Success and Failure of Reform:

Insights from the Transition of Agriculture

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Abstract

The paper analyzes the linkages between the reform strategies in transition countries and economic performance. We focus on agriculture because of the sharpness of the policy changes, fundamental differences among countries, and relative simplicity of agricultural relationships. We document post reform performance in the transition countries of Asia and Europe. We show how: a.) pricing reform and subsidy reductions; b.) land rights reform and policies that affect farm restructuring; and c.) the presence institutions that facilitate exchange (either markets or market substitutes) affect output and productivity. The paper ends with general lessons on reforms and transition.

JEL codes: P2; P3; Q1
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1. Introduction

More than 20 years ago, China embarked on its economic reform path by introducing the household responsibility system (HRS) in agriculture. A few years later, Vietnam followed. Both countries reduced price distortions and reallocated key land rights from collective farms to rural households. The impact was dramatic. Productivity and incomes in both countries soared (Justin Lin, 1992; John McMillan et al, 1989; Prabhu Pingali and Vo-Tong Xuan, 1992). The reforms lifted hundreds of millions of rural households out of dire poverty (World Bank, 2000). Economists praise the Chinese reforms as the “biggest antipoverty program the world has ever seen” (John McMillan, 2002, p. 94) and have claimed that the reform policies have led to "the greatest increase in economic well-being within a 15-year period in all of history" (Stanley Fischer, 1994, p. 131).

As a consequence, expectations were high ten years later when leaders in many nations of Central and Eastern European (CEE) and the former Soviet Union began to dismantle Socialism and liberalize their agricultural economies. Reformers implemented a bold series of policies, increasing incentives and modifying the institutions within which rural residents lived and worked. The reforms, however, disappointed many nations. Farm output fell and rural poverty increased (Karen Brooks and John Nash, 2002).

The sharp differences among nations in the early impacts of agricultural reform and transition in the rest of the economy triggered an intense debate on the sources of growth (Mathias Dewatripont and Gérard Roland, 1992; 1995; Kevin Murphy, Andrei Shleifer and Robert Vishney, 1992; John McMillan and Barry Naughton, 1992; Jeffrey Sachs and Wing Thye Woo, 1994; Gérard Roland, 2002). Some researchers, especially those studying East
Asia, credit the gradual sequencing of reforms that initially focused mainly on reforming property rights and delayed any major changes to the marketing system (Perkins, 1988). For example, Lin (1992), McMillan et al (1989) and Pingali and Xuan (1992) attribute most of the success of the agricultural reforms in China and Vietnam to the rise in the incentives provided by decollectivization. The case of China demonstrated that transition in agriculture could succeed, at least in the early years, without the disruption caused by the dismantling of government-run marketing channels and in the absence of well-functioning markets (McMillan and Naughton, 1992; Alan deBrauw et al., 2000; 2003).

In reaction to the claims about East Asia, skeptics responded that rural development in China and Vietnam occurred primarily as a result of low initial levels of development (Sachs and Woo, 1994). Post reform growth was nothing more than the rise in economic activity that was experienced elsewhere in East Asia during the post World War II era. Others have been even more antithetical. Leszek Balcerowicz (1994, p. 34) writes that the use of the ‘Chinese Way’ as an argument in favor of gradual reforms in CEE and CIS is "a patent misuse of the facts." Gordon Hughes (1994, pp. 135-6) states that "China's path is in no way relevant to the structural problems faced in Eastern Europe and the FSU" and should be "no guide to what can or should happen."

As the reforms in CEE and the Commonwealth of Independent States (CIS) have unfolded, differences in economic performance among transition nations outside East Asia complicate the puzzle. As we show in this paper, although agricultural output fell uniformly across Europe in the wake of the reforms, based on other measures, within a short period of time the farming sectors in Hungary, the Czech Republic, Slovakia and other nations responded positively. Output per unit of labor rose sharply. Total factor productivity (TFP) in agriculture grew as strongly in CEE within a few years after the fall
of the Berlin Wall as it did at a similar point in the reform process of China and Vietnam (Songqing Jin et al., 2002; Dwayne Benjamin and Loren Brandt, 2001; Karen Macours and Johan Swinnen, 2000a).

Agriculture, however, did not fare as well in most CIS countries. Although many policies—especially price adjustments and subsidy removals--were common across CEE and the CIS nations, others, such as farm restructuring and the liberalization of marketing institutions, proceeded more gradually in most CIS nations. A careful examination of the subsequent outcomes suggests that the nature of reform matters. While the magnitude of the collapse in terms of output was no worse in the CIS nations than in CEE, when measured in terms of productivity, the go-slow strategy in the CIS nations faltered. Productivity in Russia, Ukraine and Kazakhstan not only fell sharply during the immediate post reform period, it continued falling or remained stagnant during most of the first decade of transition. Examined through the lens of productivity, the patterns of performance are more similar between East Asia and CEE than they are between CEE and the CIS nations.

Given these intriguing combinations of policies and performance, we believe a renewed inquiry into the debate about the impact of reform on economic performance is due. The commonalities and differences of the nature of reform among East Asian, CEE and the CIS nations and the subsequent productivity contours call for a careful comparative analysis. To do so, we turn to the literature and build an empirical picture of the policies and institutional shifts that triggered agricultural growth in some of the world’s 28 transition nations and led to stagnation in others. The lessons learned from the process of transition in the agrarian development of most of the formerly Socialist countries can inform policymakers and scholars about the choice of reform strategy and the relationship between reform and economic growth.
Focusing on agriculture to analyze which policies contribute to success and failure of economic reform has several benefits. The sharpness of the policy changes in agriculture and the fundamental differences among countries provide as clean a test as we can get. The relative simplicity of agricultural relationships—a farm is an easier production entity to analyze than an industrial firm—also adds clarity to the analysis. Hence, far from being a limitation of the study, our analysis of the reforms of price policy, property rights and market liberalization in agriculture will yield important general lessons for those interested in the more fundamental relationships between reform, institutional change and growth.

A study centering on agriculture also is inherently interesting, especially to those studying economic development. For example, in most East and Central Asian nations agriculture dominated the economy during transition and the changes in the sector have had an important impact on overall economic performance (Dwight Perkins, 1994; Anita Chan, Ben Kerkvliet, and Jon Unger, 1999; David Green and Richard Vokes, 1998). When more than 50 percent of a nation’s labor force is employed in agriculture, and when the major share of consumer income is spent on food, successful agricultural reform can have a major impact on poverty reduction and the welfare of the population. In fact, in studying the link between policy and performance, we believe that there are lessons for those studying economic performance outside the transition world.

To meet this goal, we pursue three specific objectives. First, we systematically document the post-reform trends in the agricultural performance in all transition countries of Asia and Europe.¹ Second, we discuss three key reforms, price and subsidy changes, property rights reform and market liberalization, and review the evidence linking them to

¹ A list of the 28 transition countries that we examine (some in more depth than others) by their geographical categorizations is in Appendix A.
the observed rises and falls in output and productivity. Finally, in the last section, we review our general findings and draw a series of lessons.

While the transition literature is rich and we document, analyze and discuss many issues, we believe studying agriculture reform and performance leads to three new sets of insights. First, unlike the view of skeptics that find little in common among reform experiences across the transition world, the literature and data from East Asia, Central Europe and the CIS nations provide a consistent picture linking reforms in agriculture to the performance of the sector. In particular, the miraculous growth of output in East Asia and the crash in output in CEE and the CIS nations can almost fully be explained by the shifts in the relative terms of trade. Second, while the performances during the initial reform years differ dramatically in terms of output contours between East Asia and CCE, when measured in productivity, however, the paths are remarkably similar. Property rights reform—decollectivization in East Asia and land restitution and farm restructuring in some CEE nations—gave strong income and control rights to producers which in turn resulted in strong productivity growth. The emergence of institutions of exchange also played an important role in explaining East Asia and CEE productivity growth. Finally, our analysis demonstrates that the real outliers in the reform process are the CIS nations. The absence of markets and poor property rights exacerbated the deteriorating performance caused by falling output-to-input price ratios and mired many CIS countries in a decade of productivity stagnation.

Based on these insights, several general lessons emerge. When measuring success, it is important to carefully compare the performance of transition nations on the basis of productivity, not output. Definition of success changes fundamentally when comparisons are based on productivity. In addition, while we find that initial conditions and the
sequencing of policies do make a difference in making reform policies successful, our analysis suggests that above all success requires two key elements: good rights and an institutional environment within which agents can exchange goods and services and access inputs. However, despite the need for rights and markets or market substitutes, we also find that there clearly is much room for experimentation and heterogeneity. In the final analysis, on the basis of our study of the first decade of agricultural transition we find that growth and rising efficiency occurred in almost all nations in which reformers created property rights and improved the marketing environment.

2. Success and Failure in Raising Production and Productivity during Transition

Before trying to reconstruct the record of the agricultural sectors in transition economies, we must agree on what constitutes success. As noted by early development economists, agriculture performs several important tasks for a developing nation—especially in the early stages of development (Bruce Johnston, 1970). Agriculture is a source of plentiful and inexpensive food. It also provides labor for the industrial and service sectors of developing nations. In addition, agriculture supplies non-food commodities (e.g., fiber products, coffee and cacao, and tobacco) for the domestic consumers and traders. Finally, the sector also creates linkages with other domestic industries and generates consumer demand.

Within the context of such a conceptual framework it is easy to see why so many nations—especially those that are fairly poor—attach great importance to the production of agricultural output. Higher food production increases the supply in domestic food markets. Increased output also provides higher incomes. For these and other reasons, many nations assess the success of their agricultural economy largely on the basis of output growth.
In some cases, however, output may not be an ideal measure. Specifically, using rising output as a metric of success could be deceiving for transition nations since prior reform most economies were characterized by high levels of distortion. In fact, it is possible that if the prices at the beginning of transition were distorted enough that output would fall or rise sharply merely in response to policies that allow prices to shift back to those that more reflect the long run scarcity value of the resources. Following this logic, if a country had heavily subsidized inputs and output prices prior to reform, successful price reform should reduce domestic production.

In contrast, in all countries (both those in which rising output is a sign of success and those in which it is not), rising productivity is necessary for a successful agricultural sector. In assessing ways that agriculture can play a positive role in an economy, rising productivity can help policy makers meet many of their economic goals. Rising productivity through policies that provide better incentives and reduce resource waste (as a result of both better incentives and more complete control rights) will a.) lead to rising food and non-food agricultural production; b.) contribute to higher income; and c.) make the sector more modern. Getting more output out of fewer inputs can leave scarce resources free to either expand output, or allow resources to shift to higher productive activities.

Because of the above arguments, in the rest of the paper we track both output and productivity. Productivity, however, will be our primary metric of success. We recognize that it is not complete and does not capture all dimensions of the short- and long-run effects of reforms on those inside the sector or on the sector’s ultimate impact on the economy as a whole. However, rises in productivity of the sector does have many benefits and is an important indicator of the sector’s health.

Many transition economies also have a relatively small share of the population in the agricultural sector so
2.1 The Record of Agriculture in Transition Economies

Remarkable differences can be observed when examining the performance of agriculture in transition countries during the first decade of reform. From the start of the reforms, output increases rapidly in East Asian transition countries (Table 1, rows 1 to 5). In China output increases by 60 percent; in Vietnam output also rises sharply, increasing by nearly 40 percent (Figure 1).

Outside of East Asia agricultural output trends follow a different set of contours (Figure 1). Production falls steeply in the first years of transition in almost all CEE and CIS countries. Importantly, however, the length of time between the beginning of reform and the bottom of the trend line varies among nations (Table 1, column 1). For example, the decline in agricultural output stops soonest in Balkan countries as Albania, Romania, and Slovenia (after 2 to 3 years). In most Central European countries, such as Poland, Hungary, and the Czech Republic, and in some Central Asian countries, such as Kyrgyzstan, Turkmenistan, and Uzbekistan, the decline lasts somewhat longer (5 to 6 years). Finally, in a group of other countries, including the Baltic nations and several of the CIS nations, such as Russia, Belarus, Ukraine, Kazakhstan, output declines for most of the decade after reform, falling to around 50 percent of pre-reform output.

Productivity trends tell a somewhat different story of how transition affects agricultural performance. While productivity trends evolve similarly to output in certain countries, strongly diverging patterns emerge in others. To get a comprehensive picture of productivity developments and to accommodate important data constraints, we analyze three sets of productivity indicators: labor productivity (output per unit of labor use), yields

rising output will not lead directly to higher incomes for much of the population.
(output per unit of land), and total factor productivity (TFP). While the most comprehensive indicator of productivity is TFP, comparative and reliable estimates of TFP are scarce because of data and methodological problems. For some transition countries TFP measures and the data needed to calculate TFP measures are simply not available. For those countries in which TFP series are available, in some cases, comparisons have to be done carefully because of differences in methodologies, time frames, sampling and commodity coverage. Information for the partial productivity measures is more readily available, and so we start by examining indicators of partial productivity and complement the analysis with a review of estimates of TFPs from the literature.

For the entire reform period, trends in agricultural labor productivity (ALP), measured as output per farm worker, parallel those of output for some countries, but differ for others (Figure 2). Like output, ALP of farm households in China and Vietnam rise steadily albeit much stronger in China than Vietnam (Table 2). In both countries labor productivity increases especially several years after the initiation of the reforms. The path of ALP for Russia, Ukraine and Central Asia also mirror those of the nation’s output, falling between 35 and 50 percent between 1990 and 1999. Agricultural labor productivity trends for several CEE countries, however, differ from those of output, actually outperforming East Asia (Figure 2; Table 2). For example, despite falls in aggregate output, output per worker more than doubles over the first decade after transition in Hungary. ALP also rises strongly in the Czech Republic, Slovakia and Estonia. In Poland, Latvia, and Lithuania, although ALP falls immediately after reform, the indicator recovers and rises after the first four years. In Albania, ALP increased rapidly between 1992 and 1995 but leveled off afterwards.
Despite the difficulties of working with official data on labor use in agriculture in transition economies, labor use patterns help explain part of the divergence of output and ALP patterns for some countries (Figure 3). The dramatic reduction in the use of agricultural labor drives the rise of ALP in the Central European countries. Official employment data from Central Europe show an average reduction of labor use of 35 percent during the first 5 years of transition. The strongest reductions occur in Hungary (57 percent) and the Czech Republic (46 percent). The same process occurs in Estonia, a country in which labor use declines by 58 percent within the first 5 years of reform.

