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**ESTONIA: MAKING THE MOST OF GLOBALISATION**

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**By Robert Price and Andreas Wörgötter**

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## ABSTRACT/RÉSUMÉ

### **Estonia: Making the most of globalisation**

Estonia has already experienced many benefits of increasing international integration, most obviously in significant convergence. From the Russian crisis in 1998 to the great recession in 2009 Estonia gained an impressive 20% in GDP per capita relative to the EU27 average in PPPs. Like the other Baltic economies, however, a considerable part of earlier convergence gains was lost in the crisis, the impact of which was aggravated by the collapse of world trade. While this was also true for Ireland, central European countries in the process of catching up, like Czech Republic, Poland and Slovakia, have been less affected by the crisis and have been able to maintain most of their convergence gains. Moreover, prior to the recession Estonia's gap in income and productivity levels compared with the EU average was still around 30% and as the country emerges from recession it faces major policy challenges to regain its pre-crisis rate of growth potential. A greater focus on closing the productivity gap in the manufacturing-for-export sector compared with other transition countries would serve as a useful and challenging benchmark in order to get more out of globalisation.

This paper relates to the *2011 Economic Survey of Estonia* ([www.oecd.org/eco/surveys/estonia](http://www.oecd.org/eco/surveys/estonia)).

*JEL Classification:* F14; F23

*Keywords:* Estonia; globalisation; convergence; productivity; export performance; enterprise; periphery; FDI; competition; innovation; education

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### **Estonie : Tirer le meilleur parti de la mondialisation**

L'Estonie a déjà tiré grand profit du renforcement de son intégration internationale, et notamment des résultats probants obtenus en matière de convergence. Entre la crise russe de 1998 et la profonde récession de 2009, le pays a amélioré de quelque 20 % - chiffre impressionnant - sa position relative, en PPA, par rapport au PIB moyen par habitant de l'UE27. Mais comme dans les autres pays baltes, une grande part des gains antérieurs liés à la convergence a fondu avec la crise, elle-même aggravée par l'effondrement du commerce mondial. Si l'Irlande a connu le même sort, des pays d'Europe centrale en plein rattrapage tels que la Pologne, la République tchèque et la République slovaque ont été moins touchés par la crise et ont pu préserver la majeure partie de leurs gains de convergence. Toutefois, l'écart entre les niveaux moyens de revenu et de productivité communautaires et estoniens avoisinait encore 30 % avant la récession ; au moment où l'Estonie sort de la crise, les pouvoirs publics se heurtent donc à des défis de taille pour maintenir le taux de croissance potentielle enregistré avant la récession. Dans la perspective de mieux exploiter la mondialisation, l'accent mis par d'autres pays en transition sur la résorption du déficit de productivité dans le secteur manufacturier exportateur pourra servir de point de repère intéressant.

Ce document se rapporte à l'*Étude économique de l'Estonie 2011* ([www.oecd.org/eco/etudes/estonie](http://www.oecd.org/eco/etudes/estonie)).

*Classification JEL:* F14; F23

*Mots clés:* Estonie; mondialisation; convergence; productivité; performance des exportations; entreprises; périphérie; IDE; concurrence; innovation; éducation

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## ESTONIA: MAKING THE MOST OF GLOBALISATION

By Robert Price and Andreas Wörgötter<sup>1</sup>

Even after the crisis a considerable amount of growth momentum undoubtedly still exists in Estonia. But past growth was associated with imbalances, and estimates of sustainable growth potential growth may have to be revised down in the aftermath of the financial crisis.<sup>1</sup> Against that background, this paper looks at the policy conditions needed to re-attain, or even accelerate, sustainable convergence by making more out of globalisation. Much of the policy groundwork has already been established in the context of post-independence and pre-EU accession reforms, which have established an economic framework based on market openness and a business-friendly regulatory regime. The focus is on how Estonia can profit from the ongoing process of globalisation to accelerate the process of convergence and bind Estonia to the “core” (Table 1).

**Table 1. Estonian GDP per capita convergence (EU27 = 100)**

	1998	2000	2007	2008	2009	1998-2009	2007-09
EU (15 countries)	115	115	112	111	111	-4	-1
Euro area (16 countries)	113	112	109	108	108	-5	-1
<b>Estonia</b>	<b>42</b>	<b>45</b>	<b>69</b>	<b>67</b>	<b>62</b>	<b>20</b>	<b>-7</b>
Ireland	121	131	148	135	131	10	-17
Latvia	36	37	56	57	49	13	-7
Lithuania	40	39	59	62	53	13	-6
Hungary	54	55	63	64	63	9	0
Poland	48	48	54	56	61	13	7
Slovenia	79	80	89	91	86	7	-3
Slovakia	52	50	68	72	72	20	4

Source: Eurostat, <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsieb010>.

Growth prior to the crisis was driven by debt-financed expansion of domestic demand, which was associated with unsustainable external and internal imbalances. The crisis leaves a legacy which makes it impossible for the economy to grow using the same pattern as in the past. Obstacles also remain in the form of the remote geographical position and the small size of the country and its enterprises. Future growth will need to be driven much more by knowledge and innovation processes in order to close the still sizeable productivity gap. Globalisation should turn out to be a powerful instrument in this respect, provided the right policies are applied.

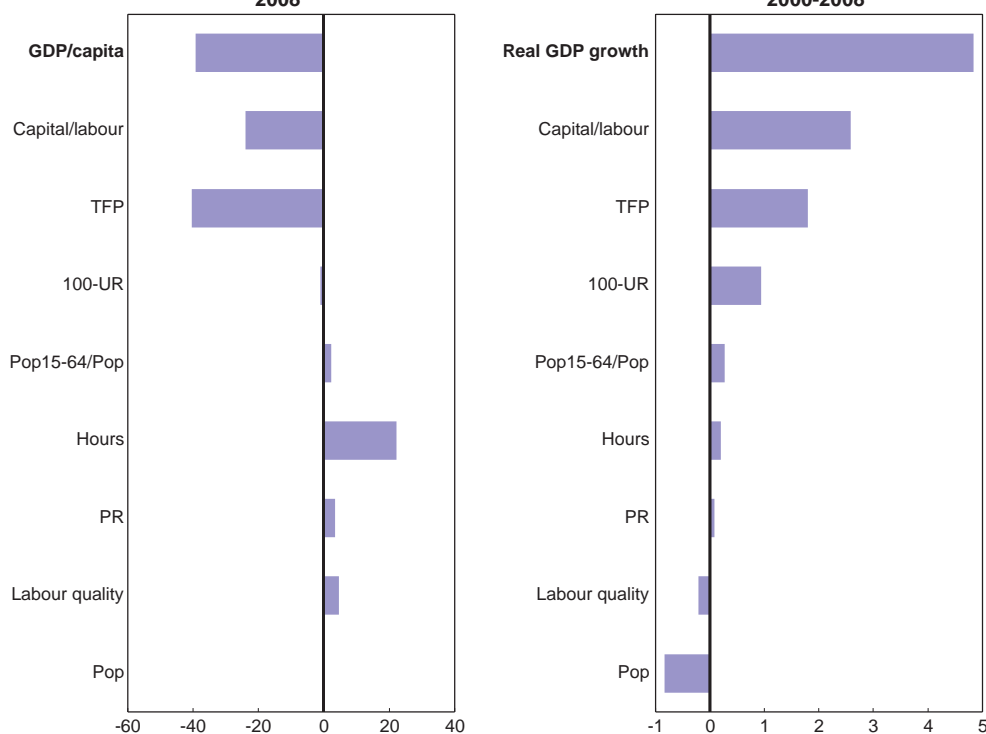
1. This paper is a slightly revised version of Chapter 4 of the *OECD Economic Survey of Estonia* ([www.oecd.org/eco/surveys/estonia](http://www.oecd.org/eco/surveys/estonia)) published in April 2011 under the authority of the Economic and Development Review Committee. The authors thank OECD staff members Andrew Dean, Robert Ford and Zuzana Smidova for valuable comments. Research assistance was provided by Margaret Morgan.

## Characteristics and dynamics of Estonian convergence

### *Convergence was driven by rapid productivity gains ...*

The Estonian potential growth rate is estimated to have been around 6% over the period 1997-2009, rising to more than 8% between 2003 and 2006 during the EU accession and credit loosening periods (Kattai, 2010). Capital inputs and technical progress (TFP) were the principal drivers of this outcome, making relatively equal contributions, with changes in demographics and labour utilisation contributing to a much smaller degree on average (EU, 2006; OECD, 2009b). Figure 1 looks at Estonian output performance, in level and growth terms, as it was in 2006 prior to the slowdown, in comparison with the EU (EESTI, 2008). The main determinants of the differences in GDP levels between Estonia and the EU15 have been low capital/labour ratios and total factor productivity (TFP). However, both factors feature positively in Estonia's superior growth rate, indicating convergence. Demographic factors (resident population, birth rate and size of the working age population)<sup>2</sup> and labour market factors (the number of

**Figure 1. Components of GDP per capita and real GDP growth, Estonia and EU**  
 Estonia-EU15 gap, % 2008  
 Estonia-EU15 growth difference, % 2000-2008



*Note:* The gap is calculated as  $100(EST - EU15)/EU15$  using GDP in current prices. Component estimates are derived from a Cobb-Douglas production function,  $GDP = [TFP][(E)(H)(Q_L)]^a K^{(1-a)}$  which can be transformed into  $GDP/POP = [K/((E)(H))]^{(1-a)} [TFP][1 - UR][POP\ 15-64/POP][H][PR][Q_L]^a$  or the equivalent equation for GDP with POP as a component. POP is total population, capital/labour is  $[K/((E)(H))]^{(1-a)}$ , K is the stock of capital, E is total employment, H is annual hours worked per person employed, a is the share of labour in total value added, TFP is total factor productivity (the Solow residual), UR is the unemployment rate (unemployed/labour force), POP 15-64 is population aged 15 to 64 years, PR is the participation rate 100 (labour force/pop 15-64) and  $[Q_L]^a$  is labour quality which is estimated as a function of employment and wage by skill level. Components of the gap are not additive but those for the growth differences are. Details of the methodology are in the Source.

*Source:* "What explains the differences in income and labour utilisation and drives labour and economic growth in Europe? A GDP accounting perspective European Economy", *Economic Papers*, No. 354, January 2009, Brussels and the related *LAF Database*, available at [http://ec.europa.eu/economy\\_finance/db\\_indicators/laf/index\\_en.htm](http://ec.europa.eu/economy_finance/db_indicators/laf/index_en.htm).

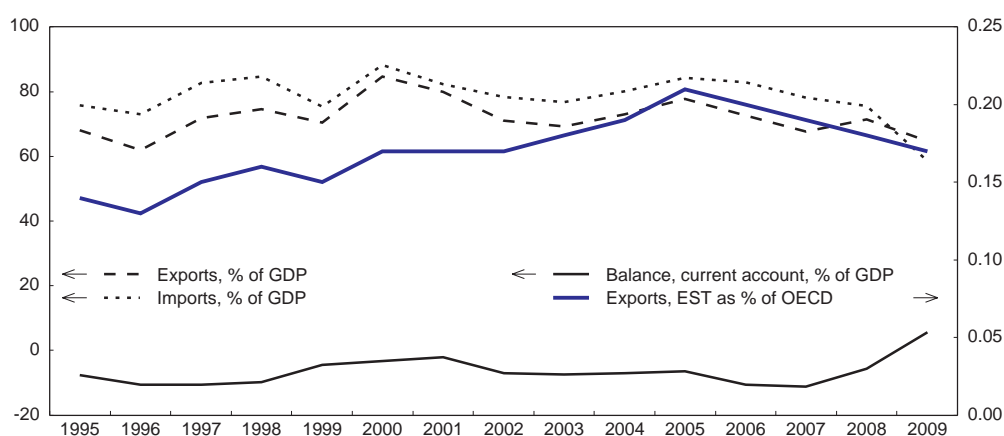
work hours per worker, unemployment and employment rates) have played a much smaller, though on average positive, role in the convergence process. This picture is confirmed by a decomposition of Estonia's per capita GDP gap compared with the top half of OECD countries, which is wholly due to lower labour productivity while labour force participation is above average (OECD, 2011).

