CHAPTER 2

# Labor Productivity

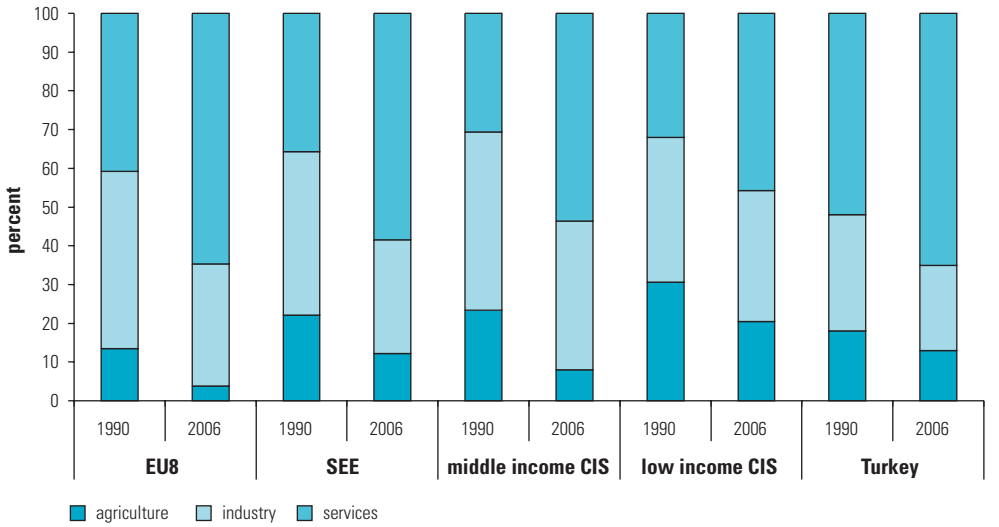
Accompanying the transition from command to market economies were substantial changes in the sectoral composition of value added—with a broad pattern of deindustrialization, declining agriculture, and expanding services, which had been repressed under central planning (figure 2.1). Deindustrialization moved labor into services in the EU8 and middle income CIS countries but into agriculture and services in the low income CIS countries.

The shares of employment in manufacturing in the EU10 and middle income CIS countries in 2004 continued to exceed those in market economies at similar per capita incomes (figure 2.2).[1] The shares of employment in agriculture in the EU10 and middle income CIS countries fell short of market economy benchmarks, being more akin to those in developed economies. The shares of employment in services in those subgroups increased by 8–10 percentage points, approximating market economy benchmarks. In the low income CIS countries, by contrast, the share of employment in agriculture increased by 15 percentage points and somewhat exceeded market economy benchmarks in 2004, while the share of manufacturing employment fell well short of them. Many of these changes had occurred by 1998, although there was some decline in the share of

[1] This chapter draws on World Bank (2008a and 2005b).

FIGURE 2.1

**Sectoral Shares of Total Value Added**




*Source:* World Bank staff estimates and World Development Indicators Database

*Note:* First period data are from 1990, with the following exceptions: Kazakhstan (1992) and Bosnia and Herzegovina (1994). Second period data are from 2006, with the following exceptions: Albania (2005), Bosnia and Herzegovina (2005), Russian Federation (2005), and Slovenia (2005).

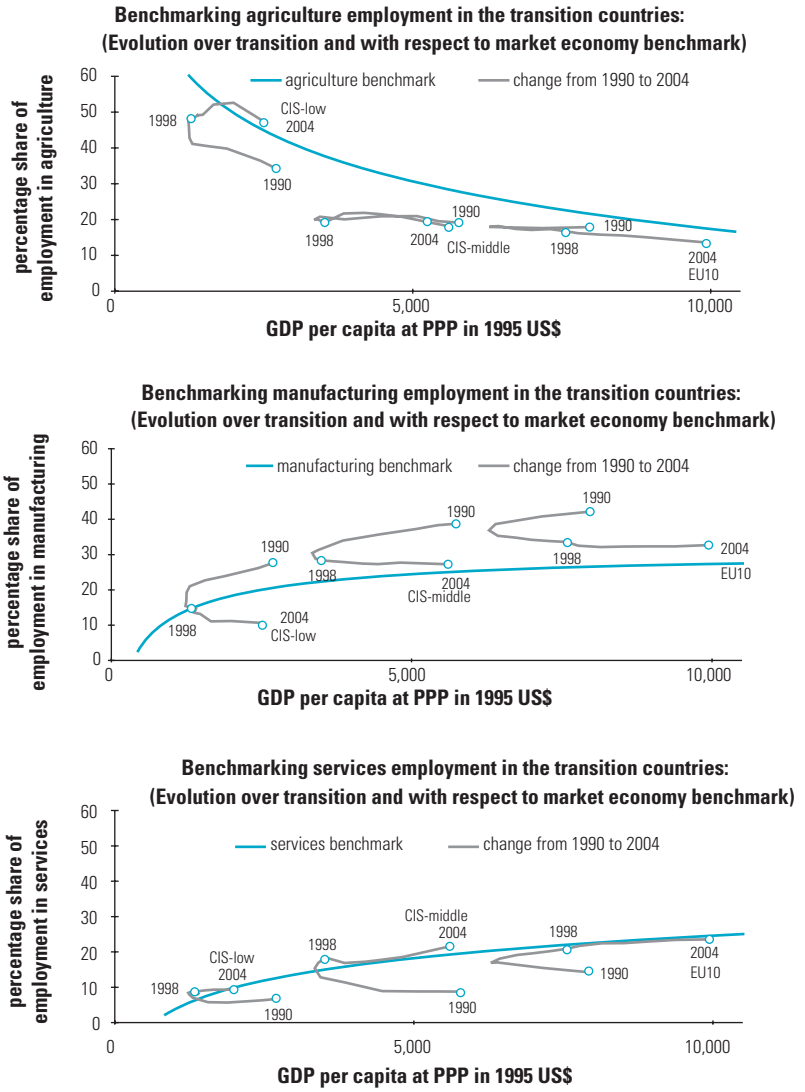
agricultural employment in the low income CIS countries, an increase in services in the middle income CIS countries, and some further shrinkage in agricultural employment and expansion of employment in services in the EU10 countries. The expansion of services since the beginning of the transition was productivity enhancing because productivity in services was higher than in agriculture and industry in the EU10 (see figure 2.11). But the expansion of employment in agriculture, particularly in the low income CIS countries, and in services in both middle and low income CIS countries over the entire period, was productivity reducing, because productivity in agriculture and services fell short of that in industry in those country groups.