In contrast, agricultural labor use rises in East Asia and part of the CIS nations, affecting ALP in either a neutral or negative way (Figure 3). For example, although ALP rises in East Asia, as it does in Central Europe, labor use does not fall. Labor use in agriculture (as a whole—that is cropping, livestock and other subsectors) actually increases in both China (10 percent) and Vietnam (25 percent). In both countries the increase in ALP evidently comes from the strong increase in output. Agricultural labor use also increases in

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3 Official data on labor use in transition agriculture are prone to measurement errors and statistical problems and should be interpreted with care. Different data sources often provide different numbers and do not always distinguish between full-time and part-time employment. Hence, in those countries in which more part time work is being done, but which continue to report all producers involved in agricultural production as full-time labor units, labor productivity trends will be understated. Also, the aggregate data hide important other reallocations of labor. For example, while overall labor use in agriculture in China rose slightly during the first five years after reform (10 percent), major efficiency gains in cropping occurred from the reallocation of labor from crops to livestock production and other sideline activities (e.g., various self-employed enterprises—Nicholas Lardy, 1983; Shenggen Fan, 1991; Jin et al., 2002). Also, in other transition countries official labor data hide important changes in effective labor input. For example, in some of the CIS countries where former collective and state farms have survived, labor is often underemployed and members of rural households are officially still employed on these farms, even though they often spend a considerable part of their time working on their own household plots and are engaged in a myriad of other sideline activities (Zvi Lerman, Csaba Csaki and Gershon Feder, 2002). In such countries, the effect of these misreportings are ambiguous and depend on whether or not the output produced on their own plots are included in output figures. If private plot output is included, we, in fact, will be measuring rising productivity when it is actually rising. If the output of these plots is not included in reported output, labor productivity measures will be underreported like those in countries in which agricultural laborers are shifting from full to part time farmers. We use data from the Asian Development Bank for Azerbaijan, Kazakhstan, Kyrgyzstan, Moldova, Tadjikistan, Turkmenistan and Uzbekistan because for most of these countries there are no consistent data in the ILO’s database for the full period.
some CIS countries, in particular in Central Asia. For example, in Kyrgyzstan agricultural employment surged between 1990 and 2000, rising by 64 percent (ILO, 2001). There, as in other countries in the region, a rising number of people in agriculture coupled with stagnant output lead to a fall in ALP.

The performance of yields parallels those of ALP (Table 3; Figure 4). In China yields increase rapidly from the beginning of transition, rising by 12 percent annually during the first 5 years after reform (row 1). Between 5 and 10 years after reform, yields continue to rise, although the rate of rise slows. Pingali and Xuan (1992) also document the rise in yields during the early years of Vietnam’s transition. In contrast, average yields fall during the first few years after reform for all CEE and CIS countries.

But, as in the case of labor productivity, after the initial post-transition years, the paths of yields differ strongly between the two regions after the first several years of reform. Figure 4 summarizes yield evolutions for selected crops (grains, sugarbeet, and cotton) and milk. In the European CIS states, including Russia and Ukraine, yields fall rapidly during the first five years to levels about 25 percent lower than pre-reform yields. In the second part of the 1990s yields stay at this low level and in some cases continue to decline. In Central Asia, yields also fall by more than 25 percent during the first years of transition. In the final years of the first decade of reform, the yields of some crops, such as grains, begin

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4 A number of factors increased the size in terms of laborers of the agricultural sector in countries such as Romania, Armenia, and several Central Asian nations. Policy, demographic and macroeconomic pressures, and other factors contributed to the rise of agricultural labor use in many countries. For example, in countries where the agricultural sector worked as a buffer after a collapse of the industrial economy (e.g. Romania, Kyrgyzstan), and in fact absorbed labor from other sectors. As in Vietnam, rapid population growth also contributed partly to the labor inflow in several Muslim countries, such as Uzbekistan and Turkmenistan. Finally, other events also contributed to rising agricultural labor. For example, in Armenia a regional conflict disrupted critical imports and industrial production, and many people migrated to rural areas.

5 In table 5, the only exception is Romania where strong increases in dairy yields more than offset declines in crop yields.
to recover; however, those of cotton, the most important commodity in several Central Asian countries, continue to fall.

In contrast, in Central Europe yields not only decline less than those in the CIS states, by 10 to 15 percent on average during the first few years of transition, they also begin recovering faster (generally from the third year of transition onward). Between 1992 and 1999 agricultural yields increase, on average, by 2.5 percent annually. A similar, but more pronounced, yield pattern can be observed in the Baltics. Average yields in the Baltics dropped initially to almost 25 percent below their pre-reform levels. In the second half of the mid 1990s, however, they recover, rising by an average of 3 percent annually. As in Central Europe, yields decline less in the Balkan countries, only 10 to 15 percent (in total), on average, although their yield recovery is slower, an average of 0.9 percent annually during the second half of the 1990s.

In the same way that changes in labor use affect ALP, changes in the use of inputs (including labor and other inputs, such as land and fertilizer) affect yields, although different inputs exhibit different rates of change (Table 4). Tractor use, for example, declines sharply in most countries to around 70 percent of the pre-reform rate (columns 3 and 4). The input that best reflects the differences in how input use has responded is fertilizer (columns 1 and 2). In cases, such as China, fertilizer application rates soar during the reform period, rising by more than 300 percent (Bruce Stone 1988). While part of the reason that fertilizer rises so much in China and Vietnam is the release of supply-side constraints, reform policies also are important (Qiaolun Ye and Scott Rozelle, 1994; Pingali and Xuan, 1992). In contrast, fertilizer use plummets in most CEE and CIS countries to around one-quarter of the pre-reform level of fertilizer use. On average, in the late 1990s fertilizer use outside East Asia is only 25 to 30 percent of its level in the late 1980s.
Although it is possible that partial and more complete measures of productivity could move in opposite directions, most of the evidence from the transition literature shows that, in fact, total factor productivity (TFP) trends move largely in the same direction as the partial measures (Table 5). Several series of TFP estimates have been produced for China’s agriculture (McMillan, Whalley and Zhu, 1989; Fan, 1991; Lin, 1992; Guangzhong Wen, 1993; Jikun Huang and Scott Rozelle, 1996; Shenggen Fan, 1997; Jin et al., 2002—see rows 1 to 5 for Jin et al’s estimates). The studies uniformly demonstrate that in the first years after reform (1978 to 1984), comprehensive measures of productivity (either constructed TFP indices or their regression-based equivalents) rose by 5 to 10 percent per year. Although Wen (1993) worries that TFP quit growing in the post-reform period (1985 to 1989), Fan (1997) and Jin et al. (2002) demonstrate that during the 1990s, TFP continues to rise at a rate of around 2 percent per year. During the early reform period in Vietnam between 1980 and 1985, Pingali and Xuan (1992) demonstrate that the productivity of agriculture (in this case rice, which makes up a large part of the nation’s agricultural output) rises by 2 to 3 percent annually. Although no one has analyzed the rise in productivity between years 5 and 10 after the reforms, Benjamin and Brandt (2001) estimate that between 1992 and 1997, TFP for rice and total crop output generally continues to rise in Vietnam (though in the case of total crop output, TFP growth differs between the south—positive, and the north—negative).

Estimates of TFP changes in CEE and the CIS countries also show that measures of TFP generally move in a manner consistent with the partial ones (Table 5. Karen Macours and Johan Swinnen (2000a) estimate that TFP indices in Central European agriculture decline during the first three years of transition (between 1989 and 1991) by 2.3 percent annually. The indices, however, rebound strongly after three years of reforms, rising by 4.5
percent annually between 1992 and 1995. The Balkan countries demonstrate a similar, but more pronounced pattern, falling by around 7 percent annually over the first three years before increasing by more than 7 percent annually during the subsequent three years. TFP estimates by Zvi Lerman et al (2003) shows that productivity increases between 1992 and 1997 in two Baltic countries (Estonia and Lithuania) and, quite strongly, in two Transcaucasian countries, Armenia and Georgia. Similar to the movements of labor productivity and yields, TFP declines significantly in the Central Asian countries.

Perhaps because of the size and strategic importance of Russia and Ukraine, relatively more work on TFP has been done on these countries, although the results are less consistent than those for other parts of the reforming world. For example, Lyubov Kurkalova and Helen Jensen (2003) find that technical efficiency on Ukrainian collective and state farms declined during early transition (1989-1992). Likewise, several studies find that the efficiency of Russian farms also decline significantly during transition, results that are consistent with the trends in ALP and yields (Sergey Sotnikov, 1998; David Sedik, Michael Trueblood and Carlos Arnade, 1999; and Michael Trueblood and Stefan Osborne, 2001). Trueblood and Osborne (2001), for example, conclude that their results “support the conventional wisdom that overall productivity [in Russian agriculture] has declined in the reform period” (p. 10) and that productivity declines by 2.1 percent annually between 1993 and 1998 and they find “no evidence of a productivity rebound.”

The case of Russia and Ukraine, however, is perhaps the only one in which the partial measures differ from the TFP measures from some of the studies. Lerman et al. (2003) estimate that TFP increases in Russia and Ukraine between 1992 and 1997, a time when its partial measures are falling. Likewise, Murova, Trueblood and Coble (2001) find
a slight increase in technical efficiency of Ukrainian crop farming over the 1991 to 1996 period.  

In summary, the records of transition countries differ across regions and over time within regions. Different criteria also paint different pictures of success. In the early reform years, East Asian transition countries clearly perform the best during the first years of reform in terms of both output and productivity. However, after an initial few years, several CEE countries begin to experience rising productivity, measured either as labor productivity (ALP), yields or TFP. Productivity measures rise throughout the later transition period (years 4 to 10) in both Central Europe and East Asia, even though the direction of output in the two sets of countries moves in opposite directions. Productivity in Central Europe rises even as output falls, primarily because inputs fall even faster. Hence, when critics of the transition in CEE nations point to the collapse of output as an indicator of poor economic performance, it is not clear that they always have a valid point.

According to the TFP measures, the efficiency of producers of a number of CEE transition nations improves significantly a few years after transition. Such a pattern not only characterizes Central European countries but also several Baltic and some Balkan countries.

The record is less positive in the CIS. Output and labor productivity fall sharply in almost all CIS countries during most of the first decade of reform. Hence, according to both partial and most full measures, productivity during the first ten years of reform fell in most CIS nations. Despite this, there is evidence that TFP increases in some Transcaucasian countries, such as Armenia and Georgia. Moreover, some studies indicate that TFP may have increased in Russia and Ukraine, especially in the second half of the 1990s. The

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6 As we will explain in section 3, the inconsistent results for Russia are likely due to differences in sampling and reflect variations in the performance of different farm structures with the countries. An update of the
findings of these studies contradict those from the rest of the literature. Interestingly, and perhaps a sign that productivity trends are beginning to turn even in the slower moving CIS, indicators in some nations show that although productivity fell with output during a significant part of the first decade, there is evidence of the beginning of improvements in productivity since the late 1990s (EBRD, 2002).

3. Prices, Rights and Markets: Determinants of Success and Failure

While previous research on the determinants of the success of transition economies has identified a number of important factors, we examine three in this section. We examine shifts in price and subsidy policy, property rights reform and farm restructuring, and market liberalization mainly because they have played a role—sometimes positive and sometimes not—in most transition economies. Because of complicated ways that the policies and interactions of policies affect performance, we first review the policies and defer to examination of their effects until they can be looked at together. In addition to these three sets of factors, others surely also affect the performance of different transition countries (e.g., initial level of development at the time of reform--Sachs and Woo, 1994; Karen Macours and Johan Swinnen, 2000b; the speed of reform—McMillan and Naughton, 1992; political economy and regional tensions—Roland, 2000; Martha de Melo and Alan Gelb, 1996; and the management of public investments—Huang and Rozelle, 1996; Csaba Csaki, 1998; Shenggen Fan, Linxiu Zhang, and Xiaobo Zhang, 2002).

3.1 Prices and Subsidies

Lerman et al (2001) calculations indicates that TFP increases in Russia and Ukraine are due mostly to increases after 1995, as TFP declined before then.
The administration of prices by the Socialist planning apparatus is one of the most distinguishing characteristics of pre-transition countries. While in some countries leaders allowed subsets of goods to be traded out of the plan, for most high priority commodities—which almost always included food and fiber—planning ministries in most nations allocated goods and services mostly on the basis of quantity-based plans. Prices mostly served accounting functions.

Despite the similarities, there were several critical differences among nations. In setting the prices of agricultural goods, inputs and services, the ratio of input to output prices faced by producers differed greatly among the countries. For example, in China and Vietnam before reform authorities used administrative prices to impose a heavy tax on agriculture by requiring farmers to deliver their output at artificially low prices (Lardy, 1983; Terry Sicular, 1988a; Green and Vokes, 1998). In contrast, leaders in most of the CEE and the CIS nations supported agriculture with heavy subsidies, typically setting artificially low prices for inputs and relatively high prices for output (Edward Cook et al. 1991; Andrzej Kwiecinski and Natacha Pescatore, 2000; Willam Liefert et al, 1996; USDA, 1994; Thomas Tomich et al 1995). The extent to which prices were above or below the market price prior to an economy’s transition almost certainly would have different consequences for the sector’s performance as reformers tried to bring the nation’s price structure closer to that of the rest of the world.

In East Asia, perhaps one of the least appreciated moves of the early reformers was their bold decision to administratively increase the price of farm goods that were to be received by farmers (Lardy, 1983; Terry Sicular, 1988b). Between 1978 and 1983, in a number of separate actions, planners in China increased the above quota price, the payment farmers received for voluntary sales beyond the mandatory deliveries, by 41 percent for
grain and by around 50 percent for cash crops (Sicular, 1988b). According to the State Statistical Bureau’s data, the relative price of grain to fertilizer rose by more than 60 percent during the first 3 years after reform (Figure 5). During the early reform years, the rise in above-quota price represented a higher output price at the margin to farmers, since until 1984, state-run procurement stations regularly purchased all grain sold by farmers at the above-quota price as long as they had already fulfilled their mandatory marketing delivery quota which was purchased at a state-set quota price, which for the case of rice, for example, was 50 percent below the above-quota price (Terry Sicular, 1995).7

The important contribution of China’s pricing policy is the timing and breadth of the policy change. The first major price rise occurred in 1979, almost at the same time when reformers were deciding to decollectivize. However, given the leadership’s decision to gradually implement the Household Responsibility System (HRS), beginning first in the poorest areas of China, the price increases immediately affected all farmers, both those in areas that had been decollectivized and those that had not. By 1981, the time of the second major price increase, according to Lin (1992), less than half of China’s farmers had been allowed to dismantle their communes. Hence, as long as there was some, albeit weak, link between the output price and production, the plan-based price rise would have led to increases in China’s farm output.

During its first years of reform, Vietnam followed an almost identical path (Csaki, 1989). As in China, almost a decade before Vietnam’s leaders abolished the state’s procurement system and formally allowed private traders to purchase directly agricultural goods from farmers, leaders raised prices administratively and increased the profits earned

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7 Although the statistical bureau did report a “market” price at that time (which actually was about the same level as the above quota price), such a small amount of grain (and less of fiber and oil seeds) was sold on
by the farmers (Pradumna Rana and Naved Hamid, 1996). According to official data from Vietnam, during the first five years of the reforms, the output-to-input price ratio rose more than 35 percent above its pre-reform level. Like, China, the price rise occurred at a time when Vietnam was just beginning to push its Doi Moi decollectivization policies and more than 10 to 15 years before land titles were issued.