***... which may be more difficult to achieve in the post-crisis environment***

Underlying trends on the supply side still favour relatively rapid convergence, but a high potential growth rate will not be restored automatically as a replacement for unsustainable domestic demand expansion. The decrease in the birth rate in the 1990s has not yet influenced the working age population, but will do so in the coming years, hence reducing the demographic contribution to growth. Significant increases in the level of labour utilisation are unlikely. On the contrary, there is the risk of increasing long term unemployment (see OECD, 2011b, Chapter 1). There is scope and need for further capital deepening. But in the short-term, the impulse from investment will be smaller: investments made in the boom phase were tilted towards specific sectors, such as construction and real estate, and the capital stock generated and the technology brought in will not necessarily match the new demand structure.<sup>3</sup> After the crisis financial markets are unlikely to finance similarly large current account deficits as before, so a larger export sector will be required with different skill requirements. And in the longer run, the convergence process will bring diminishing returns, so convergence in per capita incomes will increasingly depend on total factor productivity growth rather than factor accumulation. Within sectors productivity differentials with the EU average are still substantial, particularly in services, so the scope for further TFP growth above the EU average is there. But the extent to which this is exploited will also depend on the policies in place.

***Internationalisation started with exports but then led to foreign-debt growth***

**Figure 2. Trade in goods and services**

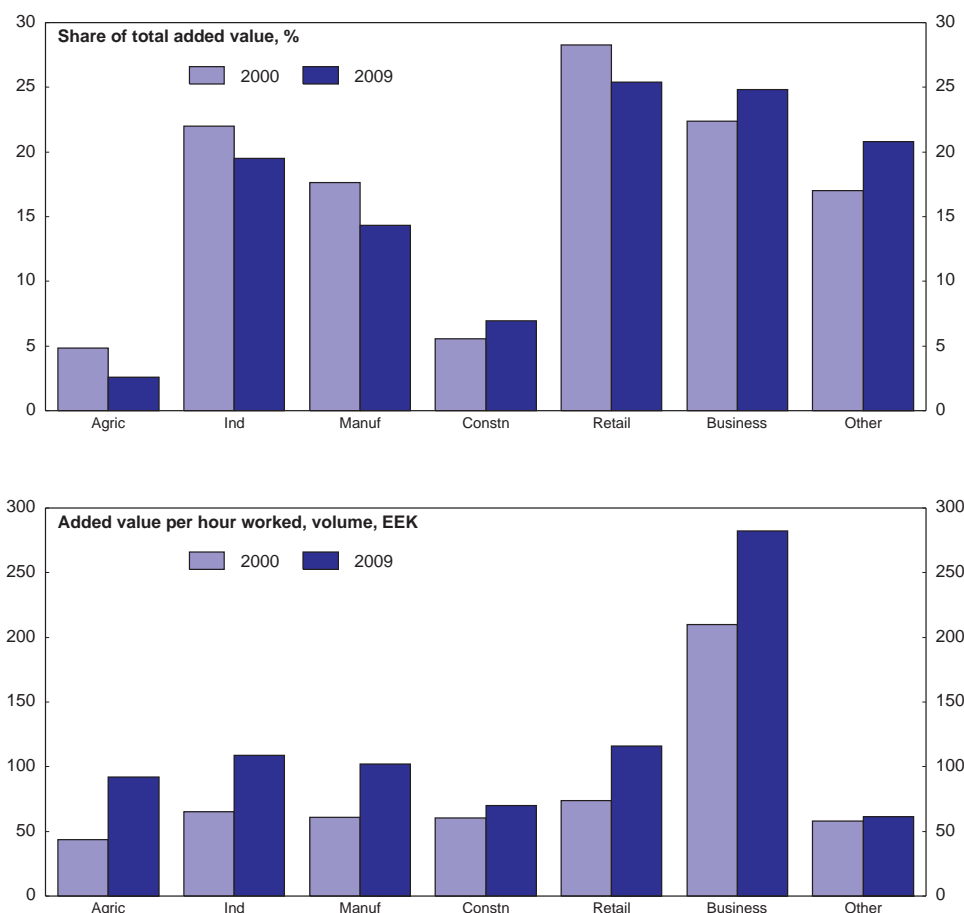


Source: Bank of Estonia; OECD, *National Accounts Database*.

The internationalisation of the economy took off immediately after regaining independence and was the essential spur to growth in the nineties, with the export share moving up sharply to reach a peak of over 80% of GDP at the beginning of the century, since when it underwent a trend decline to around 70% (Figure 2), before increasing again in 2010 with a recovery of world trade. The ratio of Estonian exports relative to OECD exports reached its peak in 2005 and has fallen back about 20% since then. The Russian crisis in 1998 forced an accelerated re-orientation of Estonian export markets from East to West, with long term beneficial effects induced by entering high income markets. This process generated a better division of labour, which has helped to close the gap between the added value and productivity per person created

by Estonian enterprises compared with the European Union average, which decreased by approximately 20 percentage points over the first seven years of the 2000s. However, the contribution of manufacturing to GDP growth was smaller than that of real estate, renting and business activities. In terms of growth of productivity per employee, the contribution of the manufacturing sector was also behind that of wholesale and retail trade; electricity, gas and water supply, and mining and quarrying (Figure 3). The convergence process prior to the recent downturn was thus fuelled to a large extent by domestic drivers.<sup>4</sup>

**Figure 3. Added value created and labour productivity**



Note: Added value classified by NACE Rev. 1.1:

Note: Added value classified by NACE Rev. 1.1:

Agric Agriculture, hunting, forestry and fisheries

Ind Industry including energy

Manuf Manufacturing

Retail Trade, hotels, restaurant, transport

Business Financial, real estate, renting and bus

Other Other services.

Source: OECD, *National Accounts Database*.

Globalisation played a role here, via FDI-facilitated privatisation activity and financial sector deepening, to which the traditional export channels were of secondary importance (EDF, 2008). However, loan-financed domestic consumption and residential investment increases have turned out not to be sustainable, so that this particular global growth model is one that cannot be relied on in future because of the imbalances created.



***Export performance has been based on factor endowments...***

The vulnerability of Estonia's gains from globalisation can be seen from the export side, insofar as the process of internationalisation has been essentially driven by existing factor endowments and the advantages for enterprises to divide the production chain and engage in vertical specialisation (EU, 2006). In that respect, the extent of specialisation has been constrained by 'gravity' factors, in that Estonian trade levels and patterns have been restored to what they should have been, given its size, state of development, the peripheral degree of integration into core EU markets and its historical and geographical ties to the Baltic Sea region (Paas and Tafenu, 2005).<sup>5</sup> As pre-transition trade with the EU was much smaller than the potential trade level predicted by a gravity model, the adjustment to "normal" trade patterns took place at high speed, which may have had some adverse consequences for the corresponding production structures. Trade has expanded principally with its closest neighbours, Finland and Sweden, the other two Baltic states and it recently also recovered with the nearest CIS countries. Trade with the more removed countries of the euro area fell as a proportion of Estonian exports (Figure 4). In concentrating on the production of cheaper and simpler products or the sale of natural resources to near-neighbours, the country can be described as still on Europe's periphery (Estonian Ministry of the Environment, 2005).

Compared with other central European economies Estonia was gaining less market share during the whole 2000s (Table 2). An initial boost in export market shares ahead of EU accession in 2004 was followed by smaller increases in the boom years afterwards, while Poland, Czech Republic and Slovakia were more successful maintaining export momentum.

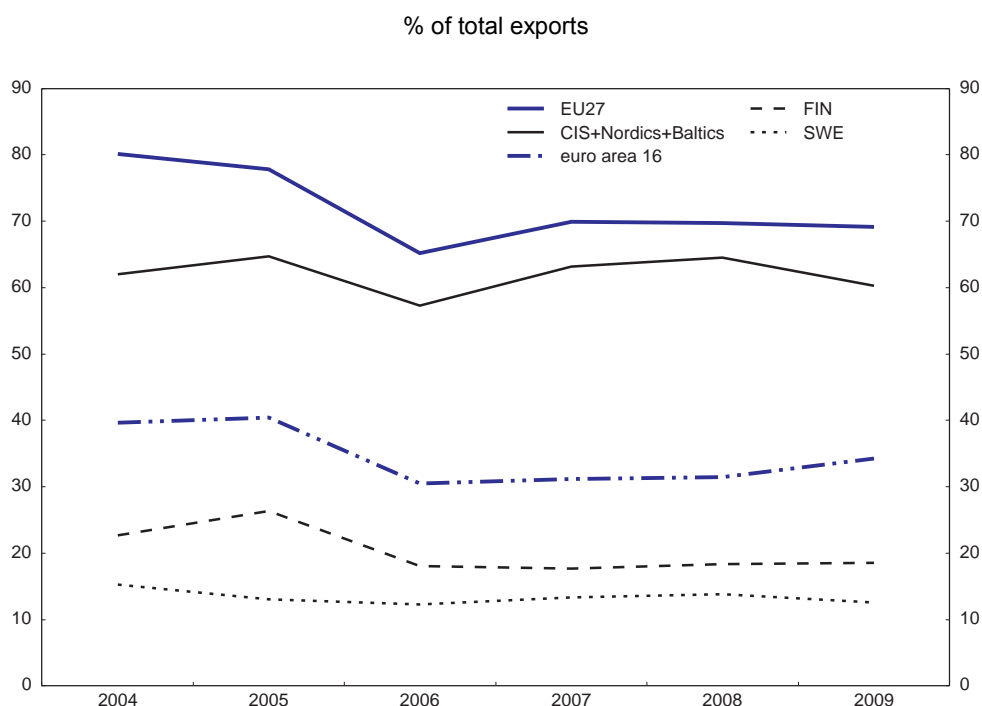
**Table 2. Export market share for selected countries: 2000-09**

Year	Estonia	Czech Republic	Slovak Republic	Hungary	Poland	Slovenia
2000	0.061	0.456	0.182	0.438	0.584	0.136
2001	0.065	0.529	0.200	0.495	0.669	0.148
2002	0.065	0.570	0.219	0.526	0.709	0.160
2003	0.074	0.613	0.273	0.554	0.784	0.170
2004	0.079	0.686	0.281	0.578	0.850	0.175
2005	0.085	0.706	0.287	0.572	0.888	0.174
2006	0.084	0.752	0.326	0.599	0.949	0.178
2007	0.087	0.832	0.388	0.662	1.039	0.195
2008	0.087	0.864	0.407	0.660	1.104	0.191
2009	0.081	0.863%	0.404	0.654	1.099	0.186

Source: OECD, OECD National Accounts Database via ADB.

Regional integration trends reveal a clear distinction between the pattern of Estonian trade development and that required for integration within the EU15. The existing special relationships between countries of the region have favoured the rapid integration of economies with different factor endowments, based on specialisation in (low cost) labour-intensive goods in post-socialist countries and capital-intensive goods in the developed countries of the region. Under conditions of increasing mobility of labour and capital, there will be a significant pressure on these specialisation patterns in both new and old member states. The Baltic Sea Region (BSR) countries now face new challenges to develop more knowledge intensive intra-industry trade and horizontal integration in order to improve national and regional competitiveness in the European and global context.

Figure 4. Goods exports by destination



Note: See Glossary for members of country groups.

Source: Statistics Estonia.

### ... generating lower value added per capita than intra-industry trade

In aggregate terms, the composition of Estonian exports mirrors that of OECD international trade in terms of the balance between intermediate and final goods (Table 3): intermediate goods represent 56% of OECD goods exports while the Estonian proportion is lower with 50% (Miroudot *et al.*, 2009).<sup>6</sup> The proportions of capital goods (around 20%) and consumer goods (just over 20%) are not much different from the OECD average. Concentration on intermediate trade is not necessarily a weakness, since there is evidence that higher trade flows of intermediates leads to the incorporation of more productive foreign technology into domestic production, as well as having a positive effect on domestic efficiency *per se* (Miroudot, *op. cit.*). However, the type of intermediate trade in which Estonia is involved may not be the most favourable to growth: intra-industry trade, which is driven by product differentiation and economies of scale, makes up the major share of trade among developed countries and is among the most frequently used value-added indicators of foreign trade.<sup>7</sup>

The share of horizontal intra-industry trade in Estonian exports is indeed slowly increasing. Toming (2006) for instance, focuses on the milk, meat and fish industries, concluding that in general, foodstuffs exports to the EU15 have increased, but only the milk-processing industry has experienced a shift towards higher value-added consumer products. The Estonian food industry requires further investments in product development and quality, as well as in larger production volumes to reap the benefits of the EU market. But inter-industry trade and vertical intra-industry trade still make up a higher share of Estonian trade than most other transition economies (Rojec and Ferjančič, 2006; Fidrmuc *et al.*, 1999).