## Manufacturing

Much of the change in aggregate labor productivity in manufacturing occurred within industries, not from changes in employment across them. Supporting this contention are an analysis of growth in aggregate labor productivity in manufacturing across 9 broad ISIC sectors in the EU8 countries covering 1995 to 2004 (World Bank 2008a) and an earlier analysis of 14 manufacturing industries in the Czech Republic, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic,

FIGURE 2.2

**Benchmarking Sectoral Employment in Eastern Europe and the CIS—Evolution over the Transition and Compared with Market Economy Benchmarks**




*Source:* World Bank staff estimates; data from World Bank 2008a.

*Note:* Manufacturing sector is broadly defined as "industry," including construction, electricity, gas, and water.

and Slovenia covering 1993 to 2002 (World Bank 2005b). Both studies found that the largest contribution was on account of improvements within each industry, not by reallocating labor from less productive to more productive industries. Industries that contributed most to aggregate labor productivity growth in manufacturing were also shrinking in size, while those with below-average productivity growth gained—in relative terms—in employment shares.

The limited contribution of shifts in employment from less to more productive industries when countries were witnessing massive changes in patterns of demand, trade, and factor use supports the view that some low productivity industries may have been sheltered from competitive pressure, implying that they would have to go through restructuring and downsizing in the future. The finding that industries with above-average productivity growth have shed more labor indicates that productivity has been driven by "defensive restructuring" rather than "strategic restructuring," where factors would have been reallocated to their most productive uses (Grosfeld and Roland 1995).

The evolution of labor productivity in firms, where much of the core action of restructuring took place, can be analyzed by decomposing the change in labor productivity during the 1990s and early 2000s into five parts:[2]

- *Within-firm effect*—within-firm productivity growth weighted by the firm's initial share in employment.
- *Entry effect*—the sum of the differences between each entering firm's productivity and initial productivity in the industry, weighted by the firm's share in employment.
- *Exit effect*—the sum of the differences between each exiting firm's productivity and initial productivity in the industry, weighted by its share in employment.
- *Between-firm effect*—the gain in productivity from an increasing share of employment in high-productivity firms or a shrinking share of employment in low-productivity firms, weighted by the initial shares in employment.
- *Cross effect*—gains in productivity from the expansion of employment shares in high productivity growth firms and the reduction of employment shares in low productivity growth firms. It is positive if firms with growing productivity also increase their shares in employment, and negative if they lose their shares in employment.

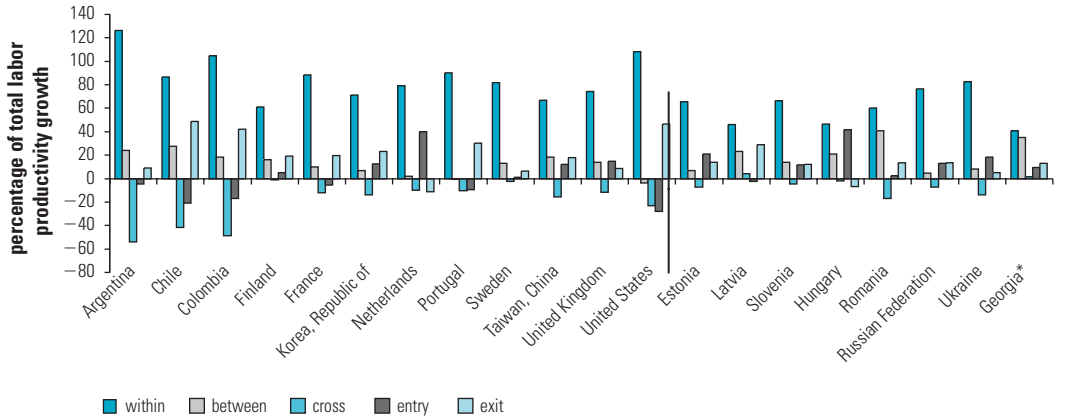
The result of implementing this decomposition in selected developed, transition, and nontransition developing economies is shown in figure 2.3.

## Within-Firm Effect

Improvements in existing firms (the within-firm effect) dominated productivity growth in transition, developing, and industrial coun-

FIGURE 2.3

**Sources of Productivity Growth in Developed, Transition, and Developing Economies**




*Source:* Bartelsman, Haltiwanger, and Scarpetta 2004 for comparator countries. Brown and Earle 2007 for Hungary, Romania, Russian Federation, Ukraine, and Georgia. Bartelsman and Scarpetta 2007 for Estonia, Latvia, and Slovenia.

*Note:* Data show the sum of the contributions from new firms and exiting firms to total labor productivity in manufacturing. Data cover different periods. Data for Georgia are for 2001–04, rather than a five-year window. Because a shorter period tends to underestimate the contribution of new firms to total productivity growth, the data are not strictly comparable.

tries alike (figure 2.3).[3] Chapter 3 examines the correlates associated with innovative activity in firms in the transition countries and compares them with the developed market economies of Western Europe.

