Is the Russian Strategy 2020 Workable?

Sources of productivity growth and policy implications for the Russian economy

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Abstract

In spite of outstanding growth in 2000-s, Russia is a lagging country. In 2012 the level of Russian GDP per capita was almost one third of the United States or just over two fifth of Germany, falling behind many post-transition. Moreover, the post-crisis recovery of the Russian economy is 3.3 per cent per year in 2010-2013, which makes its perspectives of catching up uncertain. This problem has been addressed in the first official post-crisis economic strategy, published in 2013 and entitled "Strategy 2020. New Growth Model, New Social Policy". This document aims to achieve fast and stable growth in the upcoming years at minimum rate five per cent per year of the Russian economy, suggesting a shift of the economy to a new model of growth.

The present study aims to qualify some aspects of Strategy 2020 with a newly developed Russia KLEMS dataset as well as the World KLEMS data for other countries. First, it unveils the pre-crisis sources of growth of the Russian economy. Indeed, before 2008 one third of labour productivity growth rates were contributed by capital intensity. At the same time, the lion's share of remaining multifactor productivity contribution was provided by catching up of financial and business services, which had been underdeveloped in early transition even in comparison with former planned economies in Central and East Europe (CEEs). Second, it compares contributions of labour composition to growth in Russia, CEEs and developed economies, testing the hypothesis of human capital underutilization in Russia. This study shows that the contribution of labour productivity in Russia is comparable with CEEs, so there is no evidence of substantial underutilization. Third, it compares the contribution of labour reallocation in Russia and in other countries with different levels of development. Our data shows that Russia will not gain much from further improvements in labour reallocation, because the initial level post-transition level of labour productivity variation across industries was not as high as in developing economies, being closer do the industrialized developed world. Finally, it evaluates practicality of the intensive innovations-stimulation policy measuring distances to the technology frontier in various industries. If an industry is in the vicinity of the frontier, the extension of the frontier – innovations - is the top priority. However, all Russian industries are more remote from the frontier than of CEEs. That is why technology adaptation seems to be a more efficient way for catching up.

1. Introduction

In spite of outstanding growth in 2000-s, Russia is a lagging country. In 2012 the level of Russian GDP per capita was almost one third of the United States or just over two fifth of Germany, falling behind many post-transition. Moreover, the post-crisis recovery of the Russian economy is 3.3 per cent per year in 2010-2013, which makes its perspectives of catching up uncertain. This problem has been addressed in the first official post-crisis economic strategy, published in 2013 and entitled "Strategy 2020. New Growth Model, New Social Policy" (Kuzminov and Mau 2013). This document aims to achieve fast and stable growth in the upcoming years at minimum rate five per cent per year of the Russian economy, suggesting a shift of the economy to a new model of growth.

According to *Strategy 2020*, the existing growth model provided high growth rates before 2008 because of the inflow of natural resources export profits; putting idle inputs into operation; and growing labour and capital costs, accompanied by growth of domestic consumption. The document characterizes this model as extensive and unsuited to keep high growth rates in the long run after the crisis of 2008. Although the existing growth model can provide growth rates around four per cent per year in the upcoming decade at the expense of the increase of the propensity to consume, external borrowings and intensive banking system refunding, all these stimulating measures are expected to bring the economy to the pre-crisis standing by the end of 2010-s. The purposed long run five per cent yearly growth is suggested to be achieved with a new growth model, in which productivity contribution would dominate. To achieve this, *Strategy 2020* purposes, among others, better engagement of human capital, which is assumed to be underutilized in previous years, removal of multiple barriers for optimal allocation of resources; and intensive stimulation of innovations.

The present study aims to qualify these aspects of *Strategy 2020* with a newly developed Russia KLEMS dataset as well as the World KLEMS data for other countries, available at www.worldklems.net. It raises questions, what drives Russian productivity growth and to what extent suggestions of *Strategy 2020* are relevant for growth enhancing.

Russian productivity growth is influenced by two basic facts about Russia, which is both a post-transition and a natural resources abundant economy. In the past Socialist economies fell behind the West in levels of income per capita (Bergson 1987). By early 1990-s, when the command-economy experiment was over, perspectives for growth in these economies seemed optimistic. Indeed, they had already passed the first phase of structural change, industrialization, and their labour force was educated and relatively healthy. The level of technological sophistication was high in some sectors of the economy, notably the advanced defense equipment industries with potential for diffusion to other industries (Campos and Coricelli 2002). With the opening for international trade and investment an inflow of state-of-the-art technologies from developed economies was to be expected, and given the seemingly high level of absorptive capacity, these could be quickly put to efficient use. In addition, there was a high potential for structural change to contribute to growth. Given the large differences in efficiency levels across and within industries, a reallocation of labour and capital from less to more productivity activities would boost aggregate growth.

These expectations did not materialize. Surprisingly, after two decades of transition in Central-East European economies (CEE) and Russia (CEER)[1] the gap in GDP per capita with Western Europe and US still exists[2]. Table 1 summarizes GDP per capita and labour productivity levels of eight post-transition economies in 2007, just before the global financial crisis, relative to Germany - the European productivity leader. As can be seen in column 1, even the GDP per capita of the most advanced economy, Slovenia, is below 70% of the level of Germany. Levels of other post-transition economies hover around 40-60 % of the German level. Is this due to structural characteristics of the labour force, such as participation rates, unemployment or hours worked, or due to differences in labour productivity, which can be considered as a broad measure of the technology level in the economy? Table 1 reports that the gap in labour productivity, which is defined as real value added per hour worked, explains the major part of the difference in GDP per capita levels. Cross-country variation in the amount of hours worked per worker or the employment-population ratio (the involvement of population in working age in production) does not explain much of the gap. On the contrary, working hours are longer in most countries, and participation rates higher. For example, the level of GDP per capita in Slovenia is 68.6 per cent, whereas the labour productivity level equals 57.3 per cent. The difference of 11.3 percentage points is explained by the effect of working hours (a higher number of hours worked by an average Slovenian worker in comparison with a German one); while a lower employment-population ratio reduces the gap by 3.9 percentage points. As a result, the levels of labour productivity of post-transition economies (column 4) are even lower that corresponding levels of GDP per capita (column 1) in all countries, except Poland. A similar picture emerges when one focuses on that part of the economy that can be well measured, namely the market economy[3], see column 5. We conclude that it is labour productivity backwardness, which causes the gap in incomes between post-transition and developed economies.