During the entire pre- and post-reform period, input prices—especially that of fertilizer—were still mostly controlled by the state’s monopoly agricultural inputs supply corporations in China and Vietnam (Stone, 1988; Prabhu Pingali and Nguyen Tri Khiem, 1995). Although in short supply, the governments in both countries controlled the price of fertilizer and other inputs (such as pesticides, diesel fuel and electricity) as well as their distribution (Dorothy Solinger, 1984). Communes received low-priced fertilizer from the state, but almost all of it was inframarginal. In other words, the government-supplied, subsidized fertilizer was not sufficient to meet the needs of most farmers. Producers in both the pre- and post-reform periods typically purchased additional fertilizer from the state at a higher price (Ye and Rozelle, 1994). Hence, unlike other transition and developing countries, at the margin, farmers in China and Vietnam were not able to purchase fertilizer prices at highly subsidized rates. In fact, according to Jikun Huang and Chunlai Chen (1999), during the 1980s the real price of China’s fertilizer was above the international price. Vietnam was in a similar position early during its reforms (Pingali and Xuan, 1992). Although both nations raised the price of fertilizer somewhat under rising foreign exchange markets, since rules still tightly controlled the distance of shipment and the goods that could be bought and sold, that most farmers did not consider the market price as their opportunity cost.
and budgetary pressures in the mid-1980s, the rise was not large enough to eliminate the positive incentives created by higher output prices (World Bank, 1997).  

Although price and subsidy reforms were much bolder in CEE and CIS countries than in East Asia, there were differences among regions. In Central Europe, for example, governments immediately dismantled the planning system by decontrolling agricultural prices and dramatically reducing subsidies (Jason Hartell and Johan Swinnen, 1998; Alexandra Trzeciak-Duval, 1999). For example, Estonia, the most radical reformer of countries previously belonging to the Soviet Union, totally liberalized output and input prices between 1990 and 1992. However, in most CIS countries, reformers decontrolled prices more gradually (Csaba Csaki and John Nash, 1997; Csaba Csaki and Achim Fock, 2001). Russian reformers liberalized output prices in the early reforms, but certain key input subsidies have continued. On the other hand, in countries like Belarus, Uzbekistan and Turkmenistan (the least radical reformers), price controls on both outputs and inputs have continued far into the 1990s.

Yet, the main difference between CEE/CIS and East Asian transition countries is not in their administration of price reform; rather, it is in the direction of the price adjustments (Figure 5). In East Asia pro-urban policies that used low procurement prices during the planning era to subsidize consumers (who also were workers on the front-line of East Asia’s heavy industry-led development strategy) led to artificially low farm gate prices. Price reforms that sought to set more realistic prices (i.e., those that in some sense reflected the market value of the commodities) raised prices. In CEE and in the CIS nations, since output prices had previously been supported above equilibrium prices and input prices had been heavily subsidized, price liberalization caused substantive declines in agricultural terms of

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To the extent that access to fertilizer improves during the reform (Stone, 1988), the shadow prices of
trade. In the first five years of transition, for example, output-to-input prices in agriculture fell more than 30 percent in Hungary, 50 percent in the Czech Republic and at least 70 percent in Slovakia, Poland, Russia, Ukraine, and some of the Baltics. In these countries the combination of the fall in the real price of output and the sharp rise in the real price of inputs led to a severe drop in production in most agricultural sectors and a food crises in a number of them (OECD 1998).

3.2 Property Rights Reform and Farm Restructuring

Although there were many differences among countries in the organization of their agricultural sectors prior to reform, in most cases farm production units shared several key characteristics (Lardy, 1983; Pingali and Xuan, 1992; Zvi Lerman, Csaba Csaki and Gershon Feder, 2004). Prohibiting private farming, Socialist ideals favored large, corporate organizations. In some nations state-owned farms dominated the landscape. Those that worked the land on state farms typically were paid a wage, drew a pension and performed work assignments handed down by managers, which were often part of a larger national or regional plan. Farms were theoretically organized on the same principles as factory enterprises and farmers became workers. The state made investments, set planting plans, purchased inputs through planning channels and remitted profits up through the ministerial system. In other countries, farms were run as collectives. Like state farms in most respects, the main difference was that instead of drawing a wage, collective members earned work points that entitled them to a share of the harvest that was left over after deductions were made for input purchases, taxes, quota deliveries and investment retentions.

Whatever the exact organizational form, wage- and point-earning farm workers typically faced few incentives to work hard since their compensation was at most only loosely tied to either fertilizer would also have fallen, which would also encourage higher output.
their effort or the farm’s profitability. Unlike industrial factories, however, monitoring farm workers was difficult. Logistics often compounded the problems. Planning necessities (e.g., arranging for the procurement of inputs and disposal of output) meant that farms in most countries were quite large. The large scale of farms, in turn, meant that managers were often charged with trying to direct work of many individuals that on a day-to-day basis were physically spread out over a spatially-dispersed area. In almost all studies of pre-reform agriculture collective and state farms were found to be inefficient (Joseph Brada and Arthur King, 1993; Karen Brooks 1983; Robert Meade, 2000; Justin Y. Lin, 1990; Louis Putterman, 1992).

Searching for ways to make their economies more productive, reformers had several options for eliminating inefficiencies. First, they could try to provide better incentives to elicit more effort. Second, leaders could try to reduce the operational size of the farming unit to improve information about on-farm production needs. In this same spirit, it was thought that if planning was reduced by giving more decision making authority to producers (i.e., give them better control rights) producers could produce more efficiently. Finally, reformers could try to facilitate the reduction or better allocation of inputs, including labor, that were being wasted. All countries, albeit with differing degrees of emphasis, tried to tap these sources of productivity gains.

In fact, the recognition of the shortcomings of the system and the launching of the wave of reforms in the 1980s in East Asian nations and in the 1990s in CEE and in the CIS nations was not new. Some CEE countries had attempted market-oriented reforms before 1989, mostly in the form of measures that increased enterprise autonomy (Roland, 2000). For example, Poland introduced reforms in the management of their cooperatives and state-owned enterprises in the early 1980s. Gorbachev followed later in the 1980s. Hungary’s

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9 In Poland and Yugoslavia the farm sector remained dominated by private family farms throughout the Communist regime. Hence reforms targeted other parts of the agri-food system.
10 Gorbachev also launched a major investigation in corruption in the Uzbekistan cotton regime.
leader had gone considerably beyond this by abolished mandatory planning even earlier in 1968. Yugoslavia also had begun to introduce self-management in 1965. In contrast, Czechoslovakia and Romania had little or no history of significant reforms prior to 1988.

Most of the pre-1989 reforms in CEE and CIS nations, of course, did not achieve their objectives (Roland, 2000). Communist leaders had hoped that if enterprise managers had been given more autonomy in determining output and prices, they would show more profit awareness and increase enterprise performance. Instead, in many cases enterprises started distributing most of any rising value added to workers and managers in the form of wages. With soft budget constraints, enterprises started bargaining with the central authorities for more resources, contributing to macroeconomic imbalances.

In the light of the earlier failures and in response to the mounting pressures caused by the poor performance of agriculture (among other sectors), reformers after 1989 in most CEE and CIS countries—and earlier in East Asia—decided to make fundamental changes in property rights. Consisting of control rights (that is, who gets to decide on what to plant and what inputs to use) and income rights (that is, who gets the residual income generated by the productive activity), the final form and mix of property rights differed greatly across different countries. In some cases reformers only granted partial property rights to farmers. For example, reformers sometimes provided income rights, but few control rights. In other cases leaders provided nearly full control rights with only partial income rights. Ownership changes (that is, who received alienation rights to land and other farm assets) were often considered separately from questions of farm restructuring; likewise, restructuring sometimes occurred independently of changes in rights. Almost always, the reform to property rights in the new wave of the policy changes in the 1980s and 1990s were accompanied by a reduction in the propensity of the state to planning (gradually in the case of China and Vietnam; and more rapidly in the case of the CEE and CIS nations).
Rights Reform in East Asia: Incentives, Individualization and Incomplete Privatization

East Asia’s reformers, more than anything, have followed a strategy based on providing incentives through property rights reforms, even though in China and Vietnam the shift to private ownership is today far from complete (Table 6). The reforms in China started with the Household Responsibility System (HRS), a policy of radical decollectivization that allowed farmers to keep the residual output of their farms after paying their agricultural taxes and completing their mandatory delivery quotas. Farmers also began to exercise control over much of the production process (although in the initial years, the local state shared some control rights and in some places still do today). In this way the first reforms in the agricultural sector reshuffled property rights in an attempt to increase work incentives and exploit the specific knowledge of individuals about the production process (Perkins, 1988).

In executing the property rights reforms, leaders also fundamentally restructured farms in China and Vietnam. Within a few years, for example, reformers completely broke up the larger collective farms into small household farms (Figure 6; Table 7). In China today there are more than 200 million farms, the legacy of an HRS policy that gave the primary responsibilities for farming to the individual household. There are more than 10 million farms in Vietnam.

The process of planning also began to take on a lesser important role (Sicular, 1988b). In the case of China, for example, the marketed surplus delivery quotas were divided into basic and above-quota quotas. In addition to being given higher payment for above-quota quota deliveries, farmers were given more scope in deciding what they wanted to produce. Planners gave more discretion to farmers over a variety of products, such as eggs, certain meats, fish and horticulture goods. Vietnamese reformers carried out similar reforms. In the rest of the paper when reference is made to decollectivization or the implementation of HRS, we are referring to a process of the
transfer of income and control rights to farmers and the initial reduction of planning (although not its immediate elimination).

The collective did not disappear, however. A companion set of reforms in the mid-1980s transformed communes into townships, the lowest level of China’s formal government hierarchy. Brigade leadership committees (a sub-commune level of organization) were turned into village committees, which became the government’s representative in China’s villages (Jean Oi, 1999). Villages and the small groups below them (formerly production teams) retained legal ownership rights over land and are the entities that were charged with contracting land to the farmers and setting rules for land management.

Doi Moi, Vietnam’s reform program in the 1980s, closely followed China’s strategy (Pingali and Xuan, 1992; Pingali and Khiem, 1995). Faced with large food deficits and declining productivity, Vietnam switched from collectivized production to a household-oriented contract system in 1981. Designed to provide farmers with better incentives, the reforms stipulated that individual households were to enter into a contract with the former collective. In return for maintaining productivity and selling a portion of their crop to the state at below-market prices, farmers could keep all of the output from their land. Within a few years of the initial reforms, millions of new household-based farms were established.

Only a few countries outside East Asia followed China’s model of reforming property rights and farming organizations (Tables 6 and 7). Several countries in the Balkans and Transcaucasus region distributed land rights for specific plots of land to individual households in rural areas. For example, in moves that were even more radical than China, reformers in Albania and Armenia gave households almost complete, private ownership rights to their land (Azeta Cungu and Johan Swinnen, 1999; Zvi Lerman et al.

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11 Romania used a mixed land reform strategy, combining both land distribution and restitution.
In Georgia, land use rights were transferred to individual farms by Presidential Decree in 1992, a process that contributed to the individualization of farming. Four years later these use rights were converted into private ownership rights. Azerbaijan, the third Transcaucasian state, followed the same reform strategy, although the policy moves were made after 1996 (Lerman, Csaki and Feder, 2004). What makes the reforms in these nations so special is that outside of Asia, the rest of the transition world followed a different path in their policies and rights reforms.

**Rights Reform in CEE: Restitution and Restructuring**

In contrast to East Asia, rights reform went much further than the transfer of use rights in CEE (Zvi Lerman, 2000; Johan Swinnen, 1999). The dominant land reform procedure in Central Europe, the Balkans, and the Baltic countries was restitution of land to the former owners that had lost their rights during the collectivization movement in the past (Table 6). If the original owners were not alive, reformers restored ownership rights to their closest heirs. Typically land reform laws restituted land to the historical boundaries. If restitution to the original boundaries was not possible, former owners received rights to a plot of land of comparable size and quality. In some countries restitution was combined with other land reform programs, for example, voucher privatization (Hungary), distribution of state land (Romania) or the leasing of state-owned land (Czech Republic). If successful, the new form of farming theoretically would be more efficient since land would become a marketed input that could be transferred to the most efficient producers and would have provided operators with better incentives. The new farm managers would be free to adopt a more efficient mix of inputs. Initially, however, there was a danger that restitution would result in a fragmentation of farms and a fall in efficiency (or at least a period of adjustment).
since the pre-Socialist distribution of land differed from the distribution of operational farms in the immediate pre-reform period.

While the restitution process resulted in the fragmentation of ownership, for several reasons it did not necessarily lead to a fragmentation of farms (Figure 6). Erik Mathijs and Johan Swinnen (1998) illustrate how the nature of transaction costs in land markets actually led to a consolidation of land. Restitution in many countries gave land back to individuals that were no longer active in agriculture, most commonly to either former farmers or their heirs. Except for the case in some of the poorer countries, the new landowners did not return to farming and primarily were interested in renting their land. Because the search and negotiations costs of identifying individuals that were willing to rent the land were so high, the easiest way for the new land owners to find a renter was to contact those that were already using the land. Consequently, in most cases the new leasee became those that had been involved with farming on the large prereform farms.

Transaction costs also favored the large farmers from the point of view of their search for land to rent. Almost all of those that farmed after reform were those that were active in agriculture prior to reform. Most were farm workers or cooperative members. Since land was restituted to people outside agriculture, if they wanted to stay in farming, they were forced to search for the owners of the land and strike a rental contract. However, since the management of the large farms was closely involved in the restitution process, they had an information advantage in identifying the new owners. Transaction costs on both the supply and demand side gave an advantage to large farms. As a result, after restitution, farm size did not fragment as much as had been feared. Although a small farming class did emerge everywhere, many large farms did not disappear and the
agricultural sector in several CEE countries remained characterized by a dual farm structure (Sarris et al., 1999).  

In the course of transition, however, different mixes of farm structures emerged in different nations in CEE (Table 7). For example, individual farming dominates now in several Baltic and Balkan countries. In contrast, large-scale, privatized corporate farms still use most of the land in Central European countries, such as Slovakia and the Czech Republic. The corporate farms, all of which resulted from organizational restructuring of the collective and state farms, also are far from a homogeneous organizational form. Observers in CEE find joint-stock companies, limited-liability partnerships, and agricultural cooperatives operating in the same economic environment.

Although decollectivization did not result in a complete shift to individual farming in several countries in CEE incentives improved significantly. The reforms basically gave control and income rights to the managers of the various organizational forms. The new organizations no longer guaranteed employment to their shareholders. Moreover, they were forced to operate under hard budget constraints with a real threat of bankruptcy proceedings in the cases that they defaulted on their loans. This radically changed the organizational behavior of farm enterprises. Many of the large farms turned into market-driven corporations (Lerman, Csaki and Feder, 2004). With such incentives managers set out to improve the efficiency of the farms. One result of the changed incentive structure is that many of the farms cut back substantially in their labor use by laying off

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12 In general, the new corporate farms are smaller than the former collective and state farms, and the individual farms larger than the pre-reform household plots. The average corporate farm in CEE today is between 500 to 1000 hectares, compared to 2000 to 4000 hectares for an average collective or state farm before 1990. At the same time, however, the average size of individual farms increased (Lerman et al, 2003). For example in Hungary the average size of the large scale cooperative and corporate farms declined by 50 percent during the first five years of reform; the average size of the family farm doubled between 1991 and 1996 (Erik Mathijs and Liesbet Vranken, 2004).