## Entry and Exit Effects

Firm entry and exit have been important in transition economies. Firm turnover (the sum of firm entry and exit as a proportion of the total number of firms) was substantially larger in early reforming transition economies than elsewhere. In Hungary and Romania around 30 percent of firms entered or exited the market annually in the early years of transition, falling to 10–15 percent by 2004, close to the average of 10 percent in developed countries. In such late reformers as the Russian Federation and Ukraine, however, firm turnover was mostly under 10 percent throughout the period, suggesting higher barriers to entry and exit. Firm entry generally outpaced firm exit in transition economies, particularly in the early years, in contrast to more balanced entry and exit in other countries.

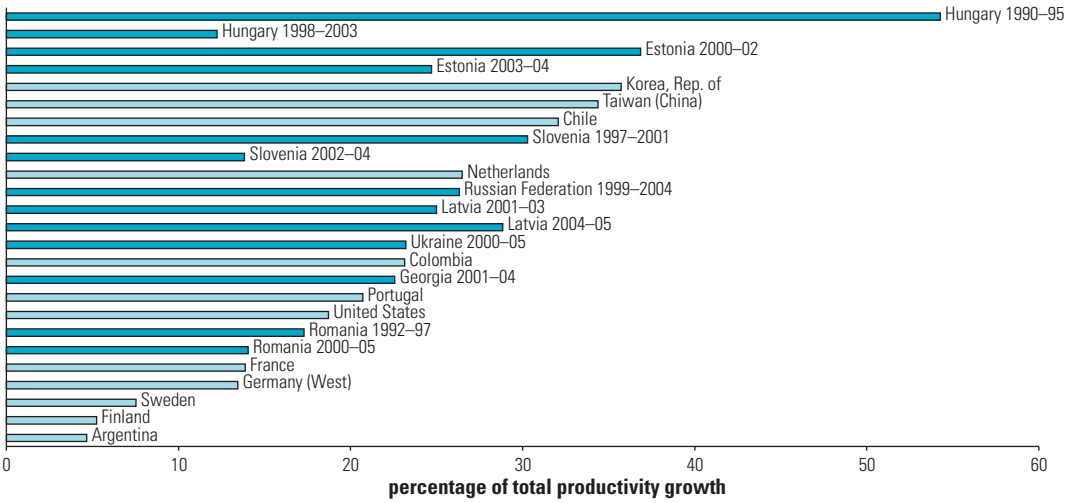
The imbalance, particular to transition countries, was not sustained in the longer run, as entry and exit moved broadly into balance in Estonia, Hungary, Romania, the Russian Federation, Slovenia, and Ukraine. This is because new firms at the beginning of the transition could adopt more efficient technologies and fill market niches that

were nonexistent under central planning. While within-firm productivity growth was dominant, entry and exit—or net entry—contributed relatively more to productivity growth in the transition countries, particularly in the early years of the transition in Estonia, Hungary, Latvia, Romania, and Slovenia and during the recovery from the 1998 crisis in the Russian Federation and Ukraine. The pattern is different in developed countries, where entry contributes less to productivity growth and in the United States reduces it. Firm exit generally contributed to productivity growth in developed, transition, and developing countries by raising the average for surviving firms. Net entry spanned a range from 15 percent to more than 50 percent of productivity growth in manufacturing in transition countries during the first decade in Estonia, Latvia, Hungary, Romania, and Slovenia and during the post-1998 recovery in the Russian Federation and Ukraine (figure 2.4). This was higher than in developed and other developing countries, where they accounted for 5–35 percent of productivity growth.

New private entrants were less productive in the year of entry than incumbents in Hungary and Romania but not in the Russian Federation and Ukraine (figure 2.5). (Incumbents include private incumbents as well as entrants with some state ownership.) In all four

FIGURE 2.4

**Contributions of Firm Entry and Exit to Productivity Growth**

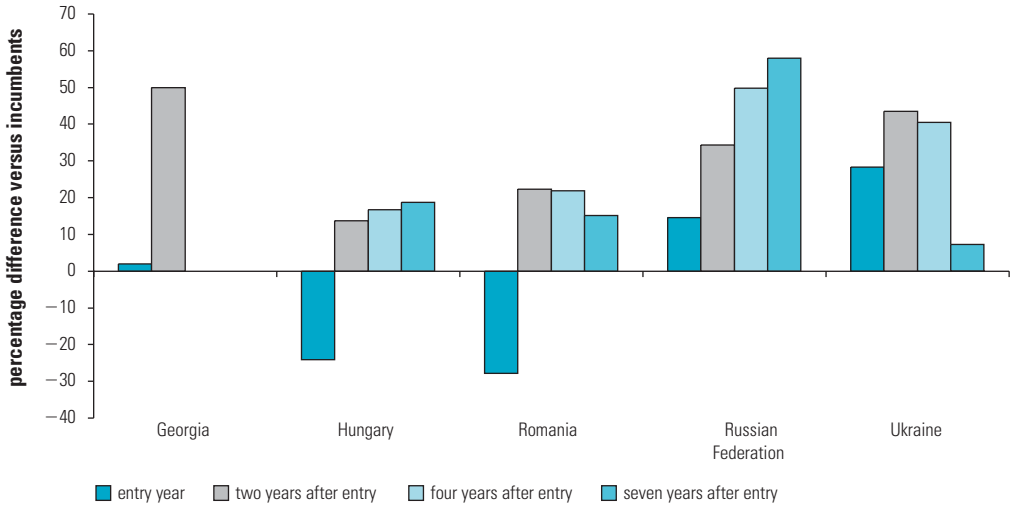



*Source:* Bartelsman, Haltiwanger, and Scarpetta 2004 for comparator countries. Brown and Earle 2007 for Hungary, Romania, Russian Federation, Ukraine, and Georgia. Bartelsman and Scarpetta 2007 for Estonia, Latvia, and Slovenia.