Tab. 1 is about here

In this context, a general question can be raised, to what extent the present backwardness of Eastern Europe and Russia in terms of labour productivity levels is related to shared features of a past of economic planning that resulted in a long period of extensive growth based on heavy investment[4], but with little technological change[5] and distorted economic structure, tilted towards heavy industry sectors[6]. At the same time it is clear, that in past two decades different developments paths have been followed and country-specific

[1] This study considers Russia and eight East-European economies: the Czech Republic, Hungary, Slovenia, Estonia, Latvia, Lithuania, Poland and Slovakia. However, because of data availability more attention will be paid to the first four.

[2] According to Sonin (2013), this point was made by Daniel Treisman, who noted that convergence of post-transition economies took much longer, than expected, so the level of developed economies has not been achieved yet.

[3] Market economy aggregates correspond to the total economy ones except public administration, education, real estate activities, and health and social work.

[4] See Ofer (1987) and Krugman (1994).

[5] See Gomulka and Nove (1984) and Holliday (1984).

[6] See Bergson (1964).

features have become more important in driving development. These include differences in the integration into European markets, including the importance of foreign direct investments (Campos and Kinoshita 2002), and in "the great divide" of institutions (Berglof and Bolton 2002). Also differences in resource abundance played an increasing role. From this perspective, the fact that, say, Russia and the Czech Republic were command economies in the past, should nowadays be less relevant for understanding the difference in their current performance than the facts that Russia has abundant natural resources and the Czech Republic is closer to European markets, a member of the European Union and deeply integrated into European production chains. These idiosyncratic factors also influenced the speed of transition and restructuring (Ahrend 2006; BenYishay and Grosjean 2014).

In order to consider post-transition and natural resources-based sources of productivity growth separately we split labour productivity growth rates into contributions of labour, capital and multifactor productivity at the industry level (industry growth accounting) and compare this decomposition for the Russian economy with three advanced post-transition economies (the Czech Republic, Hungary and Slovenia), as well as the benchmark advanced economy (Germany). Russia – CEEs comparison highlights catching up in manufacturing industries as the source of productivity growth, which is common for post-transition economies. At the same time, the industry level perspective shows that a substantial contribution of capital intensity to labour productivity growth in Russia, which originates from oil and gas export related industries and low skills intensive services (LSI Services).

In this context we consider the Russian economy assessment and policy implications of Russian *Strategy 2020*. First, it unveils the pre-crisis sources of growth of the Russian economy. Indeed, before 2008 one third of labour productivity growth rates were contributed by capital intensity. At the same time, the lion's share of remaining multifactor productivity contribution was provided by catching up of financial and business services, which had been underdeveloped in early transition even in comparison with former planned economies in Central and East Europe (CEEs). Second, it compares contributions of labour composition to growth in Russia, CEEs and developed economies, testing the hypothesis of human capital underutilization in Russia. This study shows that the contribution of labour productivity in Russia is comparable with CEEs, so there is no evidence of substantial underutilization. Third, it compares the contribution of labour reallocation in Russia and in other countries with different levels of development. Our data shows that Russia will not gain much from further improvements in labour reallocation, because the initial level post-transition level of labour productivity variation across industries was not as high as in developing economies, being closer do the industrialized developed world. Finally, it evaluates practicality of the intensive innovations-stimulation policy measuring distances to the technology frontier in various industries. If an industry is in the vicinity of the frontier, the extension of the frontier – innovations - is the top priority. However, all Russian industries are more remote from the frontier than of CEEs. That is why technology adaptation seems to be a more efficient way for catching up.

This chapter has the following structure. The second section shows that by 2007 both CEEs and Russia were laggards being remote from the technology frontier. This distance is larger in manufacturing industries than in services. Consequently, technology catch up is

common both in Russia and CEEs. Both labour productivity and multifactor productivity growth rates exceed Germany substantially, being originated in manufacturing industries. The third section deals with the role of inputs. It shows that the contribution of capital intensity to labour productivity growth of the Russian economy is increasing in time. It also discusses labour composition effects. The fourth section is focused on structural change in the post-transition period. It provides evidence that, in contrast with expectations, the role of labour reallocation in post-transition economies is modest, because the initial variation in productivity levels across industries in these countries was relatively small. The fifth section concludes, summarizing policy implications issues and directions for further research.

2. Technology catching up

In a famous article, Gerschenkron (1962) argued that backward economies could catch up to the productivity level of advanced economies by adapting frontier technologies. He hypothesized that the larger the distance to the technology frontier the more options for improvements are available, driving higher productivity growth. If productivity growth in a country depends positively on its distance to the global technology frontier, a process of convergence will occur in which countries grow towards a similar level of productivity. More recently, Acemoglu, Aghion and Zilibotti (2006) provide a formal model of this idea, in addition arguing that optimal policies need to be adapted, depending on the distance to the frontier. They suggest that the institutional environment relevant for investments- and adaptation-based strategy is not optimal anymore once the economy is close to the technology frontier.

Labour productivity growth in post-transition economies exceeds developed economies. What drives it? The literature documents two stylized facts, which could shed light on this issue and evidence in favour of catch up growth. The first is that these economies are remote from the technology frontier (World Bank 2008). The second one follows from multiple growth accounting exercises, which decompose output growth rates into contributions of inputs and multifactor productivity[7]. They show that growth in CEERs is mostly driven by MFP or, in other words, because of increasing efficiency and technology improvements.

Using standard growth accounting technique, which decomposes aggregate labour productivity growth into contributions of capital intensity, MFP, labour composition per hour and labour reallocation (Stiroh 2002; Jorgenson, Ho, and Stiroh 2005), EU KLEMS dataset (Timmer and others 2010) and a newly developed Russia KLEMS data (Timmer and Voskoboynikov 2014), we can see this catch up effect in our data both for CEEs and Russia. According to table 2, which summarizes all components of labour productivity growth in the four CEERs and Germany, MFP growth in sectors is an important source of aggregate labour productivity growth in all countries. Moreover, it is MFP, which makes labour productivity growth in CEERs higher than in Germany. Indeed, the Czech Republic, which had the lowest average MFP growth rates among CEERs, still over performs Germany, while MFP in the Russian economy exceeds Germany by more than three times.

Tab. 2 is about here

[7] See, e.g., Havlik, Leitner, and Steher (2012) and the literature review of Timmer and Voskoboynikov (2014).