It would appear that Estonia has been less successful in switching resources to higher-quality segments of the technologically advanced trade sectors. Dulleck *et al.* (2004) consider three dimensions of quality upgrading: shifts in export structure from low to high technology industries; shifts inside industries from low to high quality segments (defined by product category), and quality improvements within industries inside quality segments, defined by high unit values, which are equated with high value added. Countries find themselves in a “low-quality trap” if they specialise in low technology industries, or in low-quality segments within industries, or if they experience negative trends in unit values or unit value ratios. Some evidence of a “low-quality trap” can be found for the Baltic countries with respect to low end specialisation within industries.

**Table 3. Composition of trade: intermediate and final goods, 2006**

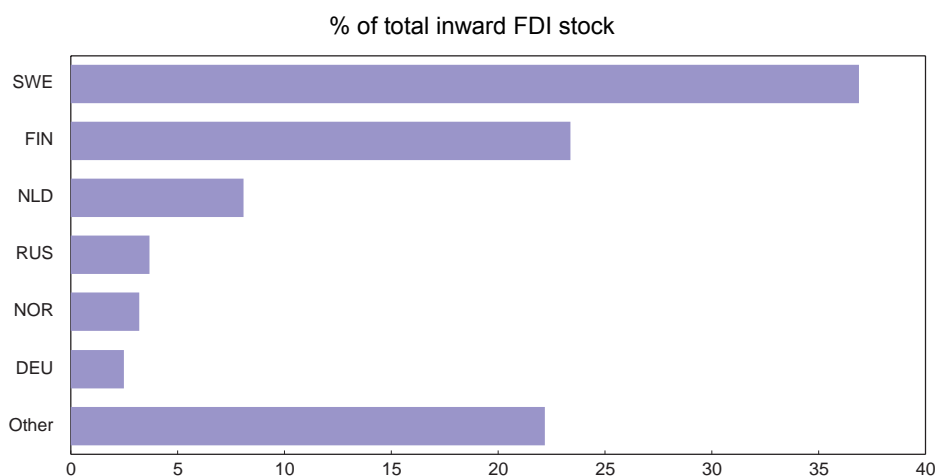
	Total USD million	Intermediate (%)	Consumption (%)	Capital (%)	Ratio of services to manufacturing exports in %	Intermediate to goods (%)	Final (%)
Estonia	10 224	51	21	20	21.2	87	13
OECD	7 702 219	56	21	17	22.9	73	27
Finland	63 488	59	18	17	23.9	79	21
Sweden	116 217	55	23	17	28.0	91	9
United Kingdom	506 111	47	27	19	32.5	78	22
Ireland	67 783	50	24	20	80.3	95	5
Poland	115 211	63	16	18	12.5	66	34
Slovak Republic	42 378	64	15	18	7.2	83	17
Slovenia	20 408	60	19	16	14.0	70	30
Estonia-OECD		-5	0	3		14	-14

Source: Miroudot *et al.*, 2009.

Estonian exports have been found to have a relatively low value added, largely because they take the form of intermediate goods (see for example Tiits *et al.*, 2003 and 2006), based on inter-industry or vertical intra-industry trade. International research finds faster growth to be related to the composition of trade: a greater weight of technologically sophisticated goods in exports being more favourable (McCann, 2007). A more knowledge intensive and innovation driven export goods structure appears to allow for longer lasting income generation than an export structure, which relies on cost sensitive goods and services. This means that where cost advantage is the original driver of trade, such trade will diminish as part of the normal process of convergence. Lower-end specialisation is thus a weak basis on which to rely for future convergence, or at least implies the need for Estonia to make a transition to high-end specialisation in the process of convergence.

### ***Substantial FDI has not created economic resilience***

One of the primary features of Estonian international integration – as for globalisation in general - has been the growth and spread of multinational enterprises (MNEs). During the past 15 years Estonia has benefited more than most central and eastern European countries from inward investment. Companies partly or wholly owned by foreigners account for one-third of Estonian GDP and over 50% of exports. However, manufacturing accounts for only 14% of the FDI stock, concentrated in traditional industries like food processing, textiles and wood products (Table 4). One third of the stock of FDI is in financial intermediation and a further quarter is invested in real estate, renting and business activities. This pattern is in contrast to for instance the Czech Republic (Table 4) as well as other central European FDI locations, where foreign investors have focused increasingly on modern manufacturing sectors (*e.g.* office machinery, computers, telecommunication, cars). In terms of geographical provenance, Sweden and Finland are the main investors in Estonia (Figure 5) and the other Baltic states, whereas Germany is the largest investor in the new EU member states overall.

**Figure 5. FDI stock by country provenance, 30 June 2010**

Source: Bank of Estonia.

**Table 4. FDI stock by activities: Czech Republic and Estonia**

	Inward FDI positions by industry	
	Czech Republic	Estonia
	% of total, 2008	% of total, 2008
Manufacturing	35.1	13.7
Electricity, gas and water	7.9	2.8
Construction	0.9	3.0
Trade, accommodation and restaurants	9.7	12.6
Transports, storage and communication	6.9	4.9
Financial intermediation	19.5	36.1
Real estate, renting and business activities	15.8	24.9
Other	4.3	2.0
	100.0	100.0

Source: OECD DotStat, 1 October 2010.

Apart from its effect on capital deepening, FDI can provide technology spillovers to domestic manufacturing firms, together with other “knowledge effects” improving working methods and management skills.<sup>8</sup> In this regard, Estonia may not have benefited as much as might have been expected from existing FDI. As far as manufacturing investment is concerned, foreign-owned firms have, on average, higher labour productivity levels than domestic enterprises; however, firm-level labour productivity at the turn of the century tended to be lower where FDI was oriented towards exports (Vahter, 2004), indicating that export activity in foreign manufacturing firms is only exploiting cost advantages.<sup>9</sup> More recently Vahter (2010) finds no significant evidence of intra-industry productivity spillovers from FDI entry in the short term, though it does seem to stimulate process innovation among domestic Estonian firms.<sup>10</sup> While Masso *et al.* (2010) also find that foreign-owned companies and domestic multinationals have higher productivity than indigenous firms, performance is quite heterogeneous and productivity spillovers most often apply to effects on vertically-linked downstream or upstream industries and are rarely found horizontally, within the same industry.<sup>11</sup>

### ***Estonian inward direct investment is driven by cost advantages***

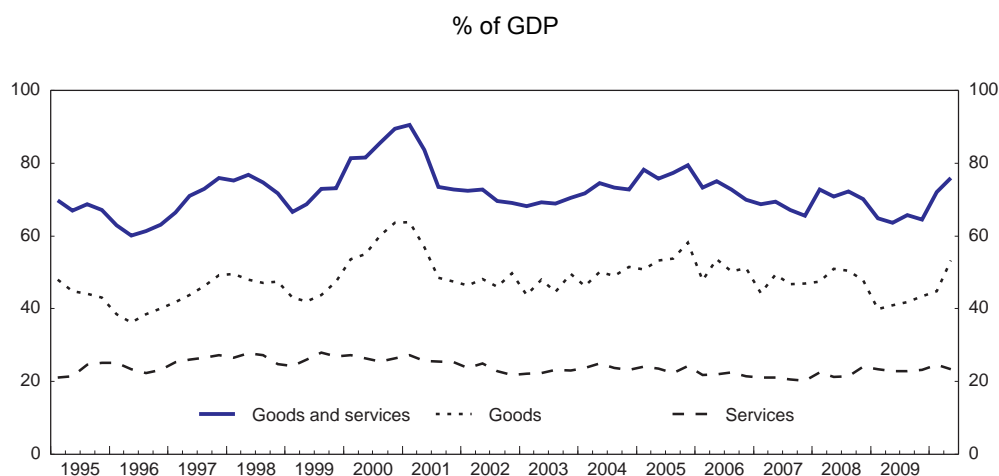
The specific industry and country orientation of Estonian inward FDI has been a factor behind the concerns about the low value added of Estonian exports, noted above. It appears that Estonia attracts manufacturing FDI due principally to lower costs compared to investors' home countries (Tiits *et al.*, 2003 and 2006). Some evidence on this is provided by research into Swedish and German MNEs (Becker *et al.*, 2005). The location choices and employment responses of both are driven by standard gravity factors such as host country GDP and geographical distance but, allowing for these, German MNEs tend to be attracted to countries with relatively abundant supplies of skilled labour, while there is no evidence of such skill tracing for Swedish MNEs. Indeed, Swedish and Finnish corporate reports suggest costs are the most important factors in determining inward direct investment (Kattel and Kalvet, 2006).

There is also some evidence that inward FDI may not have contributed much to the internationalisation of Estonian companies in the sense that they have mostly concentrated their activities on the Baltic markets or exported their production to the home market of the foreign parent (Reiljan, 2002). Foreign-owned enterprises were initially mainly interested in servicing the market of the Baltic states, later intensifying their activities in Finland, Sweden and other EU countries, but foreign direct investments into Estonia have mostly been of market-seeking nature. Conversely, the share of investors with other motives (for example, efficiency-seeking) has been rather low. Estonian foreign direct investments have been primarily oriented to geographically and economically close markets and foreign companies do not appear to have acted as "door-openers".

### ***The service sectors' contribution to growth needs enhancing***

While just over a quarter of employment is in manufacturing, the largest group of enterprises (around a third) is in the service sector. Globally, the manufacturing industry continues to be a major user of the output of the services sector as boundaries between products and services are becoming blurred and industrial companies "enrich" their products and value chains with services. With manufacturing shifting from developed industrial countries to lower-cost locations - a phenomenon which could affect Estonia in the future - manufacturers in developed industrial countries are focusing on developing and supplying services that add value to products and managing increasingly more complex production and supply chains. For example, the second highest sales contribution to the turnover of the Estonian ICT sector in recent years has been from telecommunication services, computer-related services, ICT equipment and computer manufacturing making up 31%. Exports make up a third of ICT sales, of which the services element is the fastest growing.<sup>12</sup> While no trend exists as yet for Estonian service exports to increase as a ratio of GDP, they have been less volatile than goods exports in the face of the global slowdown (Figure 6).

Furthermore, encouraging foreign presence in the services sectors can generate stronger positive productivity effects than manufacturing presence (Leshner and Miroudet, 2008).<sup>13</sup> Internationally, among sectors, computer and related activities, hotels and restaurants, construction, post and telecommunications and other business activities show strong FDI spillovers via backward linkages. In addition, FDI-related spillovers via forward linkages are found in wholesale and retail trade or other business activities. At the aggregate level, the research indicates that encouraging foreign presence in service sectors can generate strong positive direct and indirect effects in the economy, suggesting that service industries enjoy the strongest productivity-enhancing effects of FDI, particularly through downstream linkages. Direct evidence as to the effects on Estonian service sectors is unavailable. However, the share of innovative Estonian SMEs, especially in the service sector has been growing fast, albeit being concentrated almost wholly on employing new equipment (EESTI, 2009). The exports of innovative companies have been growing at a rate of 20-25% a year, albeit from a low base (CREST, 2007).

**Figure 6. Exports**

Source: OECD, *National Accounts Database*.

### ***Domestic SMEs are active in the internationalisation process***

While the sectoral distribution of productivity gains will have been due in part to industrial restructuring, including privatisation, to which capital inflows have contributed, the pattern of gains also points to the important role of small and medium-sized enterprises in the convergence process. A survey carried out by the European Commission found that the share of Estonian small and medium-sized enterprises (those having less than 250 employees) that export their goods and services is by far the highest among EU countries.<sup>14</sup> Nearly 40% of Estonian SMEs are involved in international co-operation activities such as direct foreign investments, technological co-operation and sub-contracting. Moreover, the foreign activities of locally-owned enterprises are in many cases more diversified than those that are foreign owned, suggesting that local firms tend to possess more extensive knowledge of different foreign markets, which might serve as a competitive advantage (Reiljan, 2002).