*Note:* Data show the sum of the contributions from new firms and exiting firms to total labor productivity in manufacturing. Data cover different periods. The contributions are calculated on the basis of five-year rolling windows for all but Georgia (2001–04) and Indonesia. Because a shorter period tends to underestimate the contribution of new firms to total productivity growth, the results for Georgia and Indonesia are not strictly comparable. The bars for Russian Federation and Ukraine for the early years of transition are not shown because the prolonged decline in output implies that measured labor productivity was negative during those years.

FIGURE 2.5

**New Firm Labor Productivity**




*Source:* Brown and Earle 2007.

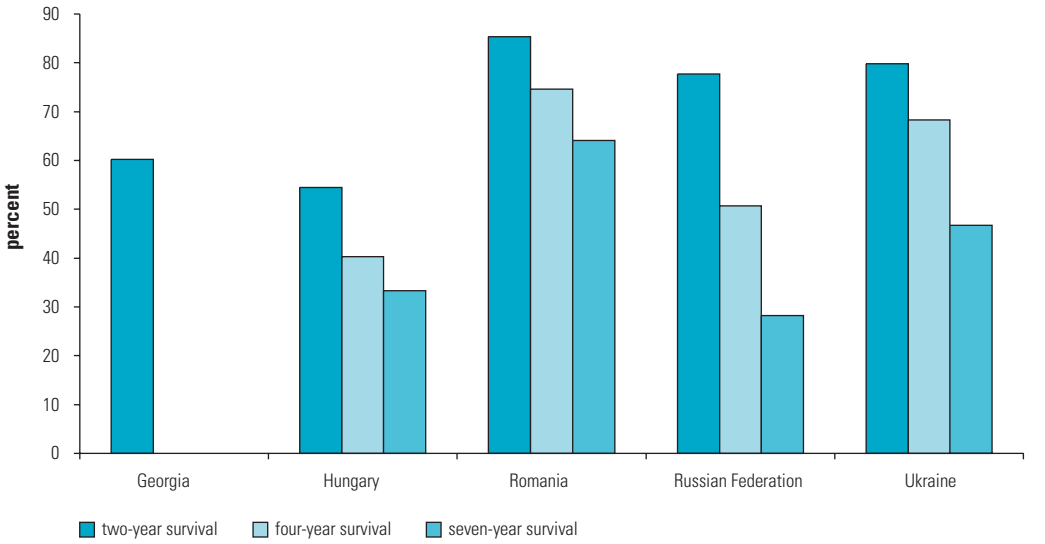
*Note:* Entrants with state ownership are classified as incumbents rather than entrants. These data are unweighted averages over 2001–04 for Georgia, 1991–2003 for Hungary, 1993–2005 for Romania, 1993–2004 for Russian Federation, and 1994–2005 for Ukraine, controlling for NACE two-digit sector-year effects.

countries, however, the productivity of entrants surpassed that of incumbents within two years of entry, indicating rapid learning in the new private sector. Indeed, productivity growth was higher among new private firms than old firms. The productivity advantage thus gained was maintained in all countries. It increased steadily for at least seven years in Hungary and the Russian Federation but was reduced after four years in Romania and only two years in Ukraine. The lower productivity of entrants relative to incumbents in Hungary and Romania, followed by their overtaking incumbents within two years, might signal an environment more conducive to learning and experimentation.

Survival rates after seven years were roughly 30 percent in both Hungary and the Russian Federation, implying that 70 percent of an entering cohort of new private firms did not survive after seven years (figure 2.6). Entrants were 25 percent less productive than incumbents in Hungary, but 15 percent more productive in the Russian Federation at entry. Survival to seven years thus involved a new private entrant having on average a clear edge over private incumbents in the Russian Federation at entry, whereas a clear disadvantage would have sufficed in Hungary, presumably because of greater learning opportunities.

In Romania and Ukraine four-year survival rates were broadly comparable at 70 percent. Entrants were nearly 30 percent less productive

FIGURE 2.6
**Survival Rates**




*Source:* Brown and Earle 2007.

*Note:* Entrants with state ownership are not included. These are unweighted averages over 2001–04 for Georgia, 1991–2003 for Hungary, 1993–2005 for Romania, 1993–2004 for Russian Federation, and 1994–2005 for Ukraine.

than incumbents in Romania, but nearly 30 percent more productive than incumbents in Ukraine at entry. Survival to four years thus involved a new private entrant having on average a clear edge over incumbents in Ukraine at entry, but a clear disadvantage in Romania. This applies even more to seven-year survival rates, which were around 15 percentage points higher in Romania than in Ukraine.

### Between-Firm Effect

Reallocations of resources between continuing firms (the between-firm effect) were mostly positive, so resources were indeed reallocated from less to more productive firms among continuers. The effect was modest before the transition, but greater once the transition began. This was so in Hungary, an early reformer in 1992–95, and in the Russian Federation and Ukraine, two late reformers, but not until their recovery from the 1998 regional financial crisis. Indeed, the between-firm effect was more important than the within-firm effect in the Russian Federation over 2001–04 and in Romania after 1998. It is important to note that productivity growth after 1998 in the Russian Federation and Ukraine did not occur simply from restoring labor productivity in incumbent firms to their pre-transition levels. It also came from reallocating resources among continuing firms and

from net entry. Together, the two were more important than within-firm productivity growth in the Russian Federation in 2001–04 and Ukraine in 2002–05.

