and R&D expenditures has some power to explain low levels of export specialisation. That is, a high score in any one or two of the factors can be entirely offset by being among the under-performers when it comes to the third factor.

Hence, resolving infrastructure, education or regulatory issues individually might have limited impact on the growth potential of high-tech industries. For example, the net benefit of additional infrastructure spending might be negative if regulatory issues prevent infrastructure prices from dropping. Other sectors illustrate further these complementarities: opening markets without creating a framework that accommodates domestic investment might risk shifting activity to more productive offshore locations. To give a specific example, improving access to the Greek electricity market, while at the same time maintaining the inefficient *de-facto* state monopoly, might result in higher electricity imports.

Table 4: The importance of complementarity

	Share of high-tech exports as % of total exports
Constant	-2.21***
Broadband access	0.321***
Pisa score	-0.117***
Intramural R&D as % of GDP	-1.16**
Being among the last 30% in one of the categories	-5.42***

Source: Bruegel. Note: We control the variables for per capita GDP, *** at the 1 % confidence level, ** at the 5% confidence level, N=93, R^2=47%.

Furthermore, the potential (feedback-) effect of sectoral success on the factors that underlie the sector's success is likely to reinforce specialisation patterns. If a successful sector promises better job prospects and higher wages, it attracts more students into corresponding education. Similarly, governments will more willingly invest in sector-specific education, infrastructure, regulatory reform or research if a successful sector can translate these efforts into instantaneous economic growth and jobs.

This leads to the timing issue. Most public investment and reform has a substantial upfront cost that only pays off in the long term. Sometimes the public has to invest for a long time in specific factors before a level is reached that allows a new sector to flourish – education systems being a classic example.

As a consequence of the above-described effects, a large number of reforms and public investments in structural factors might appear to offer little benefit for a policymaker faced with the urgent requirements of the economic and fiscal crisis.

DISCUSSION

The example of the high-tech sector demonstrates that sectoral success and the presence of corresponding structural factors coincide. It is, in fact, sensible to assume that structural factors form the basis for sectoral success. In the following we will discuss what it would take for governments to engineer sectoral success. We start by discussing the implications of the complementarity of different public investments.

Then we address the interaction between reforms and public investment. Finally, we discuss the thorny issue of targeting sectors.

Dealing with complementarities

To engineer sectoral success, public investment is obviously best employed when it is targeted to individual shortcomings that are holding back the entire sector. As discussed, the factors underpinning the success of a specific sector are often complementary. Hence, addressing individual shortcomings might not be beneficial if other barriers persist. In the high-tech example, it might for example not be enough to improve the broadband communication infrastructure. Without investment in the quality and length of education, in addition to targeted support to R&D, the cost of a massive broadband infrastructure deployment might surpass its economic benefits. Consequently, a holistic view needs to be taken of public investment[8]. At the same time, the concept of complementarity suggests that public funds used for investment in programmes that cannot become beneficial because of a lack of complementary factors might be employed more beneficially elsewhere.

Interaction of reforms and public investments

Deep structural reforms are necessary to restore the foundations for growth in Greece, as well as in Spain, Portugal, and Italy (see Table 1). But, the most important structural reforms are characterised by upfront costs that only pay dividends in the medium to long term (eg education system, pension system, labour market). Implementing such reforms without a commitment to conduct the necessary upfront public investment significantly challenges their prospects of success. In addition, some essential structural reforms might only become politically feasible if losers can be compensated to some degree. Consequently, a key criterion for public investment is if it supports necessary structural reforms. This entails two consequences. First, even the most cash-strapped public administrations might consider prioritising some funds for supporting reforms. This would not only hold for regional or national budgets. The EU might also focus its structural and regional funds on supporting reform efforts.

Second, certain public investment cannot deliver because the institutional framework is insufficient and corresponding reforms might not be easily implemented (ie if the first consequence is unfeasible). Expenditures in corresponding sectors – even though they are often highly politically contagious such as spending on declining incumbent industries – should be assiduously scrutinised.

Targeting sectors?

The costs and benefits of resolving such barriers differ between sectors and regions. To follow-up on the high-tech example, it might well be that certain countries lack so many of the underpinnings for a high-tech driven growth model, that the financial and political capital required to remove the shortcomings in the high-tech sector would be better employed in another area. This leaves policymakers with the tough choice of which sectors (and sometimes also regions) to support with the scarce available funds. Implementing the simple economic rule that the sectors should be supported where additional funding has the highest benefit is difficult to implement, as these benefits are contingent on many factors: becoming competitive in sectors with fierce international competition is difficult (eg photovoltaic panels), supporting sectors with limited growth potential might be a dead-end (eg rotary printing presses), supporting sectors that feature a concentrated market structure and focus on the domestic market risks translating into higher rents for producers instead of higher competitiveness of the sector (eg retail) and focusing on existing sectors risks exposing the country even more to sectoral shocks (eg the forestry industry in Finland in the 1990s). The cost of engendering the success of a specific sector is contingent on how difficult it is for a country to develop competitive strength in that sector. This again depends on the presence of complementary factors and how costly it is to address the identified shortcomings.

Hidalgo *et al* (2007) provide an interesting approximation to the cost of making a sector competitive. They use the correlation of export competitiveness between different sectors as one indicator to identify which sectors in a country

8. Thereby, it might prove helpful that public investment can be very narrowly targeted to different themes (eg R&D, infrastructure or education), regions and sectors (eg high-tech, services, industry). Consequently, comprehensive packages for regional and sectoral development that built on existing strength could be engineered.

might become competitive. They claim that countries might become competitive in sectors that are under-developed but 'close' to sectors already present in the country under consideration. To measure the 'closeness' of the sectors, they analyse on a global scale the co-location of sectors in countries. For example, countries exporting semi-conductors are typically found to be also exporting photovoltaic cells (see Huberty and Zachmann, 2011). Hence, a country that is successful in exporting semi-conductors, but not yet in exporting photovoltaic cells, might be more easily able to generate export competitiveness in the latter than other countries. For Greece, for example, Hausmann (2011) identifies the main product markets, which are agriculture (milk products, dried fruits, vegetables, tobacco, wheat, cotton, olive oil); metals (aluminium, copper, ferro-alloys, cutlery); textiles and garments; construction materials (cements, bars, pipes); and chemicals (medicines, cosmetics, petrochemicals). Hausmann (2011) suggests moving towards 'nearby' products that fulfil four criteria: First, how easy would it be to become 'good' at the product; second, what is the potential gain from producing it; third, how sophisticated is the product; and last, how strategic is the product – namely, how will it improve the firm's (or country's) position?

This indicates that targeting sectors to overcome barriers by implementing reforms and public investments is a complex strategic exercise[9]. But skipping the strategic choice step and returning to a disbursement of public investment based on historic sector strength and lobbying power is no option. Without strategic direction it might make sense to completely omit public 'investment in growth' programmes. Finally, independent *ex-post* evaluation of the choice is essential to learn for the future and to decide on the continuation of existing programmes.

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9. Furthermore, the sectoral advantages might change over time. The highly praised Finnish exports in 'electronics – telecommunication', for example, dropped by about 75 percent from €9.3 billion in 2007 to €2.5 billion in 2011.