One step further is identifying key sectors and industries in CEERs, which drive this MFP growth. Table 3 demonstrates sectoral MFP growth rates and contributions in CEERs in comparison with Germany[8]. Growth rates of MFP in sectors are given in the upper panel, while contributions of sectors to aggregate MFP growth are given in the lower panel. The latter are derived as a sector's MFP growth times its share in value added. As can be seen, the goods sector in the CEERs, including both high skills and low skills intensive goods, outperforms Germany. MFP growth rates of advanced manufacturing industries (high skills intensive goods) in CEERs demonstrate growth around 6 per cent per year against 3.3 p.p. in Germany, while traditional manufacturing (LSI Goods) shows 2 – 3 percent versus 1.7 percent in Germany. Further, in all economies, except Russia, it is the Goods sector that contributes the lion's share of multifactor productivity growth (see the bottom part of Table 2). The role of market services in MFP growth is substantial only in Russia with outstanding 9.4 percent growth of high skills intensive services. In Hungary MFP growth in low-skilled intensive services was particularly important.

Tab. 3 is about here

It is well known that CEERs were far remote from the technology frontier in the period before transition. Gregory and Stuart (2001, pp. 187-9) reviewed the literature and summarized that economic development of the Soviet Union took place at the background of a large technology gap, which either increased or, at best, remained constant during the Soviet period, while technology levels in the US and Western countries continued to push out the global frontier. Nevertheless, there were areas, such as metallurgy, aeronautics and military production, in which the Soviet technologies were close to the frontier, at least in the early period. Technological weakness of the Soviet economy in comparison with developed economies is well documented not only by Western scholars, but also by the official Soviet statistics. According to an official survey, by April 1, 1986, only 6.5% of the total amount of machine tools in the Soviet economy was considered as "confirmed to the up-to-date world technology level"; 45% met the domestic technological requirements and 48.5% were obsolete and were entitled to updates, which never materialized (Rosstat 1989, p. 225). The literature also provides multiple evidences of technological inferiority of CEEs before transition (Gomulka and Nove 1984).

A natural approach for explanation of variations in productivity growth across industries in CEERs after transition is thus to relate them to the initial distances to the technology frontier at the beginning of transition. We will use comparative industry MFP levels to measure this distance, following Timmer and others (2010). Such analyses are scarce at the industry level, because the estimation of MFP levels is a sophisticated and data demanding exercise. Timmer and others (2010), which covers OECD countries including three CEEs, is the only example of

[8] See the list of industries and sectors in the Appendix

this approach in the literature built on the basis of a representative macro data[9]. However, other more indirect evidence of technology convergence is also available in the literature. On the basis of high MFP growth rates Havlik and others (2012) showed that catching up in CEEs was faster in skill intensive manufacturing industries because of well-educated workforce, FDI inflows and stimulated outsourcing activities. Fernandes (2009) investigated labour productivity in the service sector of CEEs and confirmed the Gerschenkron hypothesis for productivity growth in services. So far, however, there are no studies of this type which put Russia in a comparative perspective with the early reforming CEEs.

We use the level accounting technique[10] to derive comparative MFP levels for the market economy and these are shown in Figure 1 for 1995 and 2007. This shows how much of the initial technological gap has been overcome since 1995. As can be seen, in the most advanced post-transition economy, Slovenia, MFP level has grown from 60 per cent of the German one in 1995 to 74 per cent in 2006, reducing the distance by almost 14 percentage points in eleven years. But large distances remain for the other CEEs. In 1995, Russian productivity levels were only 42 per cent of Germany, being the weakest economy. By 2007, Russia has closed only 10 percentage points of the gap, which still stands large at about half the German level. On the whole, technology catch up in CEERs was slow and the scope for future growth based on further catch up is still large.

Fig. 1 is about here

This is true for almost all sectors. Table 4 provides the distance to the global frontier in 1995 for the 5 major sectors. It shows that in 1995 the distance to the frontier for HSI Goods was larger than for LSI Goods and LSI Services, which might explain higher MFP growth rates in HSI Goods is higher (tab. 3). In turn, the technology gap is larger for HSI Services in Russia than in other CEEs, being just 12 per cent as much as in Germany. That is why this sector demonstrates outstanding MFP growth of 9.4 per cent per year.

Tab. 4 is about here

The findings of this subsection confirm that technological catch up in CEERs is taking place, but at a slow pace. It will take more time before even the most advanced economies among CEERs achieve the level of developed economies. The productivity gap is persistent, in particular for Russia.

[9] The World Bank (2008) also reported data on MFP levels for total economies on the basis of the micro database “Amadeus”.

[10] See, e.g., Timmer and others (2010)

3. The role of inputs in labour productivity growth

Aggregate level growth accounting in the previous section reveals some specific features of labour productivity growth in Russia. One of them is importance of capital intensity contribution. Indeed, it provided one fifth of productivity growth in 1995-2007 (Tab. 2), which is much higher than reported in recent literature (Entov and Lugovoy 2013; Jorgenson and Vu 2013)[11]. Another one is a positive contribution of changes in labour composition. This section discusses the role of inputs in productivity growth at the detailed industry level.

Fig. 2 speaks to the issue of extensive or intensive growth patterns at the detailed industry level in 1995-2012. It demonstrates contributions of inputs (capital intensity and labour composition) and multifactor productivity to labour productivity growth of each industry. The industries are ordered on the basis of labour productivity growth rates. For example, financial intermediation shows the highest growth rates of almost 8 per cent a year, of which only about one and half percentage points are contributed by inputs, and around six by multifactor productivity. In turn, the worst performer is Utilities with negative labour productivity growth rates and the substantial inflow of inputs, which is about two percentage ponits.

We define the growth pattern of an industry as intensive when the contribution of MFP to labour productivity growth in absolute magnitude is more than half. On the basis of this definition, growth in Financial intermediation is intensive, whereas in Utilities it is extensive. As can be seen from Figure 2, there is a majority of intensive industries: the number of intensive industries makes up 11 of 30 in total. Intensive industries are also the ones with the highest labour productivity growth rates (in the top half of the figure). Most of them belong to high-skill intensive sectors. In particular in skill intensive services, inputs growth is substantial. In skill-intensive goods production, however, MFP dominates.

Figure 2 also provides an opportunity to analyze the extensive part of the economy in detail. First, not surprisingly, Mining and Fuel, which belong to Extended Mining, are in the extensive group. Second, Retail grows practically because of inputs. This is no wander is we consider small-scale old fashioned shops or informal markets. However, modern and much more capital-intensive supermarkets seem also to have a substantial room for growth of efficiency. Finally, explosive growth of Telecommunications is also inputs driven. At the same time, absence of constant quality deflators both on input and on output sides makes the conclusion about this industry very preliminary.