### ***Smaller companies are dynamic but also more fragile***

Institutions with more than 100 employees account for the most significant share in the Estonian economy, employing more than a third of the total workforce, creating about 40% of the corporate net value and accounting for the bulk of exports. Nevertheless, smaller enterprises have tended to be more dynamic, creating most new jobs and earning higher profits (Bank of Estonia, 2010). Companies of all sizes shared in the expansion of the boom years, but new micro-companies are the main reason for the rise in the number of companies. They have a higher ratio of profit to value added than larger ones. They do not seem to operate under the same price/wage constraints as more internationally exposed companies. This is an advantage, but can also create instability when macro-economic conditions fluctuate. Smaller enterprises also have less efficient stock management. These factors may help explain why the survival rate of Estonian companies is low: slightly more than half of Estonian micro-companies (57%) are still viable three years after registration, which indicates that a large number of new companies are liquidated within three years of their foundation (MEAC, 2008). Certainly, smallness is an impediment to internationalisation, purely from the cost point of view, so there may be problems in facilitating small company growth. But there may also be other institutional factors (capital markets, legal environment, entrepreneurial culture, and support structures for businesses) which have a large role to play in increasing the low survival rate.

### ***Emerging issues and challenges***

Against the background of a growth performance which has in many respects been impressive, a number of inferences arise about the future shape and strength of Estonian growth and the policy issues they generate:

- Convergence has been driven by forces of international trade integration, product-market liberalisation and an open capital account, based on static structural factors like traditional trade specialisation and “gravity” factors as well as unsustainable dynamic factors, like debt-financed real-estate and private consumption growth. This has been an overall advantageous and appealing stage in Estonia's development into a modern market economy, but it has latterly been impeded by the bust of the loan financed domestic demand-led expansion. Future growth will thus need to be based on a more stable macro environment and a more dynamic pattern of trade specialisation.
- Successful future convergence will require a transition to export performance based not only on cost advantages but also on differentiated products with a wider geographical scope. Manufacturing resources are not currently concentrated in areas where global trade patterns indicate that value added is greatest, or where employment is shielded from further “footloose” migration. At the same time, Estonia is still geographically restricted in its export patterns, displaying some of the characteristics of a peripheral economy. For the future there is therefore a need for resources to be reallocated to higher-value occupations.
- Entrepreneurship is an important factor in Estonian economic dynamism, but SMEs are subject to greater instabilities and impediments to growth than larger firms and face greater difficulties in engaging effectively in the process of internationalisation. At the same time, internationalisation extends beyond traditional goods trade and encompasses the service sectors of the economy, which have a major potential for achieving convergence. These sectors are actually the fastest growing but judging by value added per person there is an as yet untapped potential for contributing to convergence. They also offer greater potential for exports, inward direct investment and spillovers than is sometimes realised.
- FDI needs to be focused more on areas where technological spillovers are greatest. Sustained inward direct investment is needed in areas where productivity and innovation spillovers are greater than they seem to be at present. However, the degree to which internationalisation spills over into productivity growth depends on the absorptive capacity of the economy. Various prerequisites in terms of R&D and education (and skills) infrastructure are needed for technology to flow from foreign companies to domestic firms and for export expansion to develop towards greater product innovation.

### **Framework policies for reaping more benefits of globalisation**

#### ***Openness has been, and remains, an effective strategic approach***

Institutional convergence has been more rapid in the Baltic states, notably Estonia, than in the other EU NMEs, paving the way for institutionally dependent productivity gains. Hall and Jones (1999) attribute higher TFP levels *inter alia* to better institutions, the effects of which on productivity levels will be permanent. But the effects on potential growth could wear off (Van Ark, 1999), as many of the reforms needed to create functioning market economies and to meet the institutional and legal standards of EU membership are achieved. There is, nevertheless, a significant and positive correlation between the degree of trade openness and productivity growth performance. Frankel and Romer (1999) stress the role of openness to trade as the driver of TFP, though the direct links from the one to the other are difficult to

demonstrate because of the endogeneities between them. An open trade regime implies efficiency gains from exploiting economies of scale and comparative advantage, but in addition stronger competition induces greater knowledge transfers from foreign to domestic firms. Thus, a liberal trade regime and competitive market conditions can be seen as essential components of a policy designed to maximise the benefits of globalisation. In that context, Estonia scores relatively well.

### ***Barriers to trade and foreign investment are virtually absent***

Estonia ranks as a relatively open economy with an internationally very low prevalence of trade barriers and burden of customs procedures (WEF, 2009) and a virtual absence of regulatory barriers - reflecting an absence of non-tariff barriers and the prevalence of mutual recognition agreements or international harmonisation (OECD, 2009a). Similarly, Estonia scores better than the OECD average according to the OECD's PMR scale and the WEF's measure of the business impact of rules on FDI: there are no barriers in the form of general and sector-specific restrictions on foreign acquisition of public and private firms, obligatory screening procedures and operational controls for affiliates of foreign firms (such as nationality requirements for key personnel). However, restrictions remain in place for the acquisition of land in strategic areas by non-EU nationals.<sup>15</sup>

### ***The competition policy environment requires vigilance***

Taking a broader perspective on efficiency and competition – encompassing antitrust activities, market dominance, public procurement and network sector inefficiencies – Estonia emerges relatively well according to global institutional indexes (WEF, 2009). The primary rules of Estonian competition law were enacted in 2001. Estonian competition policy is generally in line with EU competition principles. However, the situation has required considerable vigilance in the face of a deteriorating economic climate in which the incentives for collusion or abuse of a dominant position have probably increased (Competition Authority, 2009). There are three areas of concern, focusing on whether the competition authority has enough resources to be reactive, but not enough to be proactive against competition abuses:

- The Competition Authority began operation as a merged authority during 2008,<sup>16</sup> as a result of which the personnel responsible for supervisory activities were significantly reduced. Priority has been given to the fight against hard core cartels and six criminal proceedings were initiated in 2008 to disclose cartels, operating in different economic sectors, but mostly concerning public procurement. In 2009 a leniency programme came into force, according to which a cartel member who is the first to inform the authorities will get immunity from punishment. According to global experience this is the most effective means of detection of cartels, but the situation will require monitoring.
- There is a significant increase of investigations against firms exploiting a dominant market position, focusing on waste management, water, telecommunications and the financial sector. Despite the significantly heavier workload per employee, the aim is to allow one year on average for administrative proceedings, which corresponds to the general practice in the EU. But since the number of proceedings increased significantly and the number of employees decreased, the key question will be whether the efficiency and speed of the supervision related workflow can be maintained.
- There may also be scope for disseminating the work of the Competition Authority more widely. The survey of small- and medium-size enterprises referred to above found that a large majority of small businesses (84%) has had no interaction or has no information about the activities of the Competition Authority.



### *There are competition challenges in the utilities and local authority sectors*

While competition in telecommunications is fierce, dealing with dominant utilities remains a challenge. Some important infrastructure services are provided by fully or partially state-owned companies or groups which effectively enjoy a monopoly. Selling stakes in some of those companies to strategic investors poses important challenges with respect to provision of infrastructure services which are important elements of competitiveness and locational attraction. The validity of such concerns should be regularly evaluated and remaining state-ownership in such companies be considered for privatisation if there are no clear reasons found which make state-ownership necessary.

The activities of local authorities are also of some concern insofar as some of their actions (such as granting sole rights) can adversely affect the competitive situation and have necessitated intervention by the Competition Authority. While a great part of the state's contracts are awarded as a result of public procurement, the National Audit Office has recently found that many companies founded by rural municipalities and cities have interpreted the Public Procurement Act as not applying to them and have failed to organise tenders for public procurements upon making purchases. This has resulted in a serious lack of transparency at the sub-central government level, including hospitals.

### *Barriers to entry are low*

As regards barriers to entrepreneurship and market entry in general, Estonia ranks as a relatively open economy with a favourable business environment, according to formal international comparisons (OECD, 2009; World Bank, 2009; and WEF, 2009). Decisions to start a business are determined by an array of factors, but the regulatory framework is an important element in market entry. In that respect, a survey of small- and medium size enterprises by the Ministry of Economic Affairs and Communication concluded that only 4% of all enterprises consider the regulatory environment in Estonia as hindering competition. The degree of regulatory and administrative opacity facing new entrants (licences, permits, simplicity of procedures) has significantly decreased over the past half decade (as in a number of other OECD economies) and Estonia performs better than the OECD average in terms of the World Bank's index of ease of market entry, both as regards time spent starting a business and completing the formalities for warehouse construction (Table 5). Nevertheless, comparing the situation with Estonia's larger neighbours, Finland and Sweden, scope would seem to exist for further improvement. In particular, OECD PMR indicators show a slightly higher than average level of administrative burdens on sole proprietor start-ups.

**Table 5. Ease of market entry**

Region or economy	Starting a business			Min. capital (% of income per capita)	Completing construction formalities <sup>1</sup>		
	Procedures (number)	Time (days)	Cost (% of income per capita)		Procedures (number)	Time (days)	Cost (% of income per capita)
OECD	5.7	13	4.7	15.5	15.1	157	56.1
<b>Estonia</b>	<b>5</b>	<b>7</b>	<b>1.7</b>	<b>23.2</b>	<b>14</b>	<b>118</b>	<b>26.9</b>
Finland	3	14	0.9	7.2	18	38	119.7
France	5	7	0.9	0	13	137	22.9
Germany	9	18	4.7	0	12	100	60.2
Latvia	5	16	2.1	14.2	25	187	17.3
Lithuania	7	26	2.4	31.1	17	162	95.7
Netherlands	6	10	5.6	49.4	18	230	107.2
Slovakia	6	16	2	23.8	13	287	13.6
Slovenia	3	6	0	43.3	14	197	79.9
Sweden	3	15	0.6	28.5	8	116	103.3

1. Time, and costs to build a warehouse, including obtaining necessary licenses and permits, completing required notifications and inspections, and obtaining utility connections.

Source: World Bank (2009).

### ***The administrative burden on firms is lighter than average***

Steps have been taken to create a favourable legal environment with a relatively low level of bureaucracy and high level of transparency,<sup>17</sup> and current assessments are that the burden of regulation is internationally low. Estonia ranks 16<sup>th</sup> in the World Bank rating on the ease of doing business (WB, 2009). Moreover, the regulatory impact assessment (RIA) system (in operation since 1996) is functioning more effectively in Estonia than in other new member economies (Staronová, 2010; and Jacobs, 2006).<sup>18</sup> Impact statements are attached to the explanatory memoranda of all proposals, while implementation measures are systematically discussed. Estonia also scores highly on the quality of information regarding public consultations and predicted impacts, where it both identifies and directly consults affected parties. As in other countries, options in Estonia are not discussed, however, because formal guidelines do not ask for this, while *ex post* evaluation measures are not formally required. The more effective implementation of RIA is due in large measure to the role of the State Chancellery, which exercises a strong executive oversight over line ministries. As elsewhere, however, RIA does not encompass systematic reviews of established regulations.

While the overall assessment is favourable, specific areas of state regulation may still be problematic. Two-fifths of entrepreneurs see legislation and bureaucracy as a significant obstacle to development (MEAC, 2008). As regards the complex administrative procedures related to establishing a company, particularly excessive notarisation of legal deeds, the World Bank ranks Estonia as the weakest among 155 countries. The action plan drawn up by the Ministry of Justice aims to tackle problems of still excessive red tape in this area, *inter alia* by reforms to company law: simplifying the setting up of a business and communication with government institutions (by creating a one-stop-shop), simplifying regulation of the fields of activity with special requirements and making regulations more transparent, improving access to high-quality legal aid (including the availability of the services of the notary public) and making government fees and charges cost-based.

### ***Developing a favourable entrepreneurial environment***

While a favourable competition and regulatory environment fulfils one of the essential conditions for entrepreneurial development and firm creation, it may not be sufficient for an entrepreneurial climate to develop. Policies may need to actively support the development of an entrepreneurial culture, foster the international development of firms, improve SME access to funding and promote the conditions where domestic firms can absorb the technological benefits of globalisation. At the same time, it is important that state intervention does not turn into state aid, with respect to which Estonia's position is favourable, or a strategy of "picking winners", the international track record for which is very poor. Implementation of Estonian industrial strategy has been in the hands of *Enterprise Estonia* since 2001 (Box 1).