### Cross Effect

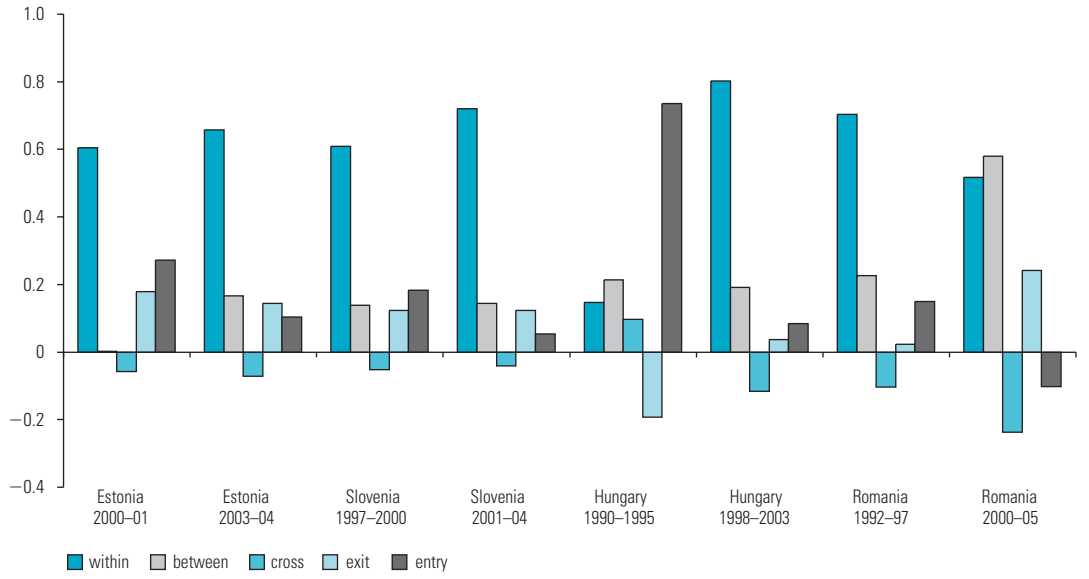
The cross effect tended to be negative in most countries, including the transition countries. This implies that, on average, firms experiencing rising productivity reduced their share of employment, while firms experiencing declining productivity raised their share of employment. The pattern of restructuring among continuing firms has therefore on average been defensive, characterized by downsizing and retrenchment, not strategic, reallocating labor to firms with rising productivity.

## Competition and Net Entry

Net entry was an important source of productivity growth at the start of the transition, but its importance relative to that of within-firm effects declined for early reformers—in Estonia (2000–04), Slovenia (1997–2004), and Hungary (1990–2003) and to a much less extent in Romania (1992–2005), where the reform effort was weaker in the early years (figure 2.7). Part of the explanation is that the profitable

FIGURE 2.7

**Sources of Productivity Growth, Selected Countries**



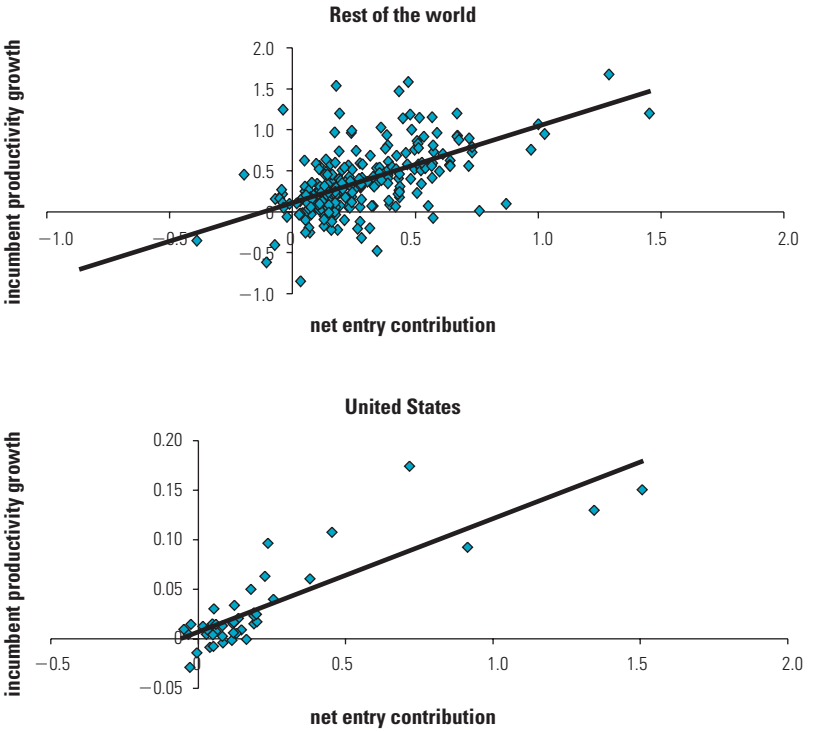

*Source:* Bartelsman, Haltiwanger, and Scarpetta 2004 for Estonia and Slovenia; and Brown and Earle 2007 for Hungary and Romania.

niches for entrants gradually disappeared as the transition proceeded. To the extent that the productivity gains from the historic misallocation of resources have been realized, this signals the end of the transition.