**Rights Reforms in CIS Countries: Paper Shares and Poor Incentives**

In most CIS countries, such as Russia, Ukraine, Belarus and most of Central Asia, land reform proceeded more gradually and procedurally in a different way than in East Asia or CEE (Table 6). Unlike restitutions, reformers in CIS nations generally were supposed to follow a two-step process, although in practice the process was not always followed completely (Lerman, 2001). In the first part, reformers transferred land from state ownership to ownership by the collective, which typically consisted of people that were living and working on the collective farms. In the second part, ownership rights were then supposed to be given to the individuals. In fact, in many nations individual households only received certificates of entitlement to land that had been shifted to the protective care of the collective. Although the certificates frequently were called land shares, they were, in fact, “paper shares” that did not establish a direct link between a specific plot of land and an individual. As a result, land reform in most CIS nations often resulted in the large-scale shift of land ownership to the collective, not to individual owners.

At least in the first decade of the reform, the share distribution system created major obstacles for restructuring CIS farms and did not always provide strong incentives to the producer (Prosterman and Hanstad, 1999). Leaders in almost all of the countries that used share distribution also banned agricultural land from being sold or purchased during the first decade of reform (Lerman, 2001). Several of the countries also have created additional restrictions on land rights. For example, farmers in Belarus, Turkmenistan, and Uzbekistan cannot transfer use rights among

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13 The main exceptions are Armenia and Georgia (see above).
themselves. Potential users of land also face high transaction costs in accessing land since the property rights on specific plots are unclear (Uzun, 2000). As Uzun (2000, p.8) observes: “land share owners do not know where their land shares are located; managers of agricultural enterprises have an opportunity to use the land owned by citizens freely and without controls; and workers, still, after nine years of reforms, do not clearly understand their choices.”

The limitations on access to land also clearly dampen incentives to use it efficiently. The weak rights also reduce pressure for restructuring of existing farm organizations by shielding them from competition for land use. Under such a system, few individuals have strong incentives to undertake any substantial investment in the physical land, equipment or management reorganization.

The partial effect of the adoption of the share distribution on outcomes in farm restructuring can be best illustrated by the case of Russia and Ukraine. The shift towards individual farming of land was limited (Table 7). During the first decade of transition most of the land remained in use by large-scale former collective and state farms. Although as in Central Europe, former collective and state farms have taken on new names, such as joint-stock companies, limited-liability partnerships, agricultural cooperatives and collective enterprises, the restructuring was often superficial and traditional functions and inefficient allocation of production factors continued (Zvi Lerman and Csaba Csaki, 1997; David Sedik, 1997). According to Zvi Lerman (1997) the main change appeared in the abolition of production plans. However, because of continued dependency of farms on political authorities, the production plans of the local government continued to influence production behavior. In some countries explicit intervention through the issuance of

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14 However, changes have been emerging in some countries in recent years. For example, Russia introduced a new land law in 2002 allowing sales of agricultural land, with some restrictions.

15 David O’Brien et al (2000) document important regional variations within Russia in land rights (eg in leasing), associated with differences in in regional policies, and show how these have had important impacts on output and productivity variations among household farms in different regions.
production plans continues in case of strategic commodities, such as cotton in Turkmenistan and Uzbekistan.\textsuperscript{16}

Despite the pessimistic record of rights reform in CIS nations, some reports suggest that by the end of the 1990s there may have been more changes than were evident in traditional statistical sources (Table 7). In many of the CIS countries the share of output from individual farms is much larger than their share in land use. This partially reflects the fact that, on average, individual farming may be more productive and that farmers typically produce a different set of more labor-intensive, high value added commodities on their own plots. Moreover, at least in some regions, household farms, operating on their own small plots, but sometimes with some rented land, were able to make progress in adapting to new market conditions. In Russia this is especially the case in some of the more reformist regions in which regional policies allowed more experimentation with private agriculture (O’Brien et al, 2000). However, as in the pre-reform period, the higher productivity also can be explained by the symbiotic relationship that continues to exist between large scale farms and many individual farms. Maria Amelina (2000) shows that even in the reform era, households frequently use the large-scale farms as way to access inputs and market their goods. Despite “help” from inputs that leaked out from the formal system, the record also clearly demonstrates that in places that reform was allowed, the improved incentives contributed to productivity growth and this in turn has encouraged greater shifts to private holdings. In Russia, for example, the share of land farmed by individuals increased from 25 percent in 1989 to 60 percent in 1999 (Figure 7).

In some of the slowest reforming countries, such as Turkmenistan and Uzbekistan, policy changes in the second half of the 1990s have strengthened the development of so-called intra-farm
leasing (Deniz Kandiyoti, 2003; Zvi Lerman and Karen Brooks, 2001). Within the framework of the former collective farms land is leased to family groups. Control rights are still limited; the leases are subject to state orders for strategic products, such as grains and cotton. In Uzbekistan, the former collective farms provide a range of services to the farms, including access to inputs and access to water. However these are as much used to enforce production plans and extract rents from the farms as they are to assist them (Pomfret, 2000, 2002b).

3.3 Liberalization and the Development of Market Institutions

In addition to property rights reform and transforming incentives, the other major task of reformers is to create more efficient institutions of exchange. Markets—whether classic competitive ones or some workable substitute—increase efficiency by facilitating transactions among agents to allow specialization and trade and by providing information through a pricing mechanism to producers and consumers about the relative scarcity of resources. But markets, in order to function efficiently, require supporting institutions to ensure competition, define and enforce property rights and contracts, ensure access to credit and finance and provide information (John McMillan, 1997; World Bank 2002). These institutions were either absent in the Communist countries or, if they existed, were inappropriate for a market system. For example, in most countries central planning agencies directed production and other economic transactions and their directives served to enforce contracts involving exchanges among various agents in the chain. Market liberalization requires the elimination of central planning, but to do so successively requires the process to be executed in a way that will allow producers to continue to have access to inputs and marketing channels while the necessary market-supporting institutions are

16 The important role of cotton in the economy of Uzbekistan, Turkmenistan and Tadjikistan as a source of
emerging. In this section in order to document how transition countries have taken different paths in market liberalization, we consider three types of ways institutions of exchanged have emerged: through the process of market liberalization; by the increased ability to enforce exchange contracts; and on the basis of how well reformers or some alternative institutions were able to guarantee access to input and output markets during transition.

Market Emergence in CEE and CIS: The Collapse of Exchange, Institution Rebuilding

On the eve of transition, the agro-food systems in CEE and the CIS countries were organized much like in the West with specialized companies at various stages of the chain, such as food processing and marketing companies (downstream firms) and fertilizer, machinery and feed producing and supply enterprises and agricultural banks (upstream firms). While there was specialization on a functional basis, the companies at various stages of the production and marketing chain operated in an environment that was centrally planned and vertically integrated.

The reform path taken in most of the CEE and CIS nations, although implemented with variations in speed, was predicated mostly on removing central planning and privatizing the up- and downstream companies. Reformers in the most aggressive countries began to liberalize markets at about the same time that they privatized farms, liberalized prices and cut subsidies. Control and ownership of tens of thousands of firms shifted.

While such actions are part of the rapid market liberalization scheme, the removal of the central planning and its system of allocation and control, in the absence of new institutions to enforce contracts, distribute information, and finance intermediation caused serious disruptions throughout the food economy (Oliver Blanchard and Michael Kremer,

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*foreign exchange and tax revenue is essential to understanding the transition and the special nature of the*
One of the most serious problems for farms was access to credit for investment and working capital (Hobbs et al. 1997). With farm profitability collapsing due to the falling terms of trade, internal financial resources became limited. External finance was difficult to obtain during early transition (OECD, 1998). Formal sources of credit, such as agricultural banks, were themselves facing restructuring and macro-economic reforms. Financial market liberalization made external credit scarce and expensive. When there was credit from formal or informal sources, it was directed towards more profitable activities, such as trading, which frequently returned high and quick profits.

Problems accessing physical inputs appear mostly in fertilizer use for crop production and feed use for livestock production. Disruptions in supply contributed to the dramatic fall in input use over the first years of transition. Fertilizer use collapsed to around 30 percent of its pretransition level in virtually all CEE and CIS countries (Table 4). Unable to buy feed, livestock operations slaughtered large fractions of their herds (Britta Bjornlund et al, 2002). The feed scarcity-induced cullings contributed to a massive decline in the animal stock during the first five years, from around 30 percent in Central Europe and the European CIS to more than 50 percent in the Baltic countries (Table 4).17

One of the clearest manifestations of the institutional disruptions in the agro food chain is the contract enforcement problems that resulted in delayed payments for product reforms in the agricultural systems of these countries (Richard Pomfret, 2000, 2002; Max Spoor, 1993). 17 For example, in Russia the relative price of mixed feed more than doubled in comparison to prices of livestock products during the first years of transition and remained around that level for most of the decade (Bjornlund et al, 2002). This contributed to the decline in the animal stock to less than half of pre-transition levels. The main exceptions to this decline in livestock are Turkmenistan, Uzbekistan, and Albania. In Albania, growth in livestock resulted from a combination of an (atypical) strong increase in relative prices of livestock over grain and the shift to small-scale livestock production with the fragmentation of the collective farming system (Macours and Swinnen, 2002). In Turkmenistan and Uzbekistan, growth came about because much livestock production was already in private households, and the availability of large areas of pastures in those countries (e.g. more than 90% of agricultural land in Turkmenistan is in pastures) allowed households to
deliveries and labor. A survey of food companies in Central Europe identified payment delays as one of the most severe barriers to growth (Gorton et al., 2000). Data from Slovakian farms show that payment delays are strongly correlated with profitability problems (Slovak Ministry of Agriculture, 1996). A 1997 survey of Hungarian agricultural enterprises found that 61 percent of farms suffered contract breaches in the form of delayed payments and that these negatively affected profits (Azeta Cungu and Johan Swinnen, 2003). These delays, in the presence of high inflation, contributed importantly to the cash flow problems throughout the agro-food chain and ultimately created serious financing constraints.18

Contract enforcement and non-payment problems contributed to the widespread use of barter exchange in CIS countries, such as Russia and Ukraine. For example, in the early years of the reforms estimates put the share of barter transactions at 75 to 85 percent in Russia (Laszlo Bruszt, 2000). In several countries, the government was as much part of the problem as it was part of the solution since farms used barter to avoid taxation that could occur because the government could monitor formal bank transactions. Furthermore, as the government did not impose hard budget constraints (e.g., it did not allow bankruptcy procedures to occur), farms continued their practice of not paying bills and accumulating debts in several CIS countries, including Russia, Kazakstan, and Ukrainian until the late 1990s (Csaki et al, 2001; Stephan Von Cramon-Taubadel et al, 2001).

18 While early discussions of the finance problems focused mostly on the institutional problems, later empirical studies emphasize the profitability and cash flow problems. For example, Pederson et al. (1997) identify the importance of profitability and cash flow problems in the perceived “excessive debt burden” of Russian farms. As Csaba Csaki et al. (2001) show, farm debt in most CIS countries increased during the 1990s because farms did not pay their obligations to government, suppliers, banks, and even workers. Another example is a survey of a 1997 Romanian survey, where farmers identify insufficient income as the key reason for their loan application being rejected (52% of the cases), much more than lack of collateral (18%) or outstanding debts (11%) (Junior Davis and Angela Gaburici, 1999).
Finally, the absence of market-supporting institutions constrained the process of farm restructuring. Households, in weighing their prospects of farming on their own, frequently opted to stay with the collective farms, or in some of the new forms of farmer associations that had appeared in order to retain access to inputs and to marketing outlets (Lerman et al, 2003; David O’Brien and Stephen Wegren, 2002; Marian Rizov et al. 2001; Rachel Sabates-Wheeler, 2002). Institutions of exchange, no matter how poorly they functioned, in many nations were still largely organized around the former structure because of the absence of reform in the up- and down-stream sectors.

Furthermore, in an environment in which there are no organizations that want to deal with supplying inputs to small farms—either because the existing organizations have no incentives to do so or because new companies targeting small farmers did not emerge — political lobbying and bureaucratic connections began to play a role in facilitating change and act to discourage restructuring. In countries as Russia and Ukraine, governments discriminate openly against independent private farmers (Csaba Csaki and Allan Zuschlag, 2003). For example, to obtain fertilizer Russian farms usually need the help of political authorities, such as the regional government. Farms get fertilizer at low prices in exchange for the commitment to deliver to sell their output to the authorities (William Liefert, Bruce Gardner and Eugenia Serova, 2003). Amelina (2000) documents how in many Russian regions local governments use so-called commodity credit schemes to support former collective farms, irrespective of their profitability. These “soft,” outside funds allow the collective farm management to continue to subsidize inputs for their employees under the

19 Under this “non-cash” system, input suppliers provide goods directly to farms during the sowing season, but are not paid by the farms. Rather, the debts are assumed by the government, and written off against taxes owed to the government by the input suppliers. Farms, in return, are obliged to deliver their products (often grain) to the government, often for its use in food reserves. In the fall, when (grain) prices are low, regional governments try to collect payments sometimes by imposing barriers to sales of the commodities outside the region (Csaki et al 2003).
form of in-kind payments. The funds also are used to provide funds that collective
employees can use to buy inputs for their household plots. The systems, however,
discriminates against independent, individual farms as it excludes them from such credit
access and from having access to the lower input prices. Moreover, the commodity credit
scheme had another, equally harmful effect (Csaki et al., 2003). Because commercial credit
sources can not compete against the subsidized credit schemes, the attention of alternative
sources of finance dried up for individual farmers. The result is that only a small share of
the output from “individual farming” in Russia (Table 7 and Figure 7) comes from
registered individual “private farms”, and most from so-called “household plots.”

Similarly, in countries, such as Kazakstan, most grain farms continue to depend on local
authorities to supply key inputs and for finance for these inputs through the issue of local
authority guarantees for the provision of seed and fuel by supplies on a barter against the
season’s production (John Gray, 2000).