### ***The entrepreneurial culture needs fostering***

To different degrees, all OECD countries have put a strong emphasis on entrepreneurial education (Mittelstadt and Cerri, 2005) and Estonia has also fostered an entrepreneurial culture. "Estonian Enterprise Policy 2007-13" includes strategic objectives for the development of entrepreneurship in Estonia. In order to develop the knowledge and skills of business operators, the training, in-service training and retraining of business managers and employees and the involvement of external consultants have been supported since 2001. A mentor programme was launched in 2004 enabling start-up enterprises to find supervisors among experienced business operators or experts in their particular field of activity. Management quality is also being developed involving the training of top and middle managers, the distribution of novel administrative principles, the guidance of small and medium-sized enterprises towards management involving greater awareness and the elaboration of tools necessary for the systematic development of management quality. In 2005-07, innovation audits were carried out in Estonian enterprises with the help of *Enterprise Estonia*

aiming at raising the innovation awareness of the managers of the enterprises and motivating them to initiate, support and realise innovative activities in their companies. The feedback received is being employed to develop a basic diagnostics service for enterprises.

### **Box 1. Implementing Estonian industrial strategy**

The reorientation of entrepreneurship and SME policies in the early 2000s was accompanied by significant “institution building” in OECD economies (Mittelstadt and Cerri, 2005). In the case of Estonia, the principal institution for implementing entrepreneurial policies has been *Enterprise Estonia*.

#### **Mission and structure of *Enterprise Estonia***

*Enterprise Estonia* (EAS) was established in 2000 and promotes business and regional policy in Estonia. EAS is one of the largest institutions within the national support system for entrepreneurship, providing financial assistance, advisory, co-operation opportunities and training for the entrepreneurs, research establishments, public and third sector. *Enterprise Estonia* operates in the following sectors (in addition to tourism and regional development which are beyond the scope of this chapter):

- Sustainability and acceleration of growth of the new companies.
- Improvement of export and product development capability of Estonian companies.
- Encouragement of foreign direct investments.

Pursuant to the accession of Estonia with the European Union, *Enterprise Estonia* became an implementing unit of the structural funds of the European Union in Estonia. Most of the grants and other programmes are to be co-financed from the structural funds. In the financing period of the European Union of 2007-13 *Enterprise Estonia* can apply EEK 13 billion (EUR 830 million) out of the total of more than EEK 53 billion (EUR 3.4 billion) of structural assistance for Estonia. In September 2008, EAS was divided into 9 divisions: business start-up; business capacity; innovation; export; tourism development centre; internationalisation; living environment; business environment; and regional co-operation. For more information see [www.investinestonia.com/en/about-the-agency/enterprise-estonia](http://www.investinestonia.com/en/about-the-agency/enterprise-estonia).

#### **R&D, technology and innovation (RTDI) activities**

EAS is the implementing body for the technology and innovation measures of the Estonian National Development Plan through the sub-measures aiming at: 1) financing R&D and innovation; 2) strengthening innovation systems; 3) increasing awareness and knowledge about innovation; and 4) strengthening international co-operation in the field of R&D and innovation. The support schemes of *Enterprise Estonia* are targeted at increasing RTDI capacities in existing businesses and stimulating the creation and growth in new technology-based businesses, based on the principles worked out in the Estonian Research and Development Strategy “Knowledge-Based Estonia 2002-06” and *Estonian Research and Development and Innovation Strategy for 2007-13*, where the next priority research areas are stated: 1) user-friendly information technologies and development of the information society; 2) biomedicine; and 3) materials technologies.

No specific research priorities are established by *Enterprise Estonia* itself. Research priorities are: direct support of business R&D (grants and loans); horizontal measures in support of financing; research infrastructures; support to sectoral innovation in manufacturing; pre-competitive research; applied industrial research; knowledge transfer (between researchers); human resources development; and international research collaboration and networking.

### ***The internationalisation of firms needs to be supported because of the small size of the Estonian economy***

There is some dispute in the literature as to how far export activity is endogenous for highly productive firms. Arnold and Hussinger (2005) find that highly productive German firms chose to export, although export activity as such does not further boost productivity. This finding would suggest focusing entrepreneurial support on measures which increase productivity with no particular role for supporting

export activities. However, in the case of Estonia the small size of the economy should be taken into account. Assuming that the division of labour and specialisation progress in the same way in space as elsewhere, it can be assumed – and is indeed observed – that economic activity in small countries like Estonia needs to cross borders more often than in big economies. It is therefore likely that those transactions, which make a firm highly productive, will more likely involve global activities. If international activities are more costly on average than domestic activities then this constitutes an obstacle for especially still small firms to grow.

Purely from the cost point of view, smallness is a problem for firms seeking to expand internationally, so that there would seem to be much to gain from co-operation with respect to purchases (such as printing and paper procurement; metal and metal procurement) and from sharing entry costs into foreign markets. Pooled marketing costs and advertising, together with effective information dissemination would help, but require central initiatives. Co-operation among Estonian enterprises is now more frequent than in the European Union on average, but this is mainly in respect of suppliers and customers who are interested in semi-manufactured articles. The government aims to support entrepreneurs in the different phases of internationalisation, through the reduction of one-off sunk costs and reducing the risks of foreign operations. Various measures and activities are also directed towards supporting joint marketing, reflected, for example, in an export subsidy from *Enterprise Estonia* designed to promote such activities. Since a lack of export-related knowledge and skills is a problem for potential and new exporters, establishing support units for internationalisation and a counselling network to provide advice in the destination markets has also been a priority. *Enterprise Estonia* offers business operators a range of internationalisation-related information services.

The objective of enterprise support is that firms based in Estonia, including small firms, should become increasingly involved in international networks, assuming different functions there, including functions that will gradually become more complex and expensive (EESTI, 2008). The government will contribute to such networking through its support measures, making use of also the relevant opportunities provided by the EU. In part such networking will take place by mediation of the firms and institutions of the neighbouring country Finland.

Strategically, the official aim is to help in the formation of clusters in co-operation with professional associations and business representative organisations. The intensity of clusters in Estonia is still rather low and there has been no noticeable trend towards clustering. The National Strategic Reference Framework 2007-13 includes plans for the first central government initiated cluster programmes in Estonia. Identifying potential clusters and assisting in their development raises various problems, however. In principle, governments should concentrate on reinforcing and building on established and emerging clusters rather than attempt to create entirely new ones. This implies that the state should have policies for reinforcing different aspects of the clusters, such as R&D capabilities, infrastructure, market regulations, tax policies, standards or regulations that influence or determine buyers' needs, general societal environment supporting co-operation and networking, support for international competitiveness and so forth. It also means that the state should refrain from artificially creating clusters not corresponding to the local conditions and should be aimed at and implemented on the proper level of government policy-making capacities (Kettel *et al.*, 2006). Clusters are most often associated with rather highly developed countries or regions and the policy tools used in clustering discourse assume a relatively high level of education, R&D, private sector networking, and, above all, functioning and capable governance structures. Estonia is still moving towards achieving these conditions and may be too small for clusters that are comparable to the rest of the EU countries in size. The smallness of the economy is especially relevant with the view to the size of the possible pool of employment in a cluster area: in total employment terms only the fishing and fishing products cluster of Estonia (out of 38 clusters defined in Kettel, 2006) has an employment level that is comparable to the top 5 fishing and fishing products clusters in the EU10. In all other clusters, employment is considerably smaller than in other EU10 regional clusters. In that respect, its positioning to take

advantage of clustering may be much weaker than in most EU10 countries. Prior to the initiation of specific policies, there needs to be explicit confirmation that the basic foundation needed for clusters is present.

### ***Efficient financial services are critical to firm development***

FDI in the financial sector has led to rapid financial deepening and integration and has been a particularly noteworthy characteristic of the catching-up process. Prior to the financial crisis, there was an improvement in the ability of companies to fund expenditure from internal sources, due to high retained profits, and improved access to institutional finance. However, financial convergence in a global environment of excessively low risk premia also contributed to the overheating and did not ensure the most efficient allocation of financial resources. Prior to the crisis, only about one-third of Estonian SMEs reported that finding additional money for expansion was a substantial problem. Nevertheless, starting entrepreneurs, which have no security and no well-formulated business plan or company financial history to confirm their creditworthiness, have particular difficulties in finding financing. By comparison with the business sector in general, finding additional funding ranks first among the problems of small companies and starting companies, and 67% of entrepreneurs found the lack of financing possibilities the largest obstacle that they needed to overcome when starting their business.

Financing expansion can also be difficult. Firms can be caught in a vicious circle where they have no internal finance to cover the necessary investments, because low productivity has not generated enough profit. Two-thirds of the companies who invested in fixed assets in 2004 only used internal finance and retained earnings from previous periods, whereas leases and bank loans were used mostly by larger companies. Hence, government efforts are above all needed in small companies with an unutilised productivity growth potential and whose access to bank loans and leases is limited. Estonian entrepreneurs do not have a favourable attitude towards outside investors – only 27% see them as an opportunity of raising additional funds. One of the reasons is the short and still developing tradition of investor relations in Estonia. The focus should thus be on expanding companies' know-how and skills on how to raise capital in an appropriate form and extent. Here, attention should also be paid to mediating contacts between potential investors and companies in need of productivity increasing investment.

The most effective start-up scheme for an entrepreneur would thus be comprehensive and contain access to other support services and entrepreneurship-related information and knowledge, in addition to investment support and distribution of financial risk. In addition, a good start-up scheme would be easily accessible for the economic operator and be based co-operation with private institutions where the public sector contributes only in areas where private markets do not function. In that vein, the objectives of investment support should be to make seed capital accessible to new entrepreneurs and to ensure enterprises have the skills and the opportunities to raise capital and to make productive and future-oriented investments. State guarantees for start-up and micro-loans, the launching of traditional venture capital funds and the provision of intermediate equity financing for operating and rapidly growing small companies would form part of the apparatus for such funding, as would the development of business angel networks, including supporting companies in gaining access to foreign business angel networks, which provide not only capital but also expertise. Modelled on European best-practice (with Finland and Sweden being role-models in many instances), Estonia has successfully developed a number of institutions and instruments relating to funding structures and mechanisms. The Estonian Development Fund (modelled on the Finnish Innovation Fund) became operational in 2007, charged with nurturing early stage seed/venture capital investments into technology based start-ups and with the allocation of resources for the development of effective long-term policies and investments (accelerated production restructuring and developing technological companies).

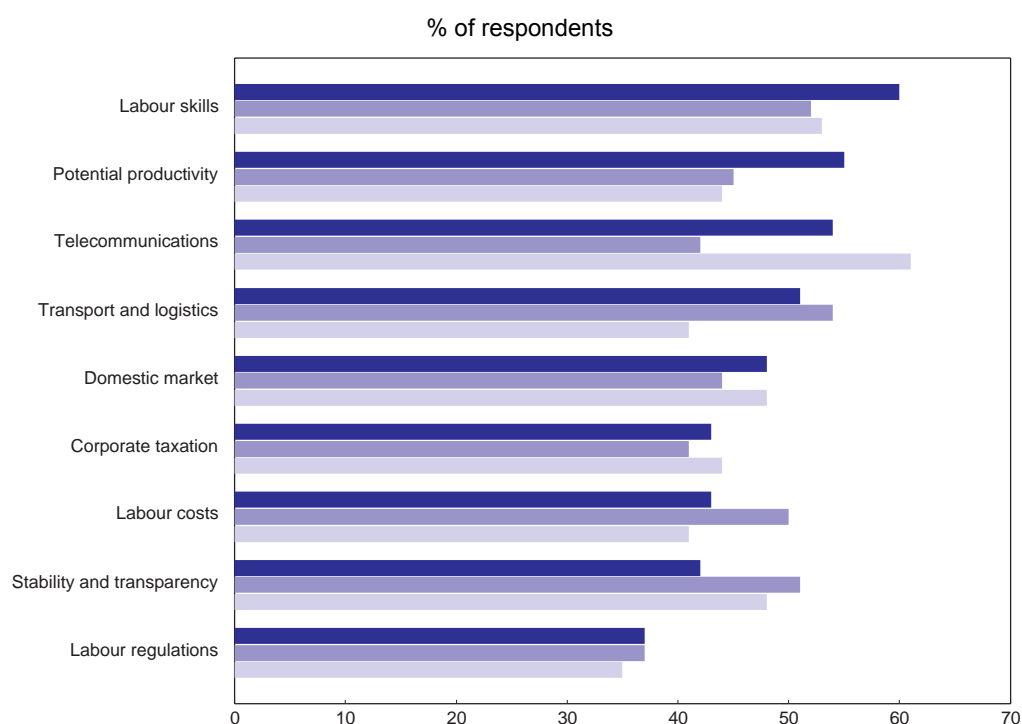
### ***Service sectors offer the greatest potential for product differentiation***

Internationalisation also requires the facilitation and promotion of inward and outward direct investment. The perception that Estonia has not been attracting FDI which does not have the same value-adding potential as in some other transition economies has been an important driving force behind Estonian industrial policy. However, the state has an important informational role to play (exercised by *Enterprise Estonia*), including foreign representation and offering proactive solutions to involve foreign investors in Estonia's priority sectors. This goes beyond the traditional emphasis on manufacturing, emphasising the opportunities in the services sector, which forms a part of the Development Fund's *Foresight Action Plan* for 2018. The most attractive services are identified as those that are knowledge-based and generate high value added, such as telecommunication services, business services, financial intermediation, consulting services, exportable health care and education services, transportation and logistics services, and the creative industry. The aims of the *Foresight Action Plan* are: 1) to understand the characteristics, development dynamics and governing forces of the services sector; 2) to map the state of play in the Estonian services sector while assessing its future prospects, including highlighting the activities/niches with the best prospects; and 3) to suggest a policy framework that policy makers could use for enhancing innovation and export capacities of the niches in the services sector that offer the best prospects.