Fig. 2 is about here

Tab. 5 is about here

The period of 1995-2012 is long enough. It includes two economic crises, 1998 and 2009, as well as the inter-crises period of rapid resurgence. How did the growth structure change in these periods? The

[11] The next section shows that the role of capital intensity for the period 1995-2012 is close to 40% (see Tab. 2).

advantage of using the KLEMS data is that we cover a long time period up to the recent financial crisis, allowing for simple dynamic analysis. We split the data into three periods, 1995-2002, 2003-2007 and 2008-2012. In this split we included peaks and troughs of business cycles into the periods to minimize errors because of short-term demand side driven effects, such as the post-crises recovery growth.

The results for Market sector of the Russian economy are reported in Table 5. One immediately sees that the labour productivity growth in total value added changed dramatically, increasing from 3 to almost 7 percent in the second period, and falling to 1.8 percent in years of the global recession. But, more importantly, we note that Russia's growth structure seems to become more extensive. In late 1990-s – early 2000s productivity was totally driven by multifactor productivity. In the following years of Russian economic boom and an increase of oil and gas revenue the contribution of inputs increased from zero to one third of aggregate labour productivity growth. Finally, in years of the global crisis labour productivity growth seems to be inputs-driven with growing real costs of production (negative MFP growth). The Russian economy has become more dependent on the inflow of oil and gas export revenue and the last crisis aggravated this tendency.

Table 5 indicates two more important aspects. The first is a positive contribution of changes in labour composition. In the post-transition economy the role of a high qualified labour is growing. This contribution is higher than in Germany, where labour composition is more stable (tab. 3). Since the other CEEs also demonstrate a higher contribution of labour composition change in comparison with Germany, this effect can be considered to the post-transition improvement in allocation of skills. Interestingly, table 5 demonstrates a stable positive contribution of labour reallocation for the Russian economy in all three periods, including years of crisis. In other words, in bad years firms preferred to get rid of low skills workers and saved high skilled.

The second aspect is a declining contribution of labour reallocation. It falls from 1.4 p.p., or almost half of total labour productivity growth in early transition, to negligible 0.2 p.p. from 1.8 p.p. in years of the last crisis. This reflects the end of the transition period even for such a large late reformer as Russia. The role of labour reallocation is considered in the next section.

4. The role of structural change

The transition from a plan to a market economy is a process of reallocation of resources on the basis of market incentives (Campos and Coricelli 2002). Many studies have attempted to investigate this structural change process in a three-sectoral framework (agriculture, industry and services) following the tradition of Kaldor, Maddison, Kuznets and Chenery. For example, Döhrn and Heilemann (1996) used the Chenery Hypothesis, which links the sectoral structure of an economy with its stage of development, size and the endowment with natural resources. They found that by 1988 manufacturing was oversized in many Socialist countries, while services were small and underdeveloped. The authors projected a substantial shift of economic activity from manufacturing to services after transition. This shift occurred as was later documented and discussed in the literature (De Broeck and Koen 2000a; De Broeck and Koen 2000b; Raiser, Schaffer, and Schuchhardt 2004; Lazarev and Gregory 2007; World Bank 2008; Bah and Brada 2009).

However, the more recent literature[12] on issues of structural change, productivity and growth in comparative perspective argues for the need for more detailed analysis. Indeed, the three-sectoral framework may be misleading in light of new stylized facts of development, suggested by Jorgenson and Timmer (2011). They showed that reallocations between Agriculture and Manufacturing in the post-industrialized world are marginal in comparison with reallocations within Services, which now account for around 70 per cent of value added and hours worked in developed economies. Timmer and De Vries (2009) found a similar pattern for Latin-America since the 1980s. That is why it is important to consider performance of different groups of sub-industries within *Services*. In addition, the estimation of the role of reallocation on productivity is more accurate when more detailed industrial level is considered. De Vries and others (2012, tab. 11) have shown that the estimation of the reallocation effect is sensitive to the level of disaggregation. Finally, the use of more detailed data in analysis of structural change provides an opportunity of a more flexible industry grouping depending on country-specific issues. For example, to deal with the transfer pricing and vertical integration of large mining firms in Russia it is necessary to group Mining and Fuel from Manufacturing and Wholesale Trade from Services into one sector Extended Mining[13].

Fig. 3 is about here

Fig. 3 represents decomposition of labour productivity growth in eight CEERs and Germany. As can be seen, the role of labour reallocation is relatively modest. It explains at best half of a percentage point of growth. The notable exception is Russia where the contribution of labour reallocation is 1.1 out of 4.6 percentage points, or about a quarter of total growth. In this context there is a concern that a substantial labour reallocation during the years of transition, which was expected to eliminate huge planned economy distortions, did not provide a sizable increase in an aggregate labour productivity level. Explaining this, it makes sense to compare post-transition economies with developing economies, in which the reallocation of labour from sectors with a low productivity level to high productive ones, which is referred to as a structural bonus, provides a more substantial contribution.

Post-transition countries differ in two aspects. The first is a different direction of labour flows. In developing economies labour reallocates from low productive agriculture to high productive manufacturing. This is clearly not the case for CEERs, which passed industrialization no later than in the second half of 20th century. Instead, structural transformation in CEERs is more about labour reallocation from manufacturing to services, confirming the prediction of Döhrn and Heilemann (1996). This is illustrated in Fig. 4, which represents shares of hours worked in 1995 and 2007 in Czech Republic, Hungary, Russia and Slovenia with Germany. In the remainder of the chapter we will focus on these 5 countries as the necessary data is not available for the other CEEs.

[12] See, e.g., van Ark, O'Mahony, and Timmer (2008); Lin (2010); and McMillan and Rodrik (2011).

[13] Extended Mining includes Mining (C) and Wholesale trade (51). See detailed discussion of this in (Timmer and Voskoboynikov 2014).

We distinguish four sectors, which are high skill intensive goods (HSI goods), low skill intensive goods (LSI goods), high skill intensive services (HSI services) and low skill intensive services (LSI services)[14]. Indeed, both the low skills intensive and the high skills intensive services in CEERs are expanding, while manufacturing in most cases is contracting not only in CEERs, but also in Germany, leaving the market for China. At the same time, advanced manufacturing in the Czech Republic, Hungary and Slovenia (HSI Goods) gains. Havlik, Leitner and Steher (2012) explained this by pointing at factors like the educated labour force, closeness to the Western Europe, outsourcing, and substantial foreign direct investments (FDI) inflows, in particular from Germany and Austria (Marin 2009)[15]. Another remarkable point is differences in structural change in services between CEEs and Russia. By analogy with the developed economies trend, high skills intensive services (financial intermediation and business services) expanded more in CEEs, while in Russia this effect is almost absent. As for the sector of low skill intensive services, which includes such industries as retail and construction, extension is the largest in Russia, being smaller in CEEs and negative in Germany. This could reflect the limited development of this type of services in initial years of transition in Russia.