Although in its initial years after transition, the food economy in much of CEE
operated within a setting of incomplete input and output markets, a combination of public
policy measures and private initiatives facilitated the emergence of market-supporting
institutions. Those nations that implemented market liberalization reforms fastest were the

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20 In all CEE and CIS countries, rural households and farm workers had household plots under the Communist
system. There was a certain symbiotic relationship between the collective farm and the household plots. The
small-scale farms allowed workers to add to their income by producing both for own consumption and selling
some farm output. By the 1980s these household plots produced a substantial amount of output, especially for
labor intensive products such as some fruits and vegetables. Farm workers got access to cheap inputs for their
household plots as they got them as in-kind compensation on the farm, or simply stole them. After 1989, in
CEE the shift to individual farms was a shift to independent individual farms. While “hybrid” structures were
important in some countries (e.g., in Romania), it was limited in CEE. Hence “individual farms” includes a
mixture of “real” family farms and household gardens in CEE statistics. However, in countries such as Russia
the development of independent individual farms was quite limited (for reasons discussed here) and household
plots which were strongly linked to the large farms (in complex and informal ways) grew very strong in
importance. Therefore the Russian statistics have differentiated between (individual) “private farms” and
“household plots”. For example, in 1998, “household plots” used 59% and (individual) “private farms” 3% of
total output. For consistency however, we combine, for all countries, both types of farms in the category of
“individual farms” in the tables and figures throughout this paper.
first to recover (Martha de Melo et al., 1997; Charles Wyplosz, 2000). Besides general institutional and macro-economic reforms, which were important prerequisites, various CEE governments have also implemented public policies targeted at reducing institutional constraints in the agro food chain. For example, in some CEE nations, leaders began warehouse receipt and loan guarantee programs to overcome the problems faced by farmers in finding collateral for their farm loans (OECD, 1999).

A number of private initiatives also have been able to overcome market imperfections and institutional constraints (Gow and Swinnen, 1998; 2001). The most successful ones frequently depend on private enforcement mechanisms within the framework of specifically designed contracts or other arrangements (Simon Johnson et al, 1999; John McMillan and Christopher Woodruff, 1999). In other cases firms have turned to vertical integration. Such contracts with private agents, and other moves to vertically integrate, act as substitutes for missing or imperfect public enforcement institutions (Klein and Murphy, 1997). As a result of initiatives from both the public and private sectors, the agro-food chain’s financing problems in some cases have been overcome by the actions of new and restructured food processing firms and input suppliers (Pospisil, 2001; Szedelyhidi, 2001). For example, restructured food processing companies provide inputs to farmers and even set up programs to fund investments. In return, producers deliver products to the firms.

The input provision program also assists farmers with gaining access to physical inputs, such as seeds, fertilizer and pesticides. The most straightforward approach is pre-payment of inputs and working capital loans. For example, processors of oilseeds and grains provide advanced payments for chemical inputs and fertilizer. Dairy processing companies pre-finance feed for farms that deliver milk to them and provide loans for
milking equipment. Input supply firms in some countries also provide payment guarantees for farm input purchases. The rise of equipment leasing services provided by machinery suppliers is another example of how an institutional innovation helped mitigate the farm’s collateral problems in financing new equipment.

In CEE firms that were taken over by foreign investors initiated many contractual innovations. For example, foreign managers of food processors typically provide technical and financial assistance to farms as part of supply contracts in order to ensure a stable and minimum quality supply of produce from their suppliers (Dries and Swinnen, 2004a). Empirical evidence suggests that there are important spillovers from these contract innovations on domestic companies that quickly start imitating successful contracting and vertical integration programs introduced by foreign firms (Chris Foster, 1999; Hamish Gow, Deborah Streeter and Johan Swinnen, 2000).

Currently in the countries that have most successfully created a system of market institutions, a complex of public and private and formal and informal institutions has emerged that is capable of enforcing contracts and supporting access to inputs and output markets. For example, recent surveys of farmers in Poland found that almost three quarters used formal bank loans and trade credit from processing companies to finance investments in equipment and technology (Liesbeth Dries and Johan Swinnen, 2004b). While there is a significant difference in investments and product quality of farms supplying to foreign-owned dairies compared to local dairies in 1996, this difference had all but disappeared by 2001, reflecting important convergence in standards, contracting and management practices in the agro food chain—a combination of private actions and public policies imposing both tougher standards and securing the emergence of market-supporting institutions.
The emergence of markets has progressed considerably slower in most CIS countries because slow policy reforms have constrained both the development of public institutions that facilitate trading as well as private institutional innovations (Csaba Csaki and Laura Tuck, 2000; EBRD 2002). Since the late 1990s, however, there are signs of a turnaround in some CIS countries. For example, in Russia, after the 1998 financial crisis, important new developments have occurred in the food economy. A combination of enhanced policy credibility under the Putin government, minimal reforms, a more stable macro-economic framework and increased profitability of domestic food production has induced significant investments in the Russian food economy. An important share of the investments has come directly and indirectly from local financial groups. Like in CEE, investments in the food industry have affected farm performance by reducing the financial constraints that producers face through contractual arrangements (Dmitri Rylko, 2002). Similarly, in Kazakstan, recent downstream investments and contracting of grain traders with the farms have alleviated cash flow problems and relaxed input constraints at the production level (EBRD, 2002; Gray, 2001). That said, much remains to be done in building market institutions in transition countries and particular so in CIS countries.

*Market Emergence in China: A Gradual Shift from Plan to Market*

In contrast to the CEE and the CIS countries, leaders in China did not dismantle the planned economy in the initial stages of reform in favor of liberalized markets (Scott Rozelle, 1996). Sicuclar (1988a; 1988b; 1995), Perkins (1988) and Lin (1992) all discuss how China's leadership had little intention of letting the market play anything but a minor supplemental guidance role in the early reforms period in the early 1980s. In fact, the major changes to agricultural commerce in the early 1980s almost exclusively centered on
increasing the purchase prices of crops (Sicular, 1988b; Andrew Watson, 1994). The decision to raise prices, however, should not be considered as a move to liberalize markets since planners in the Ministry of Commerce made the changes administratively and the price changes mostly were executed by the national network of grain procurement stations acting under direction of the State Grain Bureau.

An examination of policies and the extent of marketing activity in the early 1980s illustrate the limited extent of changes in the marketing environment of China's food economy before 1985. It is true that reformers did allow farmers increased discretion to produce and market crops in 10 planning categories, such as vegetables, fruits, and coarse grains. Moreover, by 1984, the state only claimed control over 12 commodities, including rice, wheat, maize, soybeans, peanuts, rapeseed, and several other cash crops (Sicular, 1988b). However, while this may seem to represent a significant move towards liberalization, —the crops that remained almost entirely under the planning authority of the government still accounted for more than 95 percent of sown area in 1984. Hence, by state policy and practice, the output and marketing of almost all sown area was still directly influenced by China's planners.

Reforms proceeded with equal caution when reducing restrictions on free market trade. The decision to permit the reestablishment of free markets came in 1979, but only initially allowed farmers to trade vegetables and a limited number of other crops and livestock products within the boundaries of their own county. Reformers did gradually reduce restrictions G. William Skinner (1984) point out, the predominant marketing venue during the early 1980s was mainly local rural periodic markets. Farmers also did begin to sell their produce in urban settings, but free markets in the cities only began to appear in 1982 and 1983. In addition to being small and infrequent, traders could not engage in the
marketing of China's monopolized commodities that were still under strict control of the state procurement stations.

The record of the expansion of rural and urban markets confirms the hypothesis that market liberalization had not yet begun by the early 1980s. Although agricultural commodity markets were allowed to emerge during the 1980s, their number and size made them a small player in China's food economy. In 1984, the state procurement network still purchased more than 95 percent of marketed grain and more than 99 percent of the marketed cotton (Sicular, 1995). In all of China's urban areas, there were only 2000 markets in 1980, a number that rose only to 6000 by 1984 (Alan deBrauw et al., forthcoming). In Beijing in the early 1980s, there were only about 50 markets transacting around 1 million yuan of commerce per market per year. Each market site would have had to serve, on average, about 200,000 Beijing residents, each transacting only 5 yuan of business for the entire year. In other words, it would have been impossible for such a weak marketing infrastructure at that time to even come close to meeting the food needs of urban consumers.

After 1985, however, market liberalization began in earnest. Changes to the procurement system, further reductions in restrictions to trading of commodities, moves to commercialize the state grain trading system, and calls for the expansion of market construction in rural and urban areas led to a surge in market-oriented activity (Sicular, 1995). For example, in 1980, there were only 241,000 private and semi-private trading enterprises registered with the State Markets Bureau; by 1990, there were more than 5.2 million (deBrauw et al., forthcoming). Between 1980 and 1990, the per capita volume of transactions of commerce in Beijing urban food markets rose almost 200 times. Private traders handled more than 30 percent of China's grain by 1990, and more than half of the
rest was bought and sold by commercialized state grain trading companies, many of which had begun to behave as private traders (Scott Rozelle et al., 2000).

China moved equally slow in its liberalization of input markets (Stone, 1988; Ye and Rozelle, 1994). During the prereform era, the state distributed all key inputs such as chemical fertilizer through the government-controlled network of agricultural input supply stations. During a time when many inputs in many regions were scarce, local officials were issued coupons that gave communes that right to purchase at least part of the inputs they needed. In the initial years of reform when decollectivization was occurring, leaders did virtually nothing to limit the role of the state in input allocation. Indeed, private sales of nitrogen fertilizer were restricted and the state continued to completely control all chemical fertilizer distribution.

Even after the start of liberalization in both output and input markets in 1985, the process was still partial and executed in a start and stop manner (Sicular, 1995). For example, in the case of fertilizer, Ye and Rozelle (1994) show that after an early attempt at market liberalization in 1986 and 1987, perceived instability in the rural economy in 1988 led to sharp retrenchments. Agricultural officials only took controls back off fertilizer marketing and began encouraging private trade in the early 1990s. Justin Lin, Fang Cai, and Zhou Li (1996) argue that leaders were mainly afraid of the disruption that would occur if the institutions through which leaders controlled the main goods in the food economy (such as fodder, grain, and fertilizer) were eliminated without the institutions in place to support more efficient market exchange.

However, it is only after 20 years of market liberalization that the state had largely abdicated its responsibilities for grain and inputs trade. By the mid-1990s, about 50 percent of fertilizer was sold by private traders. In 2000, according to a survey of 1200 households
in six provinces, fertilizer sales at the farmgate level was almost exclusively handled by the private sector. Likewise, despite the failed attempts by the government to remonopolize grain trade in the mid-1990s, by 2001, the state grain bureau commercialized its remaining grain trading divisions and tens of thousands of private traders dominate grain trade. For example, according to a survey by Yuping Xie (2002), in 2001 there were more than 2000 private rice wholesalers trading in Beijing, more than 3000 in Shanghai, and more than 5000 in Guangzhou. Nearly all rice moves through their hands, completely bypassing the state. Hence, China’s markets have become more integrated, transaction costs have fallen, and there are increasingly fewer arbitrage opportunities left unexploited (Albert Park et al., 2002; Jikun Huang et al., 2003).

3.4 Effects of Price, Property Rights and Market Liberalization Reforms

The efforts to identify the sources of output and productivity growth of the agricultural sectors in transition economies range from purely descriptive to the use of time-tested methodologies. Unfortunately, most studies tend towards to descriptive end of the spectrum. In many studies researchers at most examine output and productivity trends and compare them to trends of prices and periods of implementation of property rights and market liberalization reform policies. Such casual attribution of the cause and effect, if anything, is the rule, not the exception. In the rest of this section, we discount this part of the literature and refer to only a small number of such descriptive studies.

A subset of studies uses more rigorous methods. In some cases, carefully carried out growth accounting procedures control for changes in terms of trade and fixed factors and attempt to attribute the explained rise in output to policy changes (e.g., McMillan, Whalley and Zhu, 1989, in China). Others use regression-based methods that seek to isolate the
sources of the changes in output and productivity. After holding physical inputs constant, some studies use primal-side models to identify the rise in output that is associated with the reform period by including a time period or continuous time variable (e.g., Pingali and Xuan, 1992; and Benjamin and Brandt, 2001, in Vietnam). The parts of the rise in output associated with the institutional change (either property rights reform, market liberalization, or both) are assumed by these studies to be the productivity effect associated with reform (or the period during which the reform policies were implemented). Other studies adopt dual-side approaches, holding prices and other factors constant, and similarly attribute the part of the output that increases over a reform period as the reform-induced change in productivity (e.g., Kurkalova and Jensen, 2003). Others use both approaches (e.g., Lin, 1992; Macours and Swinnen, 2000a). The importance of reform is typically demonstrated in these studies by using a decomposition procedure which divides the rise in output or (the overall increase in the growth rate) to the various factors (e.g., price changes; changes in fixed factors; and reform). A smaller group of studies (e.g., Jin et al., 2002, in China) uses regression and decomposition analysis to determine the factors that explain over time changes in TFP trends. Because leaders in China and Vietnam launched their reforms earlier, the most comprehensive set of studies tend to be those studying East Asia.

Despite attempts to carefully match periods of reform to regression-based analyses, the results of most studies need to be carefully interpreted because the use of time trends and time dummies by definition capture all systematic change that is unexplained by the other regressors that are included in the equation. The implicit assumption of most analysts almost always seems to be that nothing else was changing during the time. In almost all

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21 Only, Lin, 1992, and those that were able to use Lin’s data were able to create a measure of reform that was more finely graded than a time trend. Lin was able to create a variable that measured the number of villages in each years that had adopted decollectivization reforms.
cases, however, it is likely that the failure to capture other factors, such as traditional
technological change in cropping and livestock operations, means that the estimates of the
impacts of reforms may be biased. Finally, although interactions among the different
components of reforms (e.g., price reforms are more likely to matter more if property rights
reforms have given producers greater incentives) are almost certainly important, little
attention is given to them.

Effects of Price Shifts and Subsidy Changes

Several studies show that price changes had an important influence on the
performance of the agricultural sector and in part help explain observed trends in output.
Using simple measures of correlations, Macours and Swinnen (2002a) find a positive
relationship (the correlation coefficient is 0.70) between changes in output and changes in
relative prices across 15 countries during the first five years of transition. Although only
being used to motivate the changes, they show that output increases only in those countries
in which terms of trade increased (e.g., China, Vietnam, Albania). Empirical studies using
multivariate analysis on China confirm a strong impact of these price changes on output
during the first years of transition (Lin, 1992; Fan, 1991; Huang and Rozelle, 1996;
Fan and Pardey, 1997). Lin (1992), for example, finds that 15 percent of
output growth during the first six years of reform came from the rise in relative prices.
Huang and Rozelle’s (1996) decomposition exercise for rice demonstrates that about 10
percent of the output between 1978 and 1984 came from the price effects. In contrast, the
multi-variate estimates of Macours and Swinnen (2000a) show that around 50 percent of the

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22 It is more difficult to measure the effect of price changes on productivity, since as in McMillan, Whaley,
and Zhu (1989) and Jin et al. (2002), the price effects are removed before explaining TFP changes. In Justin
Lin (1992) and Huang and Rozelle (1996), however, there is evidence that higher prices are associated with
initial decline in crop output in eight CE and Balkan countries was due to deteriorating terms of trade.