Inward FDI decisions are to a great extent, driven by the fundamental characteristics of the economy as already discussed above. However, the conditions necessary to foster an export-oriented and sectorally diverse services economy, as is the objective, may differ in important respects from those which drive resource-based growth. Telecommunication infrastructure is more important than transport and logistic infrastructure for many of the services which form the basis of modern trade expansion.<sup>19</sup> In that respect, Estonia has established a reputation for having a highly developed telecommunications infrastructure, with respect to Internet coverage and cell phone usage; the application of new technologies to banking and government; the development of intelligent user-friendly interfaces (e.g. in the fields of mobile telecommunications and e-health applications); and the accessibility of public e-services. Moreover, labour skills are more important than labour costs or even labour market flexibility (Figure 7). Both technological innovation and skill enhancement form part of the objective of creating a knowledge-based society and are discussed in greater detail in the next sections.

### ***Policies may be individually sound but lack collective cohesion***

While there is a clear strategy in favour of enterprise development, bringing the various policy strands together into a seamless whole, which can be aligned with the objectives involved, has proved difficult. Business policy has had two main goals since 2004: to make companies more productive; and to increase their export capacity. The state has granted approximately EEK 7.4 billion (EUR 473 million) in business support through *Enterprise Estonia* (EAS) and the Credit and Export Guarantee Fund (KredEx) for the purpose of increasing the competitive strength of Estonia's economy (Table 6). However, the National Audit Office has found that state enterprise support has not made Estonia's economy more competitive - the low productivity and export capacity of companies, which form the basis of an economy's competitive advantages, have not improved significantly as a result (National Audit Office, 2010). Only one-fifth of the companies who received support from the state to increase their productivity noticed any significant impact on their productivity. According to the investigation the support has had hardly any impact on the appearance of new exporters. Moreover, enterprise support is criticised as inflexible and fragmented, benefiting only a few unrelated companies (whose integration with Estonia's economy is weak) and there has been no noticeable improvement in economic indicators or co-operation between companies.<sup>20</sup> Although, as noted, entering large export markets would call for co-operation between companies in a small country, Estonian companies still see no reason to devote resources to co-operation

**Figure 7. Factors determining location decisions**

*Note:* Sorted by location factors for high-tech, telecoms.

Source: Ernst & Young European Attractiveness Survey 2009.

and support has not succeeded in changing this understanding. Policy diffuseness is probably compounded by the fact that policies are based on European Union funds (90% of the enterprise support in 2010 is money from the European Union), which for many years have focused on the distribution of money and reporting on effective percentages of use rather than trying to ascertain whether or not the distributed funds have created any permanent benefits (National Audit Office, 2010). What is missing is a means of integrating the various and currently separate business promotion measures in order to increase the competitive strength of Estonia's economy. As a result of the audit, the National Audit Office recommends a long-term action plan on a more thorough investigation into what obstacles firms face and how government support could help to overcome them.

**Table 6. Structure of national business support**

Support Group	The expected impact of particularly these indicators	Total volume In EEK billion	% of total
Grants for start-ups	<ul style="list-style-type: none"> <li>■ Survival</li> <li>■ Number of employees</li> </ul>	<ul style="list-style-type: none"> <li>■ Grants Amount: 0.124</li> <li>■ Number of grants: 1 098</li> </ul>	1.7
More sustained and rapid growth of enterprises (EAS 1)			
Export subsidies	<ul style="list-style-type: none"> <li>■ Export turnover</li> </ul>	<ul style="list-style-type: none"> <li>■ Grants Amount: 0.356</li> <li>■ Number of grants: 541</li> </ul>	5.0
Larger businesses	<ul style="list-style-type: none"> <li>■ Value added</li> </ul>		
Export capacity and internationalisation (EAS 2)	<ul style="list-style-type: none"> <li>■ R&amp;D and corporate investment in innovation growth</li> <li>■ Development and exploration costs</li> <li>■ Revenue growth (R&amp;D institutions)</li> </ul>	<ul style="list-style-type: none"> <li>■ Grants Amount: 1.60</li> <li>■ Number of grants: 473</li> </ul>	22.3
Development grants			
Larger businesses D (EAS 3a)			
Increasing productivity grants	<ul style="list-style-type: none"> <li>■ Export turnover</li> <li>■ Value/ added growth in staff</li> </ul>	<ul style="list-style-type: none"> <li>■ Grants Amount: 0.950</li> <li>■ Number of grants: 4 795</li> </ul>	13.2
Higher productivity and corporate Value-added (EAS 3b)	for		
	<ul style="list-style-type: none"> <li>■ Investment in fixed assets growth</li> </ul>		
Export guarantees (KredEx 1)	<ul style="list-style-type: none"> <li>■ Value added per employee</li> <li>■ Turnover growth</li> <li>■ involving private sector Investing in new machinery and equipment</li> <li>■ increase in export turnover</li> </ul>	<ul style="list-style-type: none"> <li>■ Grants Amount: 2.49</li> <li>■ Number of grants: 1 779</li> </ul>	34.8
Loans (KredEx 2)	<ul style="list-style-type: none"> <li>■ Value added per employee</li> <li>■ Turnover growth</li> <li>■ involving private sector Investing in new machinery and equipment</li> <li>■ increase in export turnover</li> </ul>	<ul style="list-style-type: none"> <li>■ Grants Amount: 0.259</li> <li>■ Number of grants: 100 ***</li> </ul>	3.6
Export insurance (KredEx 3)	<ul style="list-style-type: none"> <li>■ Value added per employee</li> <li>■ Turnover growth</li> <li>■ increase in export turnover</li> </ul>	<ul style="list-style-type: none"> <li>■ Grants Amount: 1.39</li> <li>■ Number of grants: 1 240</li> </ul>	19.3
Total amount		7.18 (EUR 460 million)	100.00

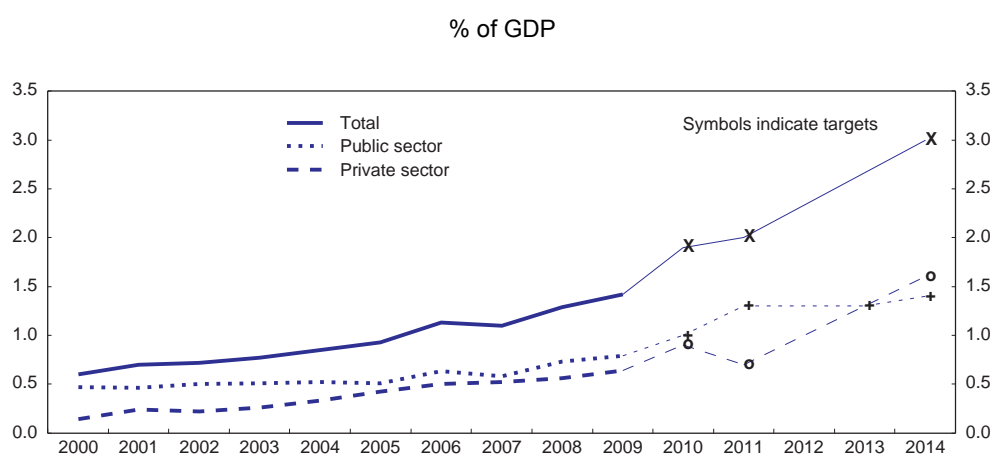
Source: National Audit Office (2010).



### *Enhancing productivity through research and innovation*

Research and innovation have been central to the Estonian goals of shifting its export basket away from a specialisation on labour- and resource-intensive fields towards more sophisticated sectors and achieving the strategic goals of doubling Estonian GDP and increasing productivity by 80% by 2014. In pursuit of these goals, *Knowledge-based Estonia* set a target of raising spending on research and development from 1½ per cent of GDP in 2008 to just under 2% by 2010 and 3% by 2014 (Estonian Ministry of Education and Research, 2007).<sup>21</sup> Public sector R&D currently forms just over a half of all such spending and this is scheduled to remain the case in the earlier years of the plan, but by 2014 the private sector is supposed to be the major contributor (Figure 8). Three challenges arise: to channel budget funds into R&D efficiently; to ensure that the R&D undertaken feeds through to productivity gains in the enterprise sector, and to ensure that the enterprise sector itself supports the attainment of the overall strategy by increasing its own R&D inputs.

**Figure 8. R&D spending**



Note: The public sector is the non-profit sector and comprises education, government and private non-profit.

Source: Government of Estonia, *Estonian Research and Development and Innovation Strategy, 2007-13* and *Estonian Strategy for Competitiveness 2009-11*; Statistics Estonia.

The increase in R&D funding has occurred against the background of a number of structural deficiencies in the Estonian research framework, which have needed correction. Estonian researchers have been among the worst paid in the EU and the least productive in terms of peer-reviewed publications. The fact that Estonia's R&D infrastructure is significantly out of date has also been pointed out by various international assessors. Hence, both the real and human capital aspects need attention. Measures are being taken to enhance the quality and numbers of people working in research and development through increased pay and the modernisation of R&D infrastructure. Co-ordinated large-scale investments are being carried out over the 2008-15 period with the government planning to update old and create new facilities within research and development institutions with the help of European Union Structural Funds. In 2008, the MoEaC (Ministry of Economic Affairs and Communication) launched a programme providing project funding for more academic research projects in order to increase the competitiveness and size of innovation research community in Estonia. In a small country such as Estonia, prioritisation is of paramount importance and in order to ensure better focus of financing R&D activities on the key areas presented in the research and development strategy, a programme of centres of excellence was implemented in 2001-07. Within the framework of this scheme, resources were allocated for centres of excellence on a competitive basis.

***The gap between academia and industry needs to be bridged***

Spending targets in themselves do not translate into achievement of productivity goals. R&D expenditures *per se* may not dovetail with private sector needs. In Estonia, the university system has been largely decoupled from the enterprise sector and the need is to achieve greater co-operation between them (Box 2). Weak co-operation between universities and business is partly explained by the fact that the research and development conducted at universities and institutions has not been sufficiently directed at practical applications, and partly by the structure of the Estonian economy, where a large proportion of enterprises operate in low value added niches and there is limited intramural research within enterprises. This gap between science and business is likely to continue for a number of years, and limits the scope and impact of R&D spending policies may have.