Fig. 4 is about here

Fig. 5 is about here

The second distinction of post-transition economies compared to other countries is a low variation of productivity levels across industries. As McMillan and Rodrik (2011, fig. 2) showed, there is a negative correlation between the level of inter-industry productivity variation and average labour productivity of a country. For this, they use the variation coefficient of (the logarithm of) industrial labour productivity as a measure of inter-industry productivity variation. Labour productivity is defined as the GDP PPP converted value added to the number of hours worked. We extend their analysis (McMillan and Rodrik (2011, fig. 2) and perform it for data on thirty nine countries in Figure 5. At the vertical axis is the coefficient of variation of labour productivity levels across 30 industries in a particular country. On the horizontal axis is the (log) level of aggregate labour productivity in the country relative to Germany. Data for forty developed, developing and post-transition economies are plotted and a dotted OLS regression line is given as well. As can be seen in Fig. 5, the observations for the

[14] See detailed sectoral composition in Appendix.

[15] With firm-level data of German and Austrian multinationals, Marin (2009) showed that this outsourcing was caused by the abundance of high skill labour in East European economies, including Russia and Ukraine, in comparison with Germany and Austria. Interestingly, according to this paper, comparative advantages in high skill labour are applicable to all East European economies, but the lion's share of FDI were hosted by CEEs, rather than Russia, Ukraine and other CIS countries. This can be interpreted as the effect of the EU membership.

post-transition economies fit the regression line[16]. It means that in 1995 the level of cross-sectoral variation of productivity in CEERs is much closer to developed, than developing economies, and the potential for the structural change bonus was only limited.

Only the Russian case is exceptional as the contribution of labour reallocation in the Russian economy is comparable with India and higher than in China[17]. Half of this is explained by the expansion of the extended mining sector, a unique Russian feature[18]. The other half could be explained by an earlier stage of transition in Russia in comparison with CEEs in 1995. Indeed, working with the manufacturing firms' level data of early reformers (Hungary and Lithuania) and late reformers (Georgia, Romania, Russia, and Ukraine), Brown and Earle (2008) showed how the role of reallocation changed in time. Before transition the contribution of labour reallocation to productivity growth was low in all these economies. In first years of transition the contribution of labour reallocation was higher in early reformers, diminishing in the following years. In turn, late reformers demonstrated the peak of the labour reallocation effect with a delay. The authors explained this pattern with a more intensive cleansing of less productive firms in early reformers in first years of transition, which intensified labour reallocation.

5. Conclusion. Long run perspective for growth

Strategy 2020 suggests the new growth model, which is based on three key issues: stimulation of innovations, better use of Russian human capital and a more efficient allocation of labour across industries. The present study shows that, being remote from the technology frontier the Russian economy needs to adopt the adaptation strategy, rather than innovations. This approach helped Europe to catch up the United States in the post-war period[19]. Further, the direct contribution of improvements in labour composition to labour productivity growth is positive, but rather small. It is not enough for catch up. Finally, labour reallocation was substantial for productivity enhancing in first years of transition, but it is negligible now. Although efforts for better allocation of inputs across industries are helpful, but not sufficient for achieving target five percent growth.

In terms of economic policy two further aspects are important. Taking into account increasing efficiency of manufacturing industries, which could work as escalators of growth enhancing (Rodrik 2011), it would be useful to stop its shrinking. One of ways of doing this is prevention of labour outflow from a mostly formal Manufacturing to low productive informality, which is documented by Gimpelson and Kapeliushnikov (2014). However, further research is needed, to what extent growing informal sector prevents growth enhancing structural change in case of the Russian economy and what government

[16] Negative slope coefficient in Fig. 5 is highly significant and the deviation of the slope coefficient from the trend for CEERs, represented by the product of the CEER dummy and the log of the aggregate labour productivity level, is also significant.

[17] Of 7.6 % of yearly average labour productivity growth of market economy in China, labour reallocation contributed 0.4%. For India corresponding values are 5.3 and 0.9. These results are consistent with findings of de Vries and others (2012), obtained with a different approach.

[18] To show this, we represent the reallocation effect as a sum of industrial components: $R = \sum_j \bar{v}_{Z,j}^{GDP} \cdot \Delta \ln \frac{H_j}{H}$. Each sectoral component is, in turn, the product of the change of labour share of this sector $\Delta \ln \frac{H_j}{H}$ and the average share of its value added $\bar{v}_{Z,j}^{GDP}$. Grouping industries by sectors we decompose total reallocation R into contributions of each sector. Of total 1.1 per cent of reallocation the contribution of Extended Mining is 0.62, which is the product of the change of labour share, 2.35 per cent, and the time average VA share 26.4 %.

[19] See, e.g., (van Ark, O'Mahony, and Timmer 2008).

policies could stop it. The second aspect is the indirect influence of educated labour force to productivity growth. Although improvements in labour composition do not provide much growth, the absorptive capacity of educated labour force makes the economy more acceptable to advanced technologies, which, in turn, stimulates growth. Still, additional research is necessary to answer a question, how this effect works in Russia.

Appendix. List of sectors and industries

NACE 1.0 Code	Name of a sector/industry used in the paper
	TOTAL ECONOMY
	Market Economy
	Goods
	High Skill-intensive
24	Chemicals and Chemical Products
29	Machinery, Nec
30t33	Electrical and Optical Equipment
	Low Skill-intensive
AtB	Agriculture, Hunting, Forestry and Fishing
15t16	Food, Beverages and Tobacco
17t18	Textiles and Textile Products
19	Leather, Leather and Footwear
20	Wood and Products of Wood and Cork
21t22	Pulp, Paper, Paper , Printing and Publishing
25	Rubber and Plastics
26	Other Non-Metallic Mineral
27t28	Basic Metals and Fabricated Metal
34t35	Transport Equipment
36t37	Manufacturing, Nec; Recycling
	Market Services
	High Skill-intensive
J	Financial intermediation
71t74	Renting of Machinery and Equipment and Other Business Activities
	Low Skill-intensive
E	Electricity, Gas and Water Supply
F	Construction
H	Hotels and Restaurants
50	Sale, Maintenance and Repair of Motor Vehicles and Motorcycles
52	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods
60t63	Transport and transport services
64	Post and Telecommunications
O	Other Community, Social and Personal Services
	Extended Mining
23	Fuel
C	Mining and quarrying
51	Wholesale trade
	Non-Market Economy
70	Real Estate Activities
L	Public administration and defence; compulsory social security
M	Education
N	Health and social work