Net entry declines to levels more characteristic of market economies as the transition progresses. But that does not mean that it becomes unimportant. The contribution of net entry to productivity growth complements the within-firm effect. Indeed, there is a strong and significant correlation in the entire sample of developed, transition, and developing countries, taken together, between the contribution of net entry to productivity growth and the within-firm effect (figure 2.8). The competition generated by entry and exit—and the risk of failure to which that competition gives rise—can be associated with greater discipline among incumbent firms and with learning in incumbent firms.[4] This is true for the United States (figure 2.8). But the relationship does not hold when confined to the transition countries, except Slovenia, an advanced reformer and the wealthiest among the transition countries, now a member of the eurozone (figure 2.9). It appears

FIGURE 2.8

**Incumbent Productivity Growth and the Contribution of Net Entry**




*Source:* Bartelsman, Haltiwanger, and Scarpetta 2004; Bartelsman and Scarpetta 2007.

*Note:* Data in the "Rest of the World" figure exclude Brazil and Venezuela. Outliers are excluded.

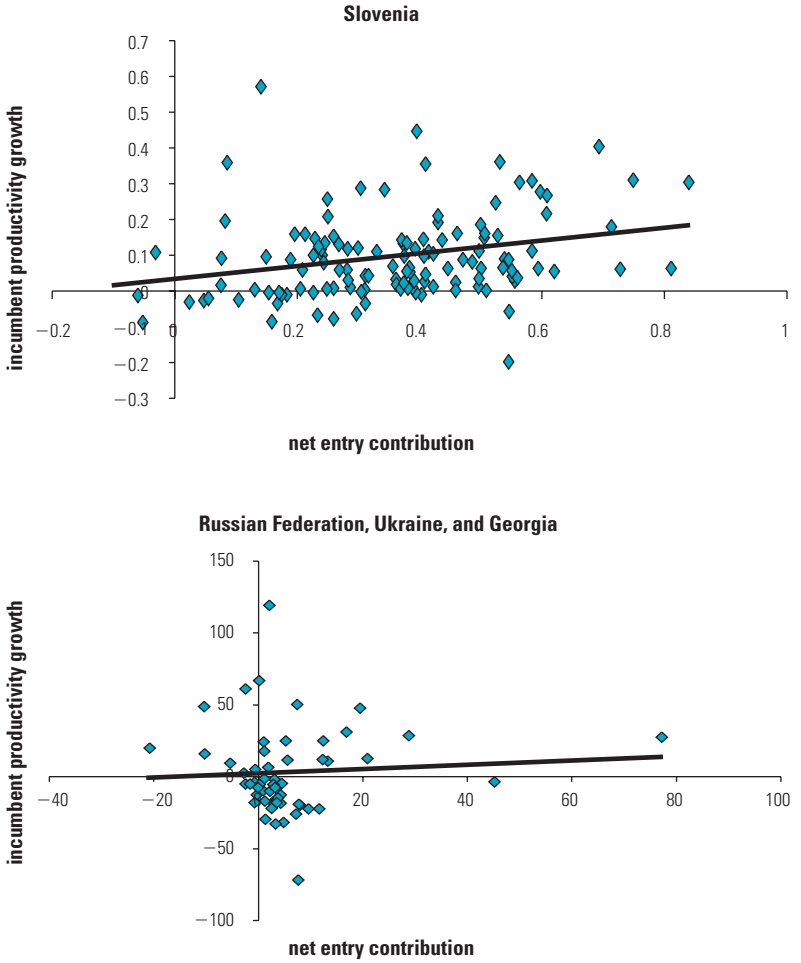
that net entry in transition economies has been a mechanism for changing the supply side of the economy and does not as yet signal the overall state of competition in the market. Only after the rates of entry and exit have settled down, can firm turnover pressure incumbents to perform better in a competitive environment. How competition in the transition countries compares with developed market economies and how it affects restructuring are discussed in Chapter 3.

## Agriculture

Low productivity in the low income CIS countries, especially in agriculture, explains why employment does not guarantee an escape

FIGURE 2.9

**Incumbent Productivity Growth and the Contribution of Net Entry**



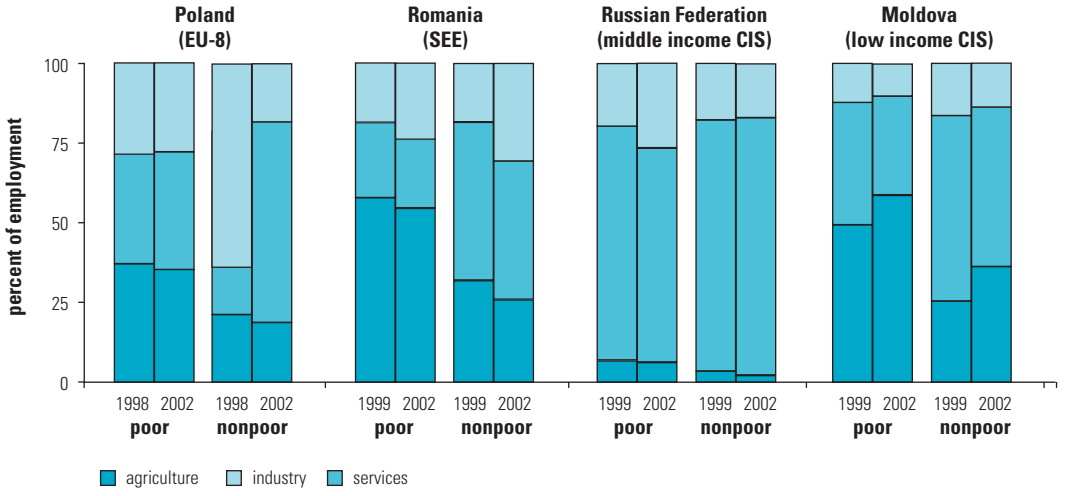

*Source:* Bartelsman, Haltiwanger, and Scarpetta 2004; Bartelsman and Scarpetta 2007; Brown and Earle 2007.