**Box 2. Increasing the interaction between science and business**

**The co-operation framework**

The detailed structure and functioning of the Estonian research and development (R&D) system is provided by the Research and Development Organisation Act, which defines the set-up for interaction between universities, public research units and business. The amended Act is due for approval at the end of 2010. According to the Act, all ministries perform the research and development functions relevant to their fields of responsibility, including implementation of the national research and innovation policy, organising the financing of R&D institutions and co-ordinating international co-operation at state level. There are two main national support systems for R&D and innovation in Estonia: the Archimedes Foundation and *Enterprise Estonia*. The objective of the Archimedes Foundation (established in 1997) is to promote and modernise Estonian education and science systems, reinforce co-operation with other spheres of society and co-ordinate and implement different EU programmes and projects in the field of training, education, research, technological development and innovation. *Enterprise Estonia* (established in 2000) provides financing, counselling, co-operation opportunities, and training for entrepreneurs, research and development institutions, the public sector and others. To provide information and create links in the field of research and development the Estonian Research Information System (ETIS) has been established by the Estonian Ministry of Education and Research in co-operation with the Estonian Science Foundation, Scientific Competence Council, public universities, R&D institutions, R&D funding institutions and the Archimedes Foundation.

**Co-ordination strategy**

Estonia is moving towards a comprehensive policy, which will cover research, education and innovation. For example "National R&D programmes" implemented with the help of Structural Funds cover research, innovation and education, "Centres of Competence" programme research institutions and industry. "Centres of Excellence" and "Graduate school programmes" support the creation of synergies between research and education. Competence Centres are implementing long-term and market oriented collaboration projects in co-operation with enterprises and research and development institutions. In developing economic clusters support will be provided for joint activities of enterprises and education institutions in the field of curricula development. The Competence Centre of enterprises operate in low value added niches and there is limited intramural research within enterprises. This gap between science and business is likely to continue for a number of years, and limits the scope and impact of R&D spending policies may have. To bridge the gap between academia and business requires increasing the amount of ideas with practical application potential at universities and R&D institutions. The relevance of research policy in general is determined by the Ministry of Education and other ministries do not feel sufficiently involved in the process.<sup>22</sup> To increase enterprises' demand for research services, the state could contribute to the development of economic clusters and partnership networks that draw together enterprises, R&D and educational institutions, local governments and foreign partners. Broadening enterprises' market horizons and helping them to make contacts with international competitors and clients also strengthens their motivation to innovate and develop their products and services. In the end, not all research will have practical value, particularly *ex ante*, so a question arises as to how much academic "blue sky" research a small country like Estonia can or should undertake. Estonia has not reached a stage where it can afford to fund much public research that does not focus on Estonia's own needs. Rather, given the necessarily small nature of Estonian R&D units, consideration should be given to further enhancing Estonian participation in respective EU Programmes or, despite understandable historical reservations, reviving research relations with the institutions of neighbouring states programme is the biggest programme with a budget of over EUR 65 million for the period 2009-15. Currently there are 7 centres in which around 500 students will be involved during that period.

National R&D programmes are prepared in co-operation with the partners (including research institutions, enterprises, etc.). The enterprises are financing separate measures and programmes in matching-cost principle. Currently the Ministry of Education and Research is preparing regulations for the R&D programmes (Energy technologies, ICT, Biotechnologies, Environmental technologies, Healthcare and health, Material technologies) which hopefully will be fully operational in 2011.

#### **Co-ordination instruments**

There are special measures to promote entrepreneurship studies and to train PhD students in co-operation with companies. The instruments include supporting the development of entrepreneurship and economic courses and modules for students of non-business studies and provision of funds to increase the accessibility of such courses. The graduate school programme supports building synergies between research and education. There is also a mobility scheme to pass doctoral courses in enterprise under the joint supervision of university and enterprise.

The larger Estonian Universities have created Technology Institutes and Technology Centres to support the co-operation with entrepreneurial sector. There is also a Spinno programme for supporting spin-off SMEs.

The Estonian Centres of Excellence programme is also one of the examples where the establishment of a Centre in certain areas should increase the research level, enhance innovative activities in this area, and increase the level of education at university. Since 2008 there are 7 Centres of Excellence (for the years 2008-15).

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#### ***Promoting business sector R&D may require new instruments***

In order to achieve the degree of R&D intensity set out in the strategy – and to create more direct links between R&D and productivity growth, the innovation capabilities of enterprises need to be raised in a broad way: encouraging SMEs to engage in product and process innovation, enhancing the links between domestic research and commercialisation, and generally creating an innovation-friendly society which will increase the capacity of the economy to absorb the technological advances spurred by globalisation. Business expenditure on R&D is currently well below the EU average and this is a major concern for Estonian RTDI policy. However, it is unclear why a 3% objective makes sense in an Estonian context. Indeed, R&D spending should be interpreted as an input (or cost) target rather than an end in itself. In the case of subsidies to private sector R&D, the impact should be assessed according to the results achieved. That is not currently the case. In the audit of R&D subsidies, noted above, the National Audit Office concluded that there is no evidence that subsidies have produced the impacts stated in policy documents: while at the micro level results are achieved, at a sectoral level there is little visible impact. This is perhaps unsurprising. While there is a case for global R&D support because of the externalities involved, the small size of the country makes it difficult for Estonia to create the critical masses needed to reap the benefits of

specific R&D advances, while rapid structural change in industry makes it hard to “pick winners”. That would seem to argue for concentrating resources on ensuring a general lifting of R&D and innovation and raising absorption capacities throughout the innovation system, rather than confining support to narrowly defined technology areas. At the very least, the implication is that the targets put forward in the strategy should not be pursued at all costs.

Currently, public support for private R&D is implemented via mainly EU funded grants. No tax credit scheme to stimulate R&D by firms exists. Direct support is provided to individual firms and their potential and *ex post* effects can be better measured than those from fiscal indirect support (OECD, 2002). On the one hand, direct support or subsidies allow the government to retain control over the type of R&D and to promote mission objectives (OECD, 2002). Moreover, they are neutral with respect to the business tax structure and they usually focus on projects with a higher social rate of return. Tax incentives, on the other hand, encourage the broadest range of firms to engage in R&D which is neutral with respect to the choice of industry and the nature of the firm, thereby being less costly to administer. There is some evidence that a mix of grants and tax concessions is more effective than sole reliance on either (Bérubé and Mohnen, 2007). Although it would be at odds with the simple and transparent Estonian tax system, such a scheme might be considered as an option for the future. The Dutch WBSO (research and development tax credit) might serve as a successful example. This programme reduces wage taxes and social insurance contributions. The condition is that these employees should work on technological R&D activities aimed at the development of products, processes and software that are new to the company. The WBSO also provides for extra incentives for high-tech start-ups to conduct R&D. The main advantages over a R&D subsidy are simplicity and lower implementation costs, while at the same time a tax reduction targeted towards R&D is more efficient in promoting R&D than a general tax cut for firms. Based on the growing experiences of other countries, it would be advisable to explore the feasibility of such a scheme.

### ***Innovativeness is a strength and should be further encouraged***

The standard separation of high- and low-tech industries focuses on average R&D intensity in individual sectors, such that the resulting definition mainly applies to total R&D in terms of end products. By this standard, the bulk of Estonian production is characterised as low tech. Low R&D inputs in this case also equate with poor R&D results in terms of patent applications. However, companies can still be high-tech in terms of processes and in that way innovative companies in traditional sectors can, in principle, contribute as much to a country’s economic growth as a high-tech company. In that respect, Estonian small and medium sized enterprises have already shown a remarkable degree of innovativeness. The proportion of Estonian enterprises classed as innovative grew from 36% in 2000 to 48% in 2006, exceeding the European Union average (44%) (Eurostat). However, the main innovation activity is focused on obtaining and employing new equipment, which makes up roughly 87% of all innovation. Thus far, new technologies have contributed to raising production volumes (process innovation) and product and technology development been not prioritised.

Clearly, as the production costs of Estonian enterprises approach the level of developed countries, Estonia will have to rely to a greater extent on product improvement to bolster its international competitive position. If there is reason to believe that some of the present industries have no viable future due to the comparative advantages of other countries, then it would make sense to see if the competences found in those industries can be used for new activities, including high tech industries. However, the attempt to allocate the larger share of resources into creation of high tech sector should not be at expense of the support to the competitiveness of the much bigger part of so called non-high tech of the economy, including low-tech service sectors.

### ***Matching educational attainment to labour market needs***

Educational attainment is an important determinant of productivity growth. Among the imbalances which pose challenges for future development of Estonia are skill shortages. In OECD countries, investments in human capital are estimated to have added 0.5% to economic growth in the OECD countries during the 1990s and the operational rule of thumb is that the extension of the average duration of schooling by one year increases economic activity by 5%. Increased educational inputs are thus important in themselves. It may be assumed that the quality and composition of educational outputs may also be assumed to affect growth. Education is positively associated with entrepreneurial spirit, while the innovative capacity of a country derives in large measure from labour force skills. In Estonia, according to a study conducted in 2005, 70% of firms had difficulties finding skilled workers and craftsmen, and 50% encountered difficulties in recruiting mid-level specialists and technicians. At the same time, only 61% of entrepreneurs provided training for their employees. Finding managers was cited as a problem by two-fifths of medium-sized enterprises. In more than half of Estonian companies, none of the managers has a university degree in their profession, only 35% of managers have attended long-term management courses, and all managers in one company have attended long-term management courses only in 12% of companies.

From the above perspective, Estonia's education needs to focus on three issues: *i*) from the human capital accumulation viewpoint, the general level of education of the working age population needs to be raised to at least the level of secondary education and to embrace the entire population in lifelong learning, including the necessary language competence; *ii*) from the "knowledge society" perspective, it will be important provide incentives for a sufficient supply of new-generation researchers and engineers and create attractive possibilities for their employment; and *iii*) greater effort is needed to match educational outputs to demands via a vibrant vocational education sector.

### ***Investment in human capital needs to be stepped up***

Apart from the emphasis on life-long learning, the EU focus is on functional literacy and the ratio of early school leavers. Estonian secondary education performance is generally above average, but it is moving towards some EU benchmarks too slowly:

- The EU objective is that 85% of young people should complete secondary education (compared with a level of 78.5% in 2008); Estonia is slowly improving from its base level of 79% in 2000 to 82% in 2008, but the pace is quite slow.
- During the 2000s, Estonia improved the rate for early school leavers from 15 to 14%, which is better than the EU average (15%), but the improvement is very slow compared to the EU target rate of 10%.
- Of the adult population in Europe, 24% have tertiary education and the objective is 40% by 2020; the Estonian figure is 34%.

Measures to encourage completion of secondary education and reduce the number of early school leavers should include more individually tailored support for student development, to help guarantee that participation leads to attainment. It would also imply separate curricula for basic schools and upper secondary schools, to stress the differences between the two stages of study. Subjects that are made compulsory should be chosen so as to ensure students can make adequate decisions regarding their future educational path and working life, including digital literacy, business competences (including entrepreneurial training) and language skills. The work of teachers will also change. Alongside the transfer of knowledge, teachers will assume an important role as supervisors, mentors and mediators. This requires, *inter alia* the development of teacher training programmes. Moreover, macro-economic and social criteria

for assessing the effectiveness of education investments should be defined and scientifically grounded methods developed for assessing both the effectiveness of teachers' work and the effectiveness of education investments.

### *Education and the knowledge society*

In adapting education to the needs of the knowledge society, the approaches and solutions in Estonia need to be brought into conformity with the general principles of the education policy of the European Union formulated at the Lisbon meeting of the Council of Europe in March 2004. This means that skills and knowledge need continuous adaptation in accordance with the changing needs of the economy. Specifically, this means ensuring a sufficient supply of scientific graduates and engineers. The fact that Estonia has been at a competitive disadvantage because of the low number of science and engineering graduates, together with the age pyramid of researchers skewed towards the older cohorts, has been seen as instrumental in creating the Estonian productivity gap described above (Table 7). The gap between the more advanced Scandinavian economies is particularly striking, and the shortage in the supply of high quality labour in Estonia is not likely to disappear, even with lower growth rates, given the demographics of higher education with low enrolment in science and engineering studies. In this context it should be explored whether the distribution of scholarships and free study places is adequate. Furthermore, consideration should be given to better aligning funding of free study places with the priorities needed for a knowledge based society. It is not obvious that the split in fully financed free study places and fully privately financed study places is optimal from the point of view of providing the right incentives to engage in higher education. Offering study places with mixed financing could be an option. In this case, loans with income contingent repayment schemes should be offered to cash-constrained students.