Tab. 1. GDP per capita and labour productivity differences in post-transition economies relative to Germany in 2007

	GDP per capita (Germany = 100)	Effect of		Labour productivity (Germany = 100)	
		working hours	employment - population ratio	Total economy	Market economy
	1	2	3	4 = (1)-(2)-(3)	5
Czech Rep.	64.8	16.3	3.3	45.1	44.8
Estonia	56.4	15.2	2.2	39.0	39.2
Germany	100.0	0.0	0.0	100.0	100.0
Hungary	51.2	17.8	-12.4	45.9	41.0
Latvia	48.5	13.0	-6.4	41.9	41.2
Lithuania	44.9	3.3	0.9	40.7	41.5
Poland*	40.8	12.6	-15.7	44.0	39.1
Russia	43.0	13.7	1.4	27.9	27.5
Slovakia	57.0	12.9	-11.9	56.0	52.4
Slovenia*	68.6	15.2	-3.9	57.3	56.3

Notes:
[1)] Converted to USD at 2005 PPPs from Inklaar and Timmer (2012).
[*)] 2006 for Poland and Slovenia
Sources: Author's calculation; EU KLEMS; Russia KLEMS; Penn World Tables, ver. 7.1. See main text.

Tab. 2. Labour productivity growth decomposition in 1995-2007
(percentage points)

	Russia	**Czech Rep.**	**Hungary**	**Slovenia***	**Germany**
Aggregate labour productivity, due to	4.29	2.84	3.45	3.99	1.71
Labour reallocation	0.98	0.23	0.19	1.23	0.25
Labour productivity, due to	3.32	2.60	3.26	2.76	1.46
Multifactor productivity	2.25	0.72	2.17	0.82	0.69
Capital intensity	0.88	1.70	0.69	1.49	0.73
Labour composition per hour worked	0.19	0.19	0.40	0.45	0.05

Notes*:* (*) – 2006.
Numbers are average productivity growth rates and refer to Market economy
Source: Author's calculation; see main text.

Tab. 3. Multifactor productivity growth rates and contributions of Market economy in 1995-2007

	Russia	Czech Rep.	Hungary	Slovenia**	Germany
Growth rates, annual growth					
Market economy, total	2.57	1.32	2.11	1.94	0.71
HSI Goods	6.31	5.83	6.11	5.75	3.33
LSI Goods	2.64	3.01	3.54	3.60	1.70
HSI Services	9.41	0.74	0.01	-0.31	-2.22
LSI Services	1.53	-0.74	1.44	0.17	0.74
Mining, Fuel*	1.00	1.89	0.71	2.92	2.08
Contributions, p. p.					
Market economy, of which	2.57	1.32	2.11	1.94	0.71
HSI Goods	0.25	0.50	0.58	0.57	0.43
LSI Goods	0.58	0.83	0.91	1.15	0.36
HSI Services	0.90	0.10	0.00	-0.05	-0.51
LSI Services	0.58	-0.30	0.56	0.06	0.26
Mining, Fuel*	0.26	0.19	0.06	0.21	0.16

Notes:
* For Russia this is *Extended Oil and Gas* sector, which includes Mining, Fuel and Wholesale trade. In other countries Wholesale trade is included into LSI Services (see details of sectoral composition in the Appendix).
** For Slovenia average growth rates have been calculated in 1995-2006. Numbers may not sum because of rounding.
Source: Author's calculation on the basis of EU KLEMS (release of November 2009) and Russia KLEMS (July 2012).

Tab. 4. Multifactor productivity levels relative to Germany in 1995 in PPP USD 2005

(Germany = 100)

	Russia	Czech Rep.	Hungary	Slovenia*
Market economy, total	42.3	57.6	47.6	59.9
HSI Goods	12.3	28.4	30.3	36.9
LSI Goods	23.2	40.2	33.8	44.4
HSI Services	12.1	53.1	66.4	66.7
LSI Services	64.4	79.7	54.0	83.4
Mining, Fuel*	83.0	99.7	95.8	35.5

Notes: This table presents results of level accounting, for which PPPs have been aggregated using the multilateral translog price indices (Caves, Christensen, and Diewert 1982). In line with this approach, an artificial country is formed by averaging across all countries in the dataset. This artificial country is used as a bridge for making binary comparisons between any two countries. Since Estonia, Latvia, Lithuania, Poland and Slovenia are not included into this dataset for level accounting, labour productivity levels in table 1 slightly differ from the corresponding values in the present table.

* For Russia this is the Extended Mining sector, which includes Mining, Fuel and Wholesale trade. In other countries Wholesale trade is included into LSI Services.

Source: Author's calculation; see main text.

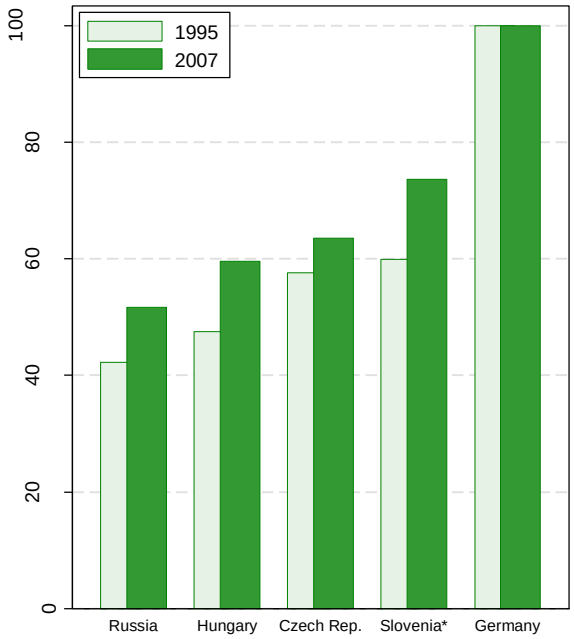
Tab. 5. Changes in labour productivity growth decomposition in 1995-2012 for the Russian economy (Market economy)

(percentage points)

	1995-2002	2003-2007	2008-2012	1995-2012
Aggregate labour productivity, due to	3.00	6.89	1.75	3.74
Labour reallocation	1.36	0.87	0.16	0.77
Labour productivity, due to	1.64	6.02	1.59	2.97
Multifactor productivity	1.73	3.71	-1.71	1.30
Capital intensity	-0.35	2.21	3.01	1.44
Labour composition per hour worked	0.25	0.11	0.29	0.22

- Labour reallocation decreases
- Labour composition accelerates growth in all periods
- Initial period is intensive, while the two following periods are extensive

Fig. 1. Multifactor productivity levels relative to Germany.