*Effects of Property Rights Reforms*

While the speed and nature of rights reform and restructuring has varied greatly across the reforming world, in those places that have carried out decollectivization, land restitutions, control rights transfers and farm reorganization, a robust positive effect appears on output in some areas and productivity has risen in all of the areas that carried out these multi-dimensioned reforms. In East Asia, the changes in incentives that resulted from the property rights reforms and farm restructuring triggered strong growth in both output and productivity. In the earliest study of the reforms, McMillan, Whalley and Zhu. (1989) document that the early reforms in China sharply raised productivity, accounting for 90 percent of the rise of output (23 percent) between 1978 and 1984. While the strong positive link between the reforms and output has been confirmed by many other studies, the shortcomings of attributing all of the productivity rise to the reform movement generally is shown by subsequent studies. In the most definitive study on the subject, Lin (1992) estimates that China’s HRS accounted for 42 to 46 percent of the total rise in output during the early reform period (1978 to 1984). The lower effect due to property rights reform undoubtedly is due in part to the fact that Lin’s estimates held other reforms measures constant – e.g., pricing policy changes (accounting for 10 percent) and nascent market liberalization policy shifts (accounting for less than five percent). In addition to including independent measures of specific reform policies, the main strengths of Lin’s study is that he uses both primal- and dual-side models and his measure of decollectivization is a continuous variable.

higher rates of technology adoption, which has contributed positively to the rise in TFP during the reform era. Hence, price changes may have an indirect effect on TFP.
Subsequent studies of China’s growth, however, showed how even Lin’s seminal work both over- and under-estimated the impact of the early reforms on agriculture. The reform effect falls to only about 30 percent in both Fan (1991), which uses a primal-side approach, and Huang and Rozelle (1996), which mainly use a dual-side approach. The fall in the return to decollectivization is explicitly shown in Huang and Rozelle (who use Lin’s measure of the shift the HRS as well as controlling for prices and most of the other factors that Lin controlled for) to be due to the inclusion of variables that hold constant technological change. In contrast, a number of researchers have suggested that the effect of the reforms exceeded the direct impact on the agricultural sector. Rises in surplus in the agricultural sector created by HRS triggered a number of subsequent growth dynamics, providing labor for rural industry’s take-off in the mid-1980s (Ronald McKinnon, 1993), fuelling the nation’s overall industrialization drive later in the reforms (Kang Chen, Gary Jefferson, and Inderjit Singh, 1992), and creating demand for the products of firms in other parts of the economy (Yingyi Qian and Chenggen Xu, 1998).

Similarly, the Vietnamese Doi Moi reform induced strong growth in both output and productivity. Rice production, the nation’s primary crop, grew on an annual basis at the rate of 3.14 percent between 1982 and 1987 up from less than 0.5 percent between 1976 and 1981 (Pingali and Xuan, 1992). Econometric analysis showed that productivity-led growth boosted output by around 15 percent during the early post reform period. Noting that both technological change and market liberalization in Vietnam’s agricultural sector was virtually absent during the early 1980s, Pingali and Xuan assert that almost all of the growth should be attributed to the property rights reforms.

In the CEE and the CIS countries in which effective reforms had been implemented, privatization of farming generally has produced two different effects on output, although one must be careful in attributing causality due to the complex links between rights reform,
restructuring and output and the interactions with the other reforms that are occurring in many countries. For example, the hard budget constraints imposed on producers by reformers reduced subsidies and led to falling inputs and output. On the other hand, greater incentives increased effort, raised technical efficiency and increased output. Calculations based on the multi-variate analysis of Macours and Swinnen (2000a), which also holds constant the over price effect, indicate that in CEE the reduced subsidy effect dominated in early transition. The negative output effect due to reductions in input (a –70 percent fall) was mitigated, but not fully offset, by the increase in output from gains in technical efficiency (a 45 percent rise). The net effect was negative (-25 percent) and explains around a quarter of the total output fall in CEE agriculture in early transition.

However, in countries in which rights reforms and farm restructuring did not improve productivity, the negative output effect of the decline in input use was reinforced by a fall in efficiency. Estimates by Lyubov Kurkalova and Alicia Carriquiry (2002) and Kurkalova and Jensen (2003) indicate that in Ukraine falling input use and declining efficiency reinforce each other during early transition. Both studies estimate company-level (or corporate farm-level) efficiency using stochastic production frontier analysis. They then go onto explain differences in inefficiency levels over time as a function of price changes, input adjustments and year effects. Although somewhat ad hoc (in that they use relative prices to explain technical efficiency differences among companies), their results are persuasive in showing that the decline in the use of inputs accounts for about the half of the total output decline in collective farms. They also blame a decline in technical efficiency (of 15 percent) between 1989 and 1992 to be due to general reform matters.23

23 Kurkalova and Carriquiry (2002) attribute the rest of the decline (-35%) to weather effects. Weather effects caused 10% of output decline in the Macours and Swinnen (2000a) study.
Total factor productivity estimates on the FSU countries between 1992 and 1997 by Lerman et al (2003) also are consistent with the significant impact of rights reforms and restructuring on productivity. Their analysis indicates strong productivity growth in Baltic countries in which reforms were implemented most strongly. Total factor productivity also increased strongly in Armenia and Georgia, two Transcaucasian countries which implemented strong individualized land rights and dramatically shifted to individual farming even though the nations were recovering from a series of natural disasters and war-related incidences. In contrast, TFP declined in the Central Asian republics in which reforms lagged most. While the most comprehensive study of productivity in the CIS nations, their link between the rise in TFP and reform should be interpreted cautiously. Using one observations per state per year, the authors estimate a production function and implicitly assume that the unexplained change in the output over time (or productivity changes) to transition policies. Unfortunately, a paucity of data make it impossible for Lerman and his coauthors to create a more a model explaining TFP, an approach that would enable them to identify more precisely the exact causes of the changes in productivity.

The importance of distinguishing between ownership types in studies that are searching to link reforms with productivity is perhaps best illustrated in the cases of Russia and Ukraine. Whatever growth occurred during the first decade of transition in Russia and Ukraine seems to have occurred on household plot production, the only place where

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24 The importance of accounting differences in the ownership status of plots (especially in distinguishing between private collective plots) is less important for the cases of East Asia and CEE. In China and Vietnam, farm households had small private plots—about 5 percent of total cultivated area—both before and after reform (Loren Brandt et al., 2002). But, except for in some villages that allocated more land in the form of private plots to household at the beginning of the reforms, by far a vast majority of households saw no difference between private plots with the onset of reform. As the reforms have proceeded, the importance of the distinction between private plots and the rest of collectively allocated plots have Moreover, all studies of the effect of the reforms on farm output and productivity includes both private and collectively owned plots. The work in CEE by Macours and Swinnen (2000a) also includes all types of plots. Moreover, although there was a clear distinction in the pre-reform era, after reform the importance of private plots diminished markedly.
rights were effectively in private use. Johnson et al. (1994), Kurkalova and Carriquiry (2002), Sotnikov (1998), and Sedik, Trueblood and Arnade (1999) find declining productivity on corporate farms in Russia and Ukraine. Michael Trueblood and Stefan Osborne (2001) discover that productivity on corporate farms declined by 2.1 percent annually after 1993 and continued to decline until 1998. Their analysis does not find any indication of a productivity rebound in Russia in the late 1990s. Interestingly, all studies that find a negative effect of rights reforms on TFP exclude household farming. In contrast, Lerman et al. (2003), who include both corporate and household farming in their analysis, find that productivity in Russian agriculture increased by 1.4 percent annually between 1992 and 1997. Similarly in Ukraine, Lerman et al. (2003) and Olga Murova, Michael Trueblood and Keith Coble (2001) find that TFP in production improved slightly during transition when they include both corporate and household farms in their analyses. Their results suggest that the positive effects come mostly from the shift to household farming.

Looking inside transition regions in CEE and the CIS nations, like in the case of East Asia, illustrates a link between technology, policy and performance. Although gains in productivity have come both from rights reforms and organizational restructuring, the relative importance of each component differs between countries reflecting technology and policy differences (Karen Macours and Johan Swinnen, 2002). In countries with labor-intensive technologies the shift from large-scale collective farming to small-scale individual farming caused dramatic gains in technical efficiency with relatively small losses in scale efficiency. In such countries, including China, Vietnam, Albania, Armenia, Georgia, and

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25 The study indicates that labor measured in hours employed contracts significantly stronger than “agricultural employment”, suggesting significant underemployment remaining on the large farms.

26 An important factor in the optimal scale of farming is, besides scale economies in some technologies, transaction costs in labor management. Large operations in agriculture face transactions costs because of principal-agent problems and monitoring costs in labor contracting which are typically large in agriculture
Romania, the gains in productivity came mostly from the shift to household farming when land was distributed to rural households (Table 7). In all these countries the man/land ratio was over 0.2 persons per hectare and TFP increased strongly during early transition (between 4 percent and 9 percent annually) when individual farming grew from 8 percent of total land use on average to 84 percent on average.\textsuperscript{27}

In contrast, in the Czech Republic, Slovakia and Hungary, countries in which farming was more capital intensive (man/land ratio of 0.14 or less), gains in labor productivity came primarily from large farms shedding labor with privatization of the farms.\textsuperscript{28} During the first five years of transition, labor use declined by 44 percent on average in these three countries, yielding an annual increase in labour productivity of 7.5 percent on average, while individual farms used only 15 percent of the land.\textsuperscript{29}

**Effects of Market Liberalization**

Few authors have attempted to quantify the gains from market liberalization. Part of the problem may be the short period of analyses, the inability of standard methodologies and measures or indicators of market liberalization to separate efficiency gains of market reform from overall gains in the reforming economy, and the breadth of the studies. For China, Wen (1993) found total factor productivity (TFP) growth had stopped in the post-1985 period, a trend he blames on the failure of the market liberalization stage of reform.

\footnotesize{\textsuperscript{27} In Azerbaijan this productivity effect is not captured in the data in tables 2-5 because the land distribution and farm individualization process only started in 1996. Average yields increased by 13\% annually between 1997 and 2002 (Republic of Azerbaijan, 2003).

\textsuperscript{28} On average, the man/land ratio was more than five times higher in East Asia than in Central Europe or Russia (table 8).}
There are two shortcomings of Wen's conclusions. First his analysis ends in 1990, a period that might be too early to have allowed the liberalization reforms to take effect. Second, he is only examining the net change in TFP and does not account for other factors that could be affecting productivity. Holding the effect of technology constant and using data through 1995, Jin et al. (2002) find that TFP growth restarts in the 1990s, a finding that they claim could be linked to increased liberalization of the economy. Like Wen, however, they do not explicitly examine the improvements in efficiency that are associated with market development. Shenggen Fan (1999) uses stochastic frontier production decomposition analysis to isolate the efficiency gains of Jiangsu provincial rice producers in the late reform era, a time when most of the property rights reforms had already been implemented and a time with market liberalization was just getting started. Fan finds that there have been only limited gains in allocative efficiency after 1984, a result that he suggests is due to the partial nature of China’s market liberalization. Unfortunately, Fan does not explicitly model the interactions between property rights reform and market liberalization. Also, his study examines only one crop in one province, a fact that limits the generalization of his study, since it is possible that many of the gains from market liberalization may come from shifting among crops (and between cropping and non-cropping activities).

The only truly systematic attempts at trying to measure the returns to market liberalization in China are deBrauw et al. (2000; forthcoming). These papers develop measures of increased responsiveness and flexibility within a dynamic adjustment cost framework (as developed by Larry Epstein, 1981) to estimate the return to market liberalization reforms, holding the incentive reforms and other factors constant. The authors find that the behavior of producers in China has been affected by market

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29 In contrast, agricultural labor use increased in many of the transition countries where individual farming
liberalization, but that the gains have been relatively small. Small gains in responsiveness (that are measured by price elasticities of factor demand for variable inputs—in this case, fertilizer) between the early and late reform periods are attributed to the gradual market liberalizing changes of the late 1980s. Farmers also have increased their speed of adjustment of quasi-fixed factors (which in the case of China’s agriculture includes labor and sown area) to price changes (and other shifts in exogenous factors) between the early and late reform period. The magnitude of the gains in efficiency from increased responsiveness and flexibility in the late reform period, however, is substantially less in percentage terms (less than 1 percent per year) than that from the incentive reforms in the early reform period (up to 7 percent per year or about 40 percent over the whole period).

But, although the gains are small, they are still positive and China’s gradual market reform policy appears to have avoided the collapse that was experience throughout CEE and CIS nations. Unfortunately, the results of the deBrauw paper can not study the interactions among property rights reform and market liberalization since it relies on the assumption that the time period of the reform identifies the effect of individual policies (that is, all of the property rights reforms were complete before 1984 and market liberalization did not begin until after 1985). The results also only examine the effect of market liberalization.

In contrast to the research in China that demonstrates the success of the gradual market liberalization measures, scholars have differing views outside of Asia. Without much quantitative support, several authors have pointed to the negative impact of the early market policies on output and productivity in CEE and the CIS nations (Roland 2000; Peter Wehrheim et al.1998). Other studies explain how the emergence of market-supporting institutions has been crucial in the agricultural recovery and growth and improved access to...
input and output markets in several CEE countries, and that their absence hampered recovery in other, mainly CIS, transition countries (EBRD 2002; Johan Swinnen, 2002; World Bank 2002).

Unfortunately, the only studies that try to quantitatively examine market liberalization effects use rough time period indicator variables. These studies provide some support for a J-shaped impact of radical market liberalization. For example, Macours and Swinnen (2000a), after holding constant property rights reform, farm restructuring, and other factors, measure the impact of the breakdown of exchange systems between farms and input suppliers and processing companies with a time period dummy variable for the first two years after major restructuring. They find that the breakdown of exchange has a negative effect on output and productivity in CEE. Evidence on subsequent recovery with the emergence of new institutions for contract enforcement in CEE is limited, but growing.

Although there has not been any transnational, systematic study of the impact of market liberalization, there have been a growing number of papers on single industries and small groups of firms in transition nations (Silke Boger, 2002; Gow and Swinnen, 2001). These studies, often case study in nature, find strong positive effects on firm performance of the emergence of institutions that help in contract enforcement and the provision of credit and other inputs. For example, Gow, Streeter and Swinnen (2001) for sugar and Dries and Swinnen (2004a,b) for dairy document how enterprises have used contracting to help producers gain access to inputs and sell their output in the absence of well functioning wholesale markets.

Despite the appearance of these case studies, most of which tell a similar story, there still is relatively little systematic, econometric-based evidence of these dynamic market liberalization effects. Macours and Swinnen (2002) using a rough measure of the overall
liberalization of the economy, developed by de Melo and Gelb (1996), do find that over the first five years of the reforms. In their regression results explaining agricultural productivity in 15 transition countries, the coefficient on the indicator of market liberalization was significantly positive. This positive correlation between the emergence of markets and productivity was found even after holding constant property rights reforms, farm restructuring and prices. This conclusion is consistent with findings of Johan Swinnen and Liesbet Vranken (2004) who calculate farm-level efficiency indicators based on representative surveys in five CEE countries and show that, after the initial transition period, the average farm efficiency in the five countries is strongly positively correlated with the level of economic reforms and market liberalization as measured by EBRD and World Bank indicators.

In summary, the transition countries have taken vastly different roads in market liberalization. The empirical evidence suggests that there is not a single successful path in establishing a market economy. In several CEE countries a rapid and radical approach to full-scale market liberalization of the entire agro food system contributed importantly to output declines in early transition, but within five years after the start of transition market institutions were emerging and after a decade robust productivity growth.