**Table 7. Students participating in tertiary education: total and in science and technology**

	Total % of total population aged 20-29	Science and engineering	Science and engineering as % of total students
EU27	28.6	7	24.5
Estonia	34	7.8	22.9
Sweden	37.6	9.6	25.5
Finland	46.7	17.1	36.6

Source: Eurostat.

The number of science graduates will to some extent increase as the proportion of overall students in the population rises (the ratio of science graduates to total graduates is not much different from the EU average in Sweden). However, if education strategy is to fit in with the general development goals of Estonia, policies may need to focus on the composition of tertiary education output, as well as the quantity. The education paradigm presented in the education strategy *Learning Estonia* is an important starting point in that regard. It is based on the need for Estonian qualifications to be based on high, internationally recognised standards and on the creation of learning opportunities which are accessible to all and cover a broad range of curricula, based in educational institutions of different types and on different forms of study. In order to ascertain the need for skilled workers and top specialists by economic sectors, co-operation has to be built between public sector organisations, employers' organisations and research and development institutions.

### ***Difficulties of reorganising public vocational education institutions***

Vocational education has been a problem area for Estonia. The policy has been to expand vocational education and, following the Development Plan for the Estonian Vocational Education and Training System 2005-08, a number of changes have been made to the system of vocational education which should have made it more attractive. Curriculum development has improved and national curricula have been adopted; the legal environment of vocational education has been updated; and the organisation of in-service and retraining in vocational education institutions has been developed further. In order to make vocational education more flexible and popular, various types of study have been created in vocational education. However, there have been difficulties in implementing reforms and several of the basic goals have not been achieved (National Audit Office, 2009).<sup>23</sup> The share of students studying in post-basic school vocational education was targeted to rise to 38%, but through 2005-09 the number of students in vocational education fell by nearly 2 600, and the share remains at 30%. The student drop-out rate was meant to decline to 10%, but the actual rate is still nearer 20%, and that may be biased downwards since it takes no account of students' movement within the academic year. The Professions Act has created a solid basis for vocational school graduates to obtain professional certificates upon graduation from the school, but the 70% goal set for the pass-rate of professional exams has not been met (the actual rate is under 30%), and the employment rate of vocational graduates has been only 66% compared with the goal of 80%. Nearly two-thirds of graduates of vocational education institutions enter the labour market without having any certificate of their professional qualifications. According to a forecast of the Ministry of Education and Research, the number of students in vocational education will decrease over the next three years, while it is planned to invest substantially in modernisation of the study environment of vocational education institutions. With the number of basic school graduates about to decrease by nearly a third, vocational education institutions will be in a situation of tough competition, which calls for an additional analysis of whether the existing school network is sustainable. This analysis should be carried out jointly with an analysis of the network of general education schools. At the same time, the National Audit Office has made recommendations to the Minister of Education and Research: *i*) to analyse the sustainability of the network of vocational education institutions in the environment of the decreasing number of students; and *ii*) to develop a methodology for calculation of drop-outs, which takes into account students' movement within the academic year. The difficulties encountered by the vocational system will, however, take time and effort to overcome.

#### **Box 3. Recommendations on making the most of globalisation**

##### **Maintaining the essentials of economic openness and fighting rent seeking establishment of entry barriers**

- Maintain Estonia's position as a business-friendly regulatory environment and start a broad-based consultation process to find out why it does not deliver better results in terms of innovation led growth.
- Extend regulatory impact analysis also to existing regulation and regularly assess the appropriateness of regulatory impact.
- Ensure that the vigilance of competition policy enforcement is not reduced by the fact that the competition authority is now smaller.
- Contain the threats to competition emanating from public monopolies and local authority sectors.
- Regularly evaluate the need for maintaining publicly owned shares in companies operating on contestable markets.

**Maintaining and enhancing an entrepreneurially friendly business environment**

- Maintain the relatively light regulatory burden and extend the regulatory impact analysis to existing regulations and the *ex post* assessment of new regulatory interventions. The range of start-up and export promotion measures designed to propitiate enterprise growth and improve export performance should be assessed for their overall coherence and effect. Make current programmes more effective and targeted by better co-ordinating them behind the common goal of higher productivity. Explore whether providing international supply chains with ready-to-use business infrastructure, especially in areas with high unemployment, would give local firms better opportunities to enter such supply chains.
- Subsidize part of the fixed costs of co-operation and networking among small firms via the development of clusters in order to overcome the constraints of Estonia's small size.
- Make adequate seed capital available by removing constraints for private venture capital investor and maintain a stable macro environment, to ensure financing is not an obstacle to firm development and innovation.
- Nurture the development of the service sectors in the context of the Foresight Action Plan strategies.

**Promoting growth through high technology**

- Do not adhere to numerical targets for R&D spending; projects should be pursued according to their intrinsic worth.
- Consider introducing tax incentives for R&D, the returns on which are easier to assess than subsidies.
- Switch resources to the promotion of non-high tech areas which can benefit from high-tech inputs.

**Expanding and enhancing skills and human resources**

- Complete the pedagogic and curricular reforms aimed at reducing drop-outs and enhancing secondary education completion.

**Expanding and enhancing skills and human resources**

- Complete the pedagogic and curricular reforms aimed at reducing drop-outs and enhancing secondary education completion.
- Financially encourage entry into scientific disciplines to foster the spread of 'knowledge-based' skills.
- Increase the integration of the vocational and mainstream education systems.
- Explore whether the distribution of scholarships and free study places is appropriate. Consider offering study places with mixed financing together with student loans with income contingent repayment schemes.



## NOTES

1. See Brixiova *et al.* (2010) for a description of the role of capital inflows for fuelling a debt financed domestic demand boom ahead of the great recession.
2. During the period 2000-06, the Estonian situation worsened compared to the EU15 average only in regard to the birth rate and migration.
3. Crisis episodes are often related to a fall in the level of potential GDP, which may be permanent or temporary depending on the sources of growth of the country (see for example Haugh *et al.* (2009)). The European Commission (2009) assumes that the cumulative fall in the EU8 as a result of the global crisis will average 5.9%.
4. For a description of the stylized facts of the extraordinary volatility in all Baltic economies see European Commission (2010)
5. In gravity models, trade is positively related to both countries economic size and development level and negatively to the distance between them, the latter determining transport costs as well as serving as a general proxy for communication and co-operation costs. Such models are based on classical theories relying on comparative advantage and relative factor endowment differences to explain the existence and structure of international trade; in these models inter-industry trade should be dominant and no attention is paid to the presence of increasing returns to scale, monopolistic competition and transportation costs which characterise new trade theories and which support the hypothesis that trade flows between countries with similar relative factor endowments are larger than trade flows between countries that differ considerably.
6. Primarily due to various forms of subcontracting, engineering products and machinery play the most important role in Estonian export, next come timber and various products made of timber (including paper, furniture, log houses). Estonia also exports metal products, chemical products and different light industry products (clothing, footwear). Food products and building materials are slightly less significant.
7. Laaser, Schrader and Heid (2008) argue for Poland, that the rapid integration into Western European production networks went hand in hand with a significant increase of intra-industry trade and became a driving force behind the modernisation of the Polish economy.
8. The positive contribution of FDI to home country productivity can occur either through the own-firm effect of increased productivity in companies with foreign owners, or through spill-over effects with increased productivity in non-FDI companies due to the presence of FDI in the same industry, or in downstream and upstream industries.
9. The study related to firm level panel data from the second part of the 1990s to 2001.
10. Masso and Vahter (2008) find that process innovation can be positively linked to productivity gains, but the impact depends on macroeconomic conditions. In the 1998-2000 period only product innovation increased productivity whereas in 2002-04 only process innovation had a positive effect. In conditions of strong macro-economic growth companies can increase productivity without innovating because of growing market demand and by exploiting economies of scale.
11. This result is affected by the fact that multinationals include Scandinavian SMEs for which expansion to the neighbouring country of Estonia is the maximum extent of foreign market entry.

12. The activities in the service line are mostly wholesale of information and communication technology, software publishing, telecommunications, programming, consultation, data processing, web- hosting, website operations, and restoring computers and communication devices.
13. Spillovers from backward linkages (upstream suppliers) occur mainly in services sectors and the fact that earlier studies tended to focus on manufacturing firms can explain why the literature has been somewhat sceptical about the existence of FDI spillovers.
14. *Estonian SMEs export more than their EU counterparts*, 19 July 2010. During the years 2006-08 nearly 55% of small and medium-sized enterprises operating in Estonia were involved directly with exporting goods and services at least a certain part of the time, against an EU average was 25%.
15. Mostly Russian immigrants arriving after WW II are affected by this regulation, because their settlements are close to the Russian border. While Estonia's strategic concerns and security ambitions are understandable, the question arises whether such policy goals could be achieved with less damaging measures.
16. The *IMD World Competitiveness Yearbook 2008* ranked Estonia 14<sup>th</sup> in transparency.
17. Lack of time and skills, as well as inadequate oversight was the main reason that implementation fell far short of expectations up to up to the mid-2000s).
18. *Ernst and Young European Attractiveness Survey 2009*, quoted on the Estonian Investment and Trade Agency website.
19. This investigation has generated considerable discussion and controversy in Estonia. The short observation period, the small number of enterprises involved, the extraordinary circumstances during the crisis may all have contributed to making it difficult to isolate the impact of support measures. Nevertheless, even if a larger variance needs to be attached to its results there is no reason to believe that the audit investigation is biased. Its findings should therefore taken into account as an incentive to engage in an expert discussion about how the effectiveness of enterprise support can be checked and what can be done to make support more effective.
20. This is the follow-up to "Knowledge-based Estonia: Estonian Research and Development Strategy 2002-2006", passed by Estonian parliament end of 2001.
21. This is in contradiction to the founding principles of Estonia's research policy established in the Organisation of Research and Development Act, which states that the Ministry of Education and Research and the Ministry of Economic Affairs and Communications are jointly responsible for co-ordinating and guiding research and innovation policies but each ministry is responsible for financing and stimulating research in its respective field. This and joint initiatives with other ministries remain a major challenge.
22. The National Audit Office has consistently monitored developments in vocational education. The previous audit, "Ensuring Quality in Vocational Education", was carried out in 2005. Thereafter a number of changes were made in vocational education.

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## Glossary

EU27		Euro area 16		CIS + Nordics + Baltics		OECD-30	
ISO Code	Name of country	ISO Code	Name of country	ISO Code	Name of country	ISO Code	Name of country
AUT	Austria	AUT	Austria	ARM	Armenia	AUS	Australia
BEL	Belgium	BEL	Belgium	AZE	Azerbaijan	AUT	Austria
BGR	Bulgaria	CYP	Cyprus	BLR	Belarus	BEL	Belgium
CYP	Cyprus	FIN	Finland	FIN	Finland	CAN	Canada
CZE	Czech Republic	FRA	France	KAZ	Kazakhstan	CHE	Switzerland
DNK	Denmark	DEU	Germany	KGZ	Kyrgyzstan	CZE	Czech Republic
EST	Estonia	GRC	Greece	LVA	Latvia	DEU	Germany
FIN	Finland	IRL	Ireland	LTU	Lithuania	DNK	Denmark
FRA	France	ITA	Italy	MDA	Moldova, Republic of	ESP	Spain
DEU	Germany	LUX	Luxembourg	NOR	Norway	FIN	Finland
GRC	Greece	MLT	Malta	RUS	Russian Federation	FRA	France
HUN	Hungary	NLD	Netherlands	SWE	Sweden	GBR	United Kingdom
IRL	Ireland	PRT	Portugal	TJK	Tajikistan	GRC	Greece
ITA	Italy	SVK	Slovakia	TKM	Turkmenistan	HUN	Hungary
LVA	Latvia	SVN	Slovenia	UKR	Ukraine	IRL	Ireland
LTU	Lithuania	ESP	Spain	UZB	Uzbekistan	ISL	Iceland
LUX	Luxembourg					ITA	Italy
MLT	Malta					JPN	Japan
NLD	Netherlands					KOR	Korea
POL	Poland					LUX	Luxembourg
PRT	Portugal					MEX	Mexico
ROU	Romania					NLD	Netherlands
SVK	Slovakia					NOR	Norway
SVN	Slovenia					NZL	New Zealand
ESP	Spain					POL	Poland
SWE	Sweden					PRT	Portugal
GBR	United Kingdom					SVK	Slovak Republic
						SWE	Sweden
						TUR	Turkey
						USA	United States

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