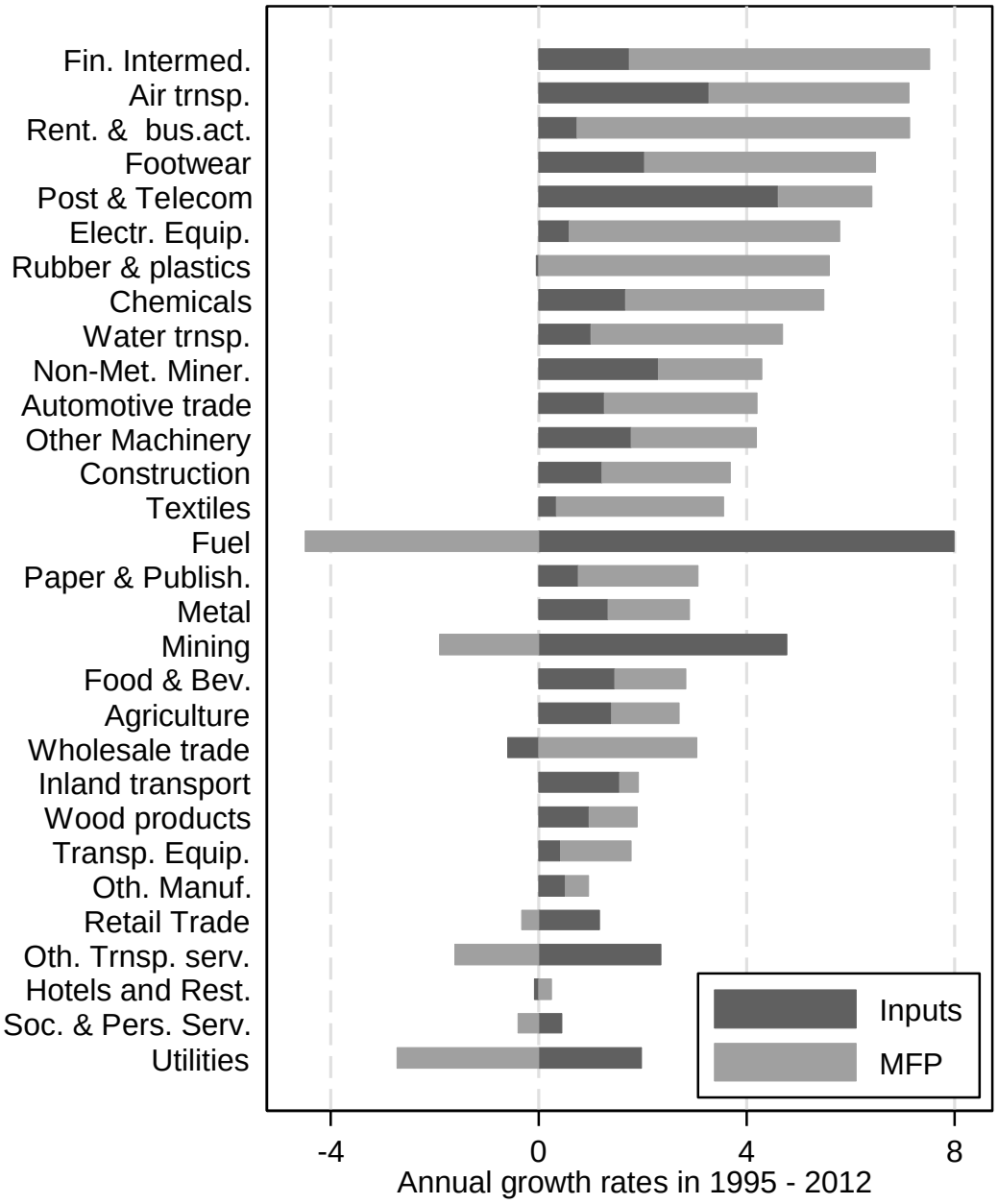
***Notes**:*

(*) – 2006.

Calculations have been made for Market economy in PPP USD 2005.

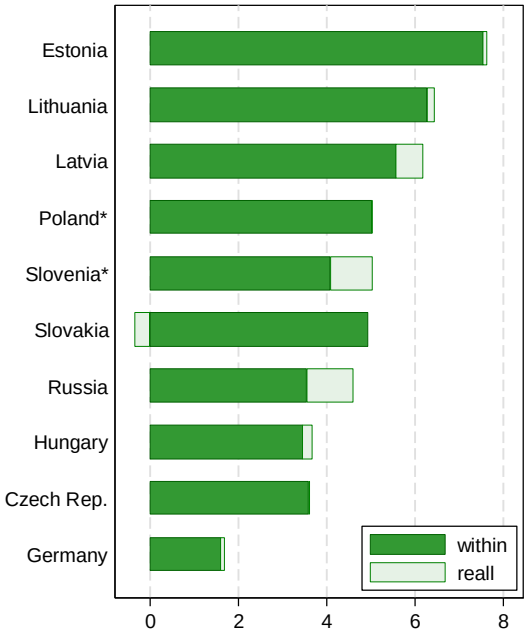
Source: Own calculations on the basis of EU KLEMS, Russia KLEMS, and (Inklaar and Timmer 2012).

Fig. 2. Growth of inputs and multi factor productivity by industry, 1995-2012



Sources: Authors' calculations, see main text.
Note: arranged with real value added growth rates.