In contrast, the success of China’s liberalization policies is due to an entirely different, much more gradual approach that ultimately contributed to positive productivity growth, while avoiding catastrophic disruption. In the short run, planning with all of its inefficiencies was retained for the nation’s major agricultural commodities. Even though the maintenance of the system of planned procurement and supply in China almost certainly caused substantial allocative irrationalities during the interim (although these have never been measured), the benefit of such a strategy was that it did provide farmers access to
inputs and product outlets during the period of property rights reforms and farm restructuring and avoided the economic collapse experienced outside of Asia (Rozelle, 1996). With improved farm productivity (initially from other policies, such as HRS), the planning system actually increased farm incomes and allowed an increasing supply of food to urban consumers. In the longer run, China’s market liberalization strategy depended on creating an environment that allowed new entrants. The gradual policies at the very least allowed space for traders to slowly develop networks and figure out ways to finance commodity trade (Watson, 1994). In the longer run, as these traders began to take advantage of profitable trades, they attracted new traders and forced the state to commercialize the trading divisions of the grain bureaus in a way that is described more generally by McMillan and Naughton (1992). Ultimately, this competition forced policy makers to formally remove most of its market-restricting policies, mainly because they were not effective. The gradual deregulation of the input and output marketing also ultimately produced its own successes.

*Interactions Among Reform Policies*

Although discussions of optimal sequencing and precise measurement of returns to reform policy depend heavily on the ability to identify and disentangle interaction effects that may occur when leaders implement more than one policy during a single time period, almost no empirical work has addressed the challenge. The biggest problem is certainly data. Lack of long enough time series with explicit measures of the reform policies makes the task almost impossible in most countries. Although most studies that use time dummies to identify reform impacts point out the multiple effects that are occurring simultaneously as well as working together, nothing more is (or can be) done with most studies.
The only two studies that have generated any formal empirical measure of the magnitude of the interaction effects are Justin Lin (1991) and Huang and Rozelle (1996). In these two works, although the authors try to isolate the behavioral effects of the HRS first-stage reforms from the effects of market liberalization, they show that in reality the two are quite related. Their analyses show that China's agricultural sector has experienced both positive and negative interactions between market improvements and improved incentives. For example, own-price output elasticities of farm producers rise after HRS, but the total output shows a secular drop due to the demise of some centrally planned policy functions that free market agents do not take over. In other words, the papers show that increased responsiveness is conditional on having good incentives and relatively full decision making authority. Moreover, the authors realize that given these interaction, when using time period indicator variables to capture the returns to a specific reform, the results will be biased.

Despite the lack of rigorous empirical evidence, our understanding of transition economies suggests that interactions are important. If state government procurement and sales channels have collapsed and market liberalization has not created new ways for producers to purchase inputs or sell out, it is almost certain that the effectiveness of improved incentives from property rights reforms would be attenuated. Likewise, market liberalization without improved incentives will likely both slow down the emergence of markets (there will be little supply or demand for the newly marketed goods and services) and reduce the impact on output and productivity growth. As a result of these strong and important interaction effects, it is likely that studies that use time period indicators to measure effects of reforms on outcomes will be over-attributing the effects to a single policy if there are more than one reforms being undertaken by reformers.
4. Summary and Lessons

In this paper our primary goal is to understand the linkages between the shifts in pricing and subsidy policies, property rights reform and farm restructuring and market liberalization and economic performance. Although striking differences have appeared in the nature of the reforms and their effects across the transition world, several strong empirical regularities linking reform strategies to performance have emerged. First, pricing policy and shifts in relative prices between the pre-reform and post-reform eras have played an important role in output changes. Price and subsidy policies, however, more than any other factor explains why agriculture in East Asian transition economies grew in the immediate post reform years and why they did not in CEE and the CIS nations. Virtually all reformers sought to bring their pricing structure more in line with international prices so they would better reflect the relative scarcities of resources and consumer demands. In the process of eliminating the distortions, however, relative prices moved in one direction in East Asia and the opposite elsewhere. During the planning era, China and Vietnam had tried to force industrialization in part by taxing agriculture with low prices in order to keep wages of industrial workers low. Their counterparts in most of CEE and the CIS nations, in contrast, had tried to stimulate food production by subsidizing inputs and providing high bonuses for marketed surplus. Hence, in the rationalization of prices, reformers in East Asia raised the prices of output which strengthened the output-to-input price ratio. At the same time, their counterparts outside East Asia eliminated planning and many or all of the input subsidies and output premiums which led to plummeting output-to-input price ratios. Since producers in all transition economies responded to price changes similarly (increasing output as output prices rose and decreasing output as input prices rose and vice versa), the
direction of the price changes after reform help explains why East Asia’s output moved up in the initial post reform era and those of CEE and the CIS nations trended down.

Beyond changes in relative prices, market liberalization policies reinforced the shifts caused by relative price changes and also help explain the sharp collapse in CEE and the CIS nations during early transition. When reformers took control they typically outright shut down the planning ministries in most CEE countries and curtailed their power in CIS countries. As a result, in most countries the systems through which the pre-reform producers had purchased their inputs and sold their output disappeared. Hence, it is easy to understand why production and productivity fell so dramatically in the first year or two after reform. In retrospect such a fall should have been expected since it is hard to conceive how completely new institutions of exchange could emerge in a matter of months. Perhaps more surprising is the speed in which institutions of exchange re-emerged in a number of CEE nations. Although deep markets characterized by the meeting of numerous buyers and sellers still had not materialized after several years of reform, the CEE experience shows how alternative institutions appeared to facilitate exchange. In those countries in which the institutions emerged, output and productivity began to recover by the mid 1990s and productivity growth has continued since. In those countries in which such institutions did not emerged, productivity continued to lag.

In East Asia reformers moved more gradually and in the initial years almost made no change to the state-dominated marketing channels that were set up during the planning era. So while market liberalization did not play much of a role in pushing up output and productivity of East Asian producers in the initial years after reform, it did not hold it back. In the longer run, however, policies in East Asia facilitated the entry of thousands of private
traders and the gradual rise of markets in the post-reform era has been linked with positive, albeit small, productivity increases.

Perhaps more than any other policy shifts, property rights reform and the farm restructuring that it facilitated are responsible for the rise of productivity in transition countries. It certainly was true in East Asia. In several Central European countries empirical studies almost all identify the positive links between property rights reform and productivity. But while the effects of land reform have both been positive and strong, the mechanism that has led to enhanced performance in East Asia and Central Europe has been quite different. In East Asia income and control rights were given to producers, creating millions of new family-run farms. Land ownership remained with the state and privatization of land is still being debated today. The partial reforms, however, appear to have provided enough incentives and improved decision making capacity to have ignited the rapid rise in output and productivity in Asia.

In contrast, privatization through restitution characterizes the main way that Central European reformers implemented the reforms. The reforms themselves, however, were not enough since many of the new landowners had long since moved to the cities. Instead, the emergence of land leasing contracts allowed the growth of individual farms and the survival of large corporate farms (albeit with less labor which was systematically laid off by large reorganized farms in the most advanced Central European economies) (Vranken and Swinnen, 2004). These institutional innovations have been essential ingredients of the rise in productivity in Central Europe.

While the picture in the literature on the CIS nations was fairly bleak in terms of property rights reform-induced productivity rises, it may be that the CIS nations are finally being affected by the reforms. During the early years after reform, the lack of clear rights
that linked income to effort and inability to provide farmers a way to restructure their farms held back any rights-generated output or productivity rises. Recent empirical work in Russia, Ukraine and Kazakhstan (mostly on economic performance in the second decade of reform) finally may be showing that improvements in property rights and farm restructuring are affecting productivity. If so, it may be that the main difference between CEE and the CIS nations is not the nature of the lag between reform and a turn around in output and productivity.

4.2 Lessons and Generalizations

In this section, we examine three sets of lessons. First, we briefly discuss the importance of choosing the right indicator for measuring performance. Second, we examine the similarities and difference in how countries have chosen different reform strategies. Finally, we make observations on how reform packages have been put together and how some combinations have been more successful than others.

Getting the Measure of Success Right

The first, and perhaps most basic, lesson is that we should be careful about which indicator we use to measure transition performance. If we use an indicator of efficiency or productivity instead of output, it is less clear that agricultural transition in CEE—especially that in Central Europe—was less successful than that in China and Vietnam. If prices need to reflect long-run scarcity values of outputs and inputs, then efficiency requires that leader raised agricultural prices in East Asia, a move that naturally would lead to higher output. Likewise, when subsidies were removed, rational producers should use less inputs, actions, which as seen by the record in CEE and the CIS where the ratio of output-to-input prices fell
sharply, led to falling output in these countries. In short, although leaders in many countries count increases in output as success, productivity shifts, not production trends, should be the primary metric for measuring success in transition agricultures.

Getting the Institutional Framework Right

Assuming success is measured correctly, comparing the property rights and organizational reform processes across the transition world also yields several lessons about the determinants of reform success. First, the lesson regarding property rights reforms is nuanced. Good rights and the incentives they created certainly contributed to and will continue to affect performance positively. Poor ones undoubtedly account, in part, for the poor performance of some agricultural systems. This is well illustrated by the difference between China and Central Europe on the one hand and Russia, Ukraine, and Central Asia on the other hand. Despite being incomplete, East Asia’s reforms allocated relatively strong property rights to individual land plots. In Central Europe land was either restituted to former owners or distributed to farm workers in delineated boundaries and leased to new farms. Although the land reforms in these countries were complex and difficult to implement, they ended up with stronger and better-defined property rights for the new landowners than in Russia, Ukraine, and many other CIS countries. In the CIS countries, in contrast, land was distributed as paper shares to workers of the collectives and state farms. Individuals could not identify the piece of land that belonged to any given share, causing weak land rights for individuals and undermined their ability to withdraw land from the large farms and establish a private farm. As a result, family farming emerged only slowly
and large farms have had fewer incentives to restructure. The empirical evidence in the literature, although fragmented, mostly supports these observations.

Despite the strong relationship between rights reform and performance, another important lesson is that full privatization of land is not needed to induce efficiency gains. In many countries the introduction of private ownership and sale of agricultural land encountered strong social and political opposition and kept reformers from providing a complete complement of rights to producers. For example, the top leadership in both China and Vietnam did not allow private ownership of agricultural land. Today, in China and Vietnam, farmers still cannot buy or sell land. The strong positive effect of rights reform and restructuring on output and productivity demonstrates that allocating clear and well-identified land use and income rights can by themselves enhance efficiency, investment and growth. In contrast, as seen from the cases of many CIS nations, if rights are too weak, there is little effect on performance.

Despite such progress, we do not want to suggest that a decade of agricultural transition has created a system of full and unencumbered property rights even in the best performing countries; in fact, many major constraints remain. For example, China’s leaders are still struggling to figure out a way to provide more secure tenure rights for farmers. Most pervasive, local leaders in many regions of the country continue to periodically expropriate land, shifting it among farmers for a variety of reasons (Brandt et al., 2002). Although the impact on the investment in land and other long-term farming assets is typically found to relatively minor (Hanan Jacoby et al., 2002), poor land tenure may be undermining the emergence of rental markets and keeping farm size from increasing and precluding farmers from using land as an asset for collateral which could be constraining investment in non-farm activities (Benjamin and Brandt, 1999). In CEE, observers of land
reform are worried about excessive land fragmentation (e.g., in the Balkan countries) and monopolistic control of large corporate farms in an emerging land market (e.g., in Slovakia).

Second, the lessons regarding the impact of farm restructuring also are nuanced. To start, it should be noted that except in labor-intensive agricultural economies, the individualization of farming should not be counted as an indicator of successful transition. Individualization frequently has been accompanied by a dramatic reduction in farm size, and in some cases, falling farm size leads to a loss of scale efficiencies. Smaller farmers in most CEE and CIS nations also experienced a sharp fall in their access to capital that was available for use in production (OECD, 1999). While moves to small farms may make sense in some labor-abundant agricultural economies in the short run, in the longer run the transition to a modern state means that farm size must be sufficiently large and the intensity of capital use should remain fairly high.

We can see how natural resource availability and initial technology, which vary tremendously across the transition world, have played an important role in affecting the impact of farm restructuring (Johan Swinnen and Ayo Heinegg, 2002). For example, technology played a decisive role in creating the success of the break-up of collective farms. With labor-intensive technology, the cost of breaking up large collective farms in terms of losses of scale economies is smaller, and the gain from improved labor incentives from the shift to family farms is larger. As a result, since farms in China and Vietnam are much more labor-intensive than the typical farm in the rest of the transition world, the reforms that provided farmers in East Asian nations incentives and individualized their farms were able to create relatively large shifts up in productivity.

In contrast, many regions outside of East Asia were characterized by an entirely different farm technology which greatly affected the impact of farm restructuring. Large
parts of Russia, Ukraine and Central Asia are land abundant. Many of the richer parts of CEE also have much less labor-intensive production systems. The returns to breaking up the large scale farms into individual farms in many of these countries necessarily are lower than the gains experienced in East Asia.

Strong benefits from farm individualization, however, were not completely absent from CEE and the CIS nations. In fact, several countries have gained, although the benefits were only enjoyed by the CEE and CIS countries with relatively high man/land ratios. The nations that benefited from farm individualization were those in the poor areas of the Balkan and Transcaucasian regions. Specifically, the four countries (Albania, Azerbaijan, Armenia and Georgia) which have man/land ratios above 0.2 persons per hectare (ratios that are similar to those of East Asia) are the nations that have experienced the highest growth rates of TFP after land was distributed to households and large scale individualization of farms followed. Such high rates of productivity gain are similar to those experienced in Asia during the first reform years.

Even without individualization corporate farms restructuring can lead to strong rises of productivity in transition agriculture. One of the main differences between Russia and Ukraine, where productivity fell, and some of the European countries, such as Hungary and the Czech Republic, where productivity increased, is not so much the scale of the farm operations, but rather the degree to which their management was restructured (Lerman, Csaki and Feder, 2004). In Central Europe, farm enterprise budgets were hardened and on-farm decision-making became independent. Farm managers became primarily concerned with turning a profit and their increased managerial efforts induced sharp shifts in input use, management reforms and efficiency increases. In contrast, large farm restructuring in
Russia and in several other CIS countries was far less profound. For example, Csaki et al. (2002) argue that even in 2001 Russian large farm decision-making still has important features similar to those of the traditional collective farm structures. Farm leaders are still committed to provide all members with jobs, regardless of cost-efficiency considerations. Farms also are obliged by tradition and sometimes by government pressure to maintain the social infrastructure of the village. In many cases, because of these other obligations, farms put little emphasis on profits.