from poverty. Figure 2.10 shows that the poor are overrepresented in agriculture, and in some low income CIS countries employment in agriculture has expanded for the poor. This expansion, including self-employment, was preferable to unemployment from the deindustrialization that occurred when uncompetitive Soviet-era industry was faced with world prices at the onset of the transition. In subgroups of transition countries and other countries at broadly comparable incomes, agriculture is less productive than industry and services (figure 2.11). This explains why Chapter 5 will find that the risk of poverty for a household whose head is employed in agriculture is significantly higher than that whose head is in industry and services. Furthermore, a large part of the population (40 percent in Moldova and 20 percent in Georgia) relies on subsistence farming as the main source of livelihood, compared with 2 percent in Hungary and Poland, 11 percent in Romania, and 14 percent in the Russian Federation. With labor productivity in agriculture as low as in low income Asia, it is not surprising that poverty continues to be a major problem in the low income CIS countries.

The expansion of agricultural employment for the poor reflected the fact that the low capital intensity of farming served as a coping strategy in the absence of adequate social safety nets during the transition. Land distribution from large, formerly collective farms to poor rural households led to gains in labor productivity and, because of the labor inten-

FIGURE 2.10

**Sectoral Wage Employment for the Poor and Nonpoor, Selected Countries**

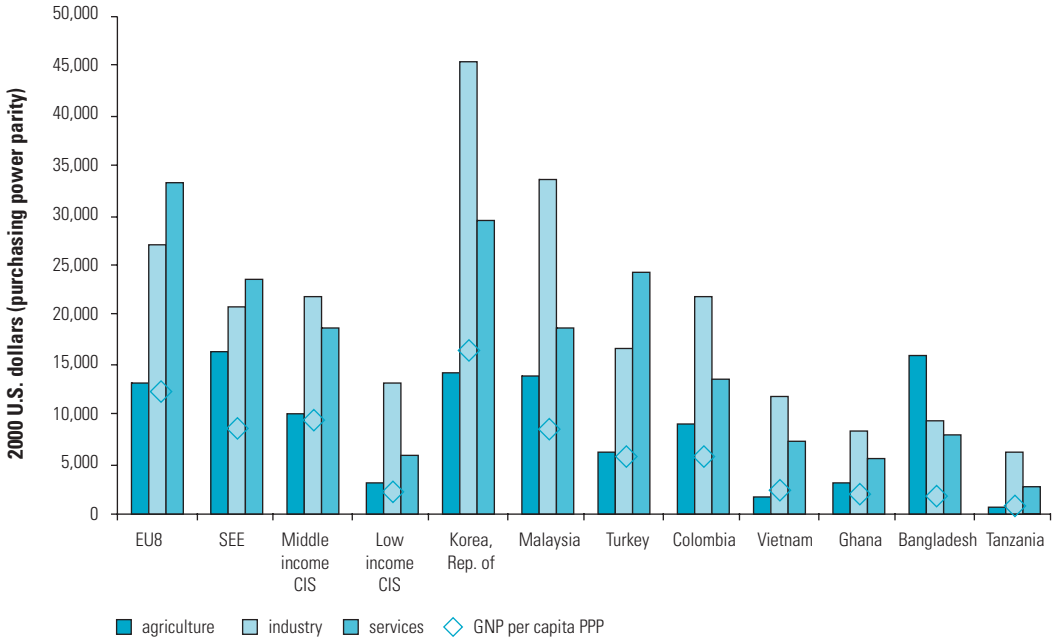



*Source:* World Bank staff estimates using data from ECA Household Survey Archive; World Bank 2005a.

*Note:* Sectoral employment data are derived from household survey data and may differ from official statistics; includes full-time and part-time employment with at least one hour of gainful work in the reference period of the survey. The data are not substantially altered when using purchasing power parities.

FIGURE 2.11

**Sectoral Value Added per Worker**




*Source:* World Bank World Development Indicators Database; ILO Key Indicators of the Labour Market (KILM) database; and World Bank staff estimates.

*Note:* Value added and GNP per capita data in 2000 PPP U.S. dollars for 2002, or the latest available year. For this figure, EU8 countries include Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic, and Slovenia. Southeastern European countries include Bulgaria and Romania. Low income CIS countries include Armenia, Azerbaijan, Georgia, Kyrgyz Republic, and Uzbekistan. Middle income CIS countries include the Russian Federation.

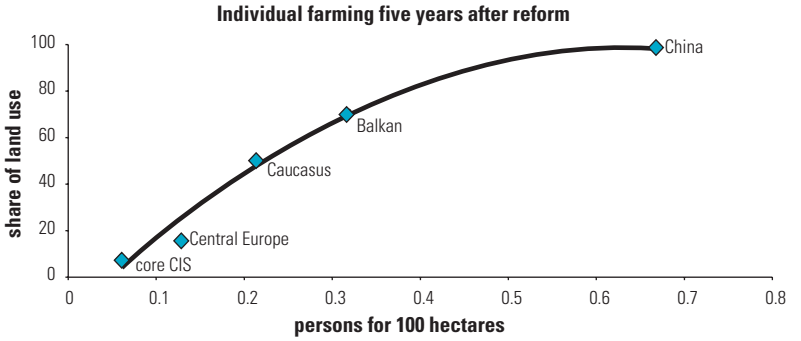
sity of agriculture in those countries, allowed an expansion of self-employment. The distribution of land plots, which was broadly comparable to those in China in the late 1970s and Vietnam in the mid-1980s, occurred in Albania, Armenia, and Georgia in the early 1990s, in the Kyrgyz Republic in the mid-1990s, in Azerbaijan in the late 1990s, and in Moldova after 1999. The correlation between labor intensity in agriculture and the growth of household farming is high (figure 2.12).