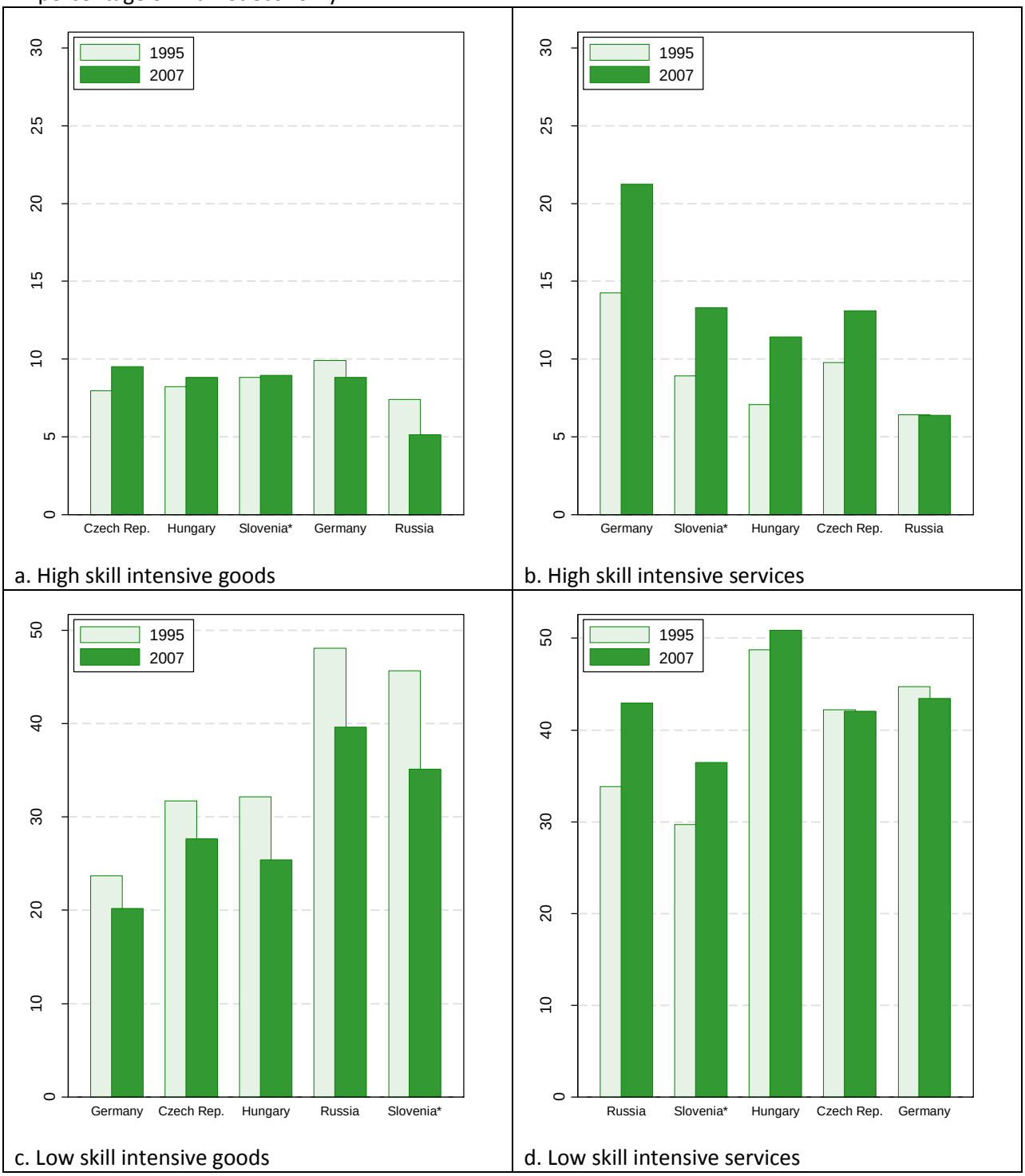
Fig. 3. Intra- and inter-industry components of labour productivity growth in post-transition economies and Germany for 1995-2007



***Notes**:*
(*) – 2006.
Decomposition of aggregate labour productivity growth into the intra-industry growth (within) and labour reallocation (reall) components in CEE economies, Russia and Germany in 1995-2007* (percentage per year)
Source: Author's calculations based on the EU KLEMS and Russia KLEMS datasets.

Fig. 4. Shares of hours worked in 1995 and 2007

In percentage of Market economy

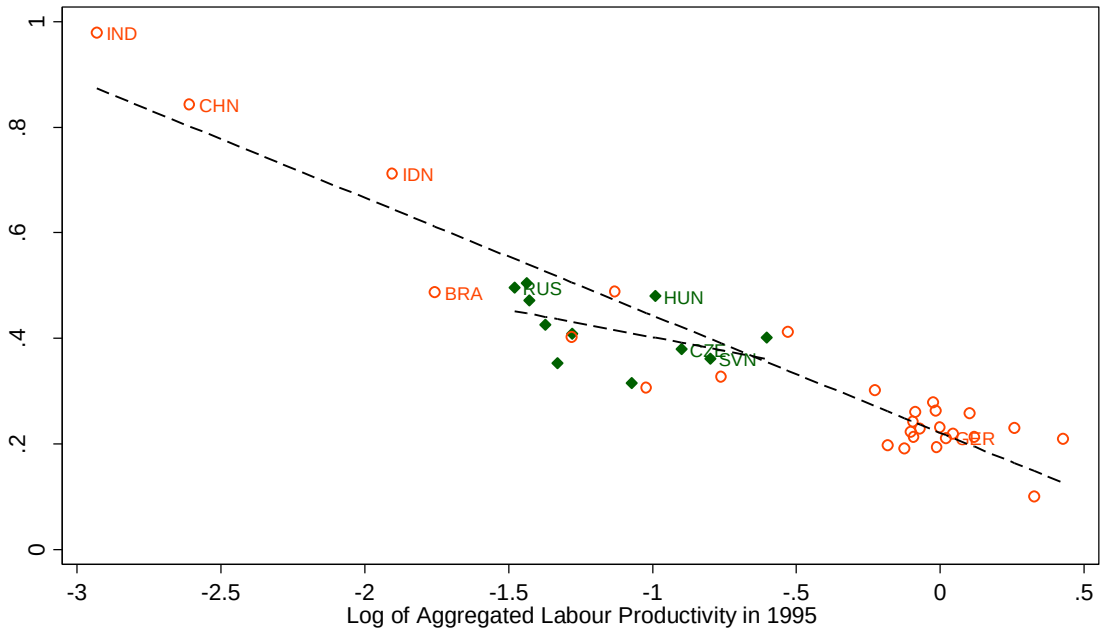


Sources: Author's calculations based on the EU KLEMS and Russia KLEMS datasets.

Notes: Arranged by the descending difference of the shares

*) For Slovenia values are calculated for 1995 – 2006

Fig. 5. Inter-sectoral productivity variation and aggregate labour productivity levels in 1995



Sources: Own calculations on the basis of WIOD Social Economic Accounts; EU KLEMS; Russia KLEMS; (Inklaar and Timmer 2012).

Note: Post-transition economies are highlighted in green
Coefficient of variation of (the log of) labour productivity in 31 industries is presented on a vertical axis. Labour productivity is defined as value added per hour worked, converted with GDP PPP 2005 from (Inklaar and Timmer 2012) to constant 2005 US dollars and projected to 1995.
Labour productivity levels of market economies (horizontal axis) are value added over hours worked, converted with GDP PPP to constant 2005 US dollars from (Inklaar and Timmer 2012), projected to 1995 and normalized to the level of Germany.

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