Developments in agriculture in the low income countries mirrored those in business, where old firms released assets that new firms could use to attain higher productivity through learning. In the Kyrgyz Republic productivity was low in agricultural enterprises and could be increased by redistributing the significant share of arable and pasture land still occupied by those enterprises to higher productivity peasant farms. Those farms, which formed the basis for the Kyrgyz Republic's agricultural transformation, account for the bulk of arable land use, agricultural value added, agricultural employment, and the land lease market.

But the boost to labor productivity from land redistribution, though important and illustrating the need to complete farm restruc-

FIGURE 2.12

**Factor Intensity and the Growth of Household Farms**




*Source:* Rozelle and Swinnen 2004, as reported in World Bank 2005a.

turing in countries where it has slowed or stalled, was a one-off event. And without a social safety net, absorbing an older labor force into semi-subsistence farms lowered productivity. Continuing gains in labor productivity will require on-farm technology transfer to improve yields for crops and livestock. It will also require better integration of agricultural households into labor markets to provide off-farm employment or access to urban labor markets in order to reduce surplus labor. And it will require better credit markets, reduced marketing costs, and improved rural service delivery, to strengthen the human capital of rural households.

In middle income CIS countries such as the Russian Federation and Kazakhstan, the higher capital intensity of agriculture implied that restructuring large farms would produce neither higher incomes nor higher unemployment. The devaluation after the 1998 financial crisis in the Russian Federation pushed up relative prices and farm profitability without any big increase in productivity. Higher productivity will require better integration with markets for other inputs and factors, markets that had collapsed in the early years of the transition. Similarly, the capital-intensive agricultural production systems in Southeastern European countries, such as Bulgaria and Romania, implied that productivity gains from shifting to small farms were less than those in poor countries with labor-intensive agriculture. And with social safety nets less developed than in the EU8, those laid off had to rely on subsistence farming, increasing the share of employment in agriculture (see figure 2.10). Low access to credit, inputs, and technology and limited off-farm employment opportunities in rural areas continue to constrain rural growth and highlight what needs to be done to develop agriculture.

Much of the growth in agricultural labor productivity in the EU8 countries came from substantial labor shedding in large-scale farms. Those laid off either found jobs in other sectors, became unemployed, or went into retirement, thanks to generous social safety nets, fiscally affordable because of the initially low agricultural employment in those countries. At 9 percent, the share of agricultural employment in the EU8 is close to the benchmark for the European Union. Growth in agricultural labor productivity has been more rapid in the Czech Republic, Estonia, Hungary, Lithuania, and the western and northwestern regions of Poland and the Slovak Republic, which are dominated by large-scale farming. But substantial increases in investment and intermediate inputs imply that the growth in total factor productivity has been less than that of agricultural labor productivity in the Czech Republic and Hungary. Labor productivity has grown more slowly in the eastern and southern regions of Poland and in Latvia and Slovenia, where small-scale farming is more prevalent. Better electricity, transport, and financial services, driven by liberalization, can boost labor productivity in agriculture in the EU8.

## Services[5]

The contribution of services to GDP increased substantially after the beginning of the transition, now ranging from 43 percent in the low income CIS countries to 62 percent in the EU8 and Southeastern European countries. Services' share in GDP among the middle income countries of the region during 2001–04 varied from around a third in Serbia and Montenegro and Macedonia to more than half—higher than the average in the EU15—in Estonia and Latvia.[6,7] The sector's share in employment over the same period ranged from a fifth in Romania to around a third in Estonia, Croatia, and Latvia. Within services, transport, telecommunications, and financial services—the backbone services—and retail trade in the EU8 countries exhibited the strongest productivity growth in 1997–2000 and 2000–04.

Liberalizing services typically combines competition (dismantling entry barriers) with better regulation (establishing an appropriate legal and institutional environment). There is a strong association between service liberalization and the productivity performance of service sectors. If recent productivity growth continues, it will improve the efficiency of those services. The efficiency of service industries is important for two reasons. First, these sectors contribute directly to overall economic performance. Second, service industries

are critical inputs for downstream manufacturing sectors, contributing on average around 10-20 percent to the cost of a product and accounting for all trading costs (transport, trade finance, insurance, communications, and distribution services). Manufacturing industries that rely more on inputs from more liberalized service sectors have higher productivity than other manufacturing industries. High quality services also make a location more attractive for foreign direct investment. Such improvements are important for the external competitiveness of sectors using services and enable their deeper integration into global production chains, a subject which is further explored in Chapter 6. On average, more progress in liberalizing services has been made in the telecommunications and electricity industries and in the EU8, Bulgaria, and Romania.

## Endnotes

1. In figure 2.2 and the accompanying text, EU10 refers to the new member states of the European Union (the EU8, Bulgaria, and Romania).
2. A formal statement is contained in the appendix.
3. The within-firm effect, whose precise formulation is shown in the appendix, can reflect measurement errors in price changes associated with quality differences or volatile inflation. It thus requires cautious interpretation (Brown and Earle 2007).
4. Such a correlation could also arise if there are technological improvements benefiting both incumbents and new entrants. But the possibility of this generating the correlation can be ruled out. This is because the within-firm effect is also positively and significantly correlated with the rate of firm turnover.
5. For a fuller account see World Bank (2008a)
6. The service sector in this comparison is defined to include market services and public utilities, excluding government services and construction.
7. The countries in the comparison include Bulgaria, Croatia, Macedonia, Romania, Serbia and Montenegro, Ukraine, Russian Federation, and the EU8 countries.