The continuation of many of these anachronistic practices is almost certainly linked the failure of restructuring. Above all, many nations failed to eliminate soft budget constraints and the government continued to tolerate non-payment of farm debts. Similarly, in some countries, such as Kazakhstan, “[i]nitital attempts at reform, which saw the state and collective farms converted first into collective farm entities and subsequently into producer cooperatives, involved little real change in patterns of ownership management and control [because] up to 1998 the former state and collective farms were never subjected to a hard budget constraint. … [W]ithout the sanction of the threat of bankruptcy there was little incentive for farm managers either to reduce their indebtedness or to reform their internal governance” (John Gray, 2000, p1). In addition, other researchers, such as Zorya (2003), argue that until 2000 the structure and behavior of the large scale farming enterprises in Ukraine did not differ significantly from the structure of Soviet agriculture, primarily because of the continuation of soft budget constraints and major constraints on individuals leaving the farms and enforcing their land rights.

Interestingly, in several transition countries “hybrid” farm organizations have emerged that seem to address the need for institutions that allow both better incentives and

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30 See table 5. In Azerbaijan this occurred only after 1996 when farm individualization and distribution of
labor governance and create organizations that can capture scale economies. For example, Sabates-Wheeler (2002) finds that in Romania the most efficient farm organization for resource-constrained small farmers are “family societies” in which farmers collectively share in the provision of mechanized services. Mathijs and Swinnen (2001) find that “partnerships,” small groups of farmers in East Germany that pooled their effort in certain production and marketing tasks outperformed all other forms of farm organization between 1992 and 1997. In Russia the most successful household farms refrain from registering as “private farms,” instead choosing to remain connected in some fashion to large farm enterprises. Such producers use their connections to gain access to inputs, marketing channels and other services in an environment where traditional markets, if any, function poorly (O’Brien et al, 2000). Even in Turkmenistan, producers have begun to shift to family-based leasing within the nation’s highly regulated environment in order to be able to access basic inputs, services and output channels through the state marketing order system (Lerman and Brooks, 2001).

Third, successful institutions of exchange—nascent markets, forms of contracting, etc.—also have many hybrid characteristics. In fact, some of the most successful transitions have not gone straight from planning to decentralized market-based exchange. Markets are emerging, but doing so quite slowly. China’s experience demonstrates not only that, when politically feasible, partial reform by proceeding on a sector-by-sector basis (i.e., liberalize some products but not necessarily all) and by using a two-tier pricing system (i.e., a system of resource allocation that occurs half through planned transfers and half through the market) can end up creating markets that make the liberalization of the partially reformed sector successful. Such a reform strategy also has a longer run effect of gradually creating a
trading class that leads the push to expand the reforms and ultimately eliminate the need for planning.

In CEE the re-emergence of vertically integrated supply chains reflects the necessity of private contract enforcement mechanism for credit distribution and input supply in the absence of well functioning public institutions. Other examples of non-traditional institutions in credit and input markets that appear successful in transition include a variety of financial instruments and enforcement institutions, including leasing of equipment, warehouse receipt systems, bank loan guarantees provided by processors to farms, trade credit, etc.. Variations in such instruments and institutions reflect differences in commodities, local institutions and economic structure. To be successful these transition innovations have to adapted and flexible to address transition and local characteristics.

Hence, whether considering institutions that create and maintain property rights or those that facilitate exchange, policies should accommodate institutions that are flexible. Flexibility is needed because transition is so uncertain and because there are many constraints that still are binding. Moreover, successful transition may trigger rapid growth which itself will require institutions to adapt quickly. For example, in land markets, the initial focus should be on stimulating short term land leasing, an institution much more adapted to transition circumstances. Later on, long-term leases and land sales can develop. In general, non-traditional and flexible institutions have been more successful.

Packages of Reforms

But the lessons go far beyond measuring success or failure of reform individually. More fundamentally, it appears from the evidence on the collective transition experiences that for any reform strategy to be successful it needs to include some essential ingredients.
In other words, ultimately successful transition requires a complete package of reforms. All countries that are growing steadily a decade or more after their initial reforms have managed (a) to create macro-economic stability, (b) to reform property rights, (c) to harden budget constraints (d) and to create institutions that facilitate exchange and develop an environment within which contracts can be enforced and new firms can enter.

Our survey of the transition experiences in different countries clearly demonstrates the problems of not making progress in all areas. For example, when rights are not clear, as in Russia, producers have little incentive to farm efficiently or to invest and restructuring is constrained. We see in other places that the creation of strong individual property rights is not sufficient. For example, in Poland in the initial years after reform, farmers had secure rights over their land. But, their inability to access inputs or to sell output prevented them from reaping the gains of specialization and improved labor effort. Both output and productivity growth performed poorly. In general, in nations that created both rights and markets, productivity rises for most of the first decade of reform (at least after the initial transition); in those that they either rights or markets or both were ignored, productivity declines or is stagnant.

That said, however, one of the most powerful lessons is that although all of the pieces of the reform package are needed, there is a lot of room for experimentation. Interestingly, if one chooses any two nations that had success, there almost always was variation in sequencing and in the form of the institutions that provided incentives and facilitated exchange. In other words, in our survey of the literature, we can not find any single optimal transition path. The optimal transition strategy in any given country is one that contains the different parts of the package; the exact nature of the parts and the order in
which they were implemented, however, has been different for each nation and takes into account the institutional and political characteristics of the country.

In terms of sequencing, while all of the ingredients are ultimately needed, our paper also has shown that reform policies do not need to come all at once. For example, in China and Vietnam, reform without collapse was possible by introducing property rights reform first and gradually implementing policies that liberalized markets and facilitate decentralized exchange. Such sequencing helped transition nations in East Asia grow rapidly in the initial years and steadily since. In CEE, however, after the initial politically-led disruptions, the gradual emergence of well-defined property rights, markets and other means of exchanging goods, services and inputs have led to steady productivity growth.

The optimality of different sequences of policies (as well as the government’s ability to implement them) almost certainly depends on the structure of the relationships between agriculture and the rest of the economy. There were important differences between East Asia versus CEE and CIS in this respect which reflect the different stages of development of the agri-food systems in each region of the transition world. While the relationships in the food systems of China and Vietnam were fairly basic, farms in the CEE and CIS needed to be integrated into a much more industrialized agro-food supply chain. Moreover, under the Soviet system, the tasks of providing inputs to farmers and managing their operations, storage, processing, transport, and road infrastructure were all allocated to different agencies. Farming was subordinate to as much as eight different ministries and local authorities had little control over any of these activities (Van Atta, 1993).

Warehouses and processing plants were hundreds of miles away. Hence, productivity improvements at the farm level would cause less impact unless simultaneous problems at processing and input supply industries would be addressed (Brooks, 1983; D. Gale Johnson,
1993). This required more of an encompassing and simultaneous reform approach beyond the farm sector, including the restructuring of food processing companies, retailers and agricultural input suppliers.\(^{31}\) In terms of administrative feasibility, the much more industrialized nature of the agri-food supply chain (meaning a more complex set of exchanges between a variety of companies) and the fact that the various steps were functionally separated in the central planning system in CEE and CIS were a severe constraint on optimal sequencing. A more gradual and orchestrated policy sequencing of a gradual reform strategy in the more developed economies in CEE (versus China and Vietnam), would have required more extensive information on the transformation process and the economy. In fact, most observers question the feasibility of plotting out any type of rational, systematically-executed reform path ex-ante. As McMillan (1997, p.232) puts it: “If it were possible to plan the transition it would have been possible to plan the economy.”

**Initial Conditions and the Impact of Reforms**

As we conclude this survey of reform policies and their impact on sector performance, it is important to reflect on a crucial, and hotly debated issue.\(^{32}\) Are the differences in performance between East Asia and the rest of the transition world due to the different reform strategies or to differences in initial conditions? In the previous paragraphs we have identified at least three sets of initial conditions that have affected the output and productivity changes in transition through their effects on reform impacts. Differences in initial price distortions affected the price reform effects; differences in technology affected the impact of rights reforms and farm restructuring; and differences in the structure of the

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\(^{31}\) Roland (2000) refers to this as the problem of “sectoral gradualism” in the Soviet system.
agri-food chain affected the distortions in exchange relationships. Each of these initial conditions favored a more successful outcome in China compared to Russia. Or to put it in other words: implementing “China’s reforms” in Russia would not have yielded the same results. In summary, initial conditions were influential in determining the transition performance during the first ten years of transition.

Despite the importance of initial conditions, we also fully believe that they cannot wholly explain past performance and to an even greater degree will not determine the future of these economies. Initial price levels and technologies in some sense can be thought of as only establishing the boundaries within which the initial reforms take place. In almost all countries, there has been room for being bold or for being timid. Within regions with relatively similar initial conditions, countries have chosen different reform policies and with significant differences in growth and productivity effects. Moreover, the influence of initial conditions has declined over time. Hence, while the nature of the policies mattered in the past (over and above the effect of initial conditions), it will matter even more in the future.

Regarding future policies, another lesson that is clear from the case of China, Vietnam and many of the other successful countries is that in the longer run, publicly-orchestrated services, such as investments in public goods and infrastructure, are needed to continue productivity growth initiated by the reforms. Regardless of how successful the initial reforms are, once producers have good property rights and incentives, and once exchange is being facilitated by functioning institutions, sustained rises in productivity will

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33 Initial conditions have further affected agricultural transition and performance through other ways. For example, initial legal and political constraints have affected the choice of governments in various areas, including land reforms (Macours and Swinnen, 2000b; Ewa Rabinowicz, 1997; Johan Swinnen, 1997) and
depend on investments in agricultural research, extension and other infrastructure projects, such as investments in water control and roads, that individual farmers will not be able to finance by themselves. In the long run, agricultural growth will suffer if such investments are ignored during transition. When nations reach the point when they are facing these longer-run problems, in fact, reform may be close to an end and transition problems may be evolving into more traditional development problems.

Finally, an important issue which we have not addressed in this paper is the political economy of the choice of reform. Why is it that certain governments have chosen to implement gradual policies and others have opted for more radical reforms? Why has the Communist governments in China and Vietnam been able to guide (and benefit from) the reform process in East Asia while it took a regime change in CEE and CIS to start the reforms? Why did CEE governments decide to restitute land to former owners, against much opposition and expert advise, while those in many CIS states issued paper shares? All these questions are important to understand if we are not only to learn about policy effects – as we have attempted to do in this paper – but also to know how we can implement the right policies in a world where political incentives constrain policy-makers choices. This is a key subject for future research.

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Technological biases under the Communist system have affected technology changes during transition (Pomfret, 2002a).
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## Appendix A. List and Classification of Transition Countries

<table>
<thead>
<tr>
<th>Regions</th>
<th>Transition Countries</th>
<th>Central and Eastern Europe CEE</th>
<th>Commonwealth of Independent States CIS</th>
<th>Former Soviet Union FSU</th>
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* Geographically, only part of Russia, including Moscow, is in Europe.
Table 1: Growth of Gross Agricultural Output (GAO) in Transition Countries (index equals 100 in first year of reform)

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<tr>
<th>Years after start</th>
<th>GAO index in year of lowest GAO</th>
<th>GAO index after 5 years of reform</th>
<th>GAO index after 10 years of reform</th>
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Source: FAO
Table 2: Growth of Agricultural Labor Productivity (Output per Farm Worker--ALP) in Transition Countries (index equals 100 in first year of reform)

<table>
<thead>
<tr>
<th>Year with lowest ALP</th>
<th>ALP index in year of lowest ALP</th>
<th>ALP index after 5 years</th>
<th>ALP index after 8/10 years*</th>
<th>Average annual change Year 0-5</th>
<th>Average annual change Year 5-8/10*</th>
</tr>
</thead>
</table>

**East Asia**
- China
  - Year 0
  - ALP index: 100
  - ALP index after 5 years: 120
  - ALP index after 8/10 years: 146*
  - Average annual change Year 0-5: 4.0
  - Average annual change Year 5-8/10*: 5.2*
- Vietnam
  - Year 0
  - ALP index: 100
  - ALP index after 5 years: 102
  - ALP index after 8/10 years: 107*
  - Average annual change Year 0-5: 0.4
  - Average annual change Year 5-8/10*: 1.1*
- Myanmar
  - Year 2
  - ALP index: 96
  - ALP index after 5 years: 115
  - ALP index after 8/10 years: 120
  - Average annual change Year 0-5: 3.0
  - Average annual change Year 5-8/10*: 1.7

**Central Asia**
- Mongolia
  - Year 6
  - ALP index: 57
  - ALP index after 5 years: 61
  - ALP index after 8/10 years: 60
  - Average annual change Year 0-5: -7.8
  - Average annual change Year 5-8/10*: -0.3
- Kazakhstan
  - Year 6
  - ALP index: 58
  - ALP index after 5 years: 60
  - ALP index after 8/10 years: 71
  - Average annual change Year 0-5: -8.0
  - Average annual change Year 5-8/10*: Na
- Kyrgyzstan
  - Year 5
  - ALP index: 59
  - ALP index after 5 years: 59
  - ALP index after 8/10 years: 67
  - Average annual change Year 0-5: -8.2
  - Average annual change Year 5-8/10*: 2.9
- Tajikistan
  - Year 9
  - ALP index: 36
  - ALP index after 5 years: 46
  - ALP index after 8/10 years: 38
  - Average annual change Year 0-5: -10.8
  - Average annual change Year 5-8/10*: -2.9
- Turkmenistan
  - Year 6
  - ALP index: 55
  - ALP index after 5 years: 87
  - ALP index after 8/10 years: 64
  - Average annual change Year 0-5: -2.6
  - Average annual change Year 5-8/10*: -7.9
- Uzbekistan
  - Year 6
  - ALP index: 80
  - ALP index after 5 years: 88
  - ALP index after 8/10 years: 86
  - Average annual change Year 0-5: -2.4
  - Average annual change Year 5-8/10*: -0.5

**Transcaucasia**
- Armenia
  - Year 7
  - ALP index: 38
  - ALP index after 5 years: 42
  - ALP index after 8/10 years: 38
  - Average annual change Year 0-5: -11.6
  - Average annual change Year 5-8/10*: -2.2
- Azerbaijan
  - Year 9
  - ALP index: 48
  - ALP index after 5 years: 57
  - ALP index after 8/10 years: 62
  - Average annual change Year 0-5: -8.6
  - Average annual change Year 5-8/10*: 1.7
- Georgia
  - Year 2
  - ALP index: 67
  - ALP index after 5 years: 85
  - Average annual change Year 0-5: -3.0
  - Average annual change Year 5-8/10*: Na

**European CIS**
- Belarus
  - Year 4
  - ALP index: 69
  - ALP index after 5 years: 71
  - ALP index after 8/10 years: 87
  - Average annual change Year 0-5: -5.8
  - Average annual change Year 5-8/10*: 4.9
- Moldova
  - Year 8
  - ALP index: 41
  - ALP index after 5 years: 58
  - ALP index after 8/10 years: 41
  - Average annual change Year 0-5: -8.4
  - Average annual change Year 5-8/10*: -5.7
- Russia
  - Year 5
  - ALP index: 63
  - ALP index after 5 years: 63
  - ALP index after 8/10 years: 65
  - Average annual change Year 0-5: -7.2
  - Average annual change Year 5-8/10*: -0.5
- Ukraine
  - Year 8
  - ALP index: 52
  - ALP index after 5 years: 65
  - ALP index after 8/10 years: 52
  - Average annual change Year 0-5: -7.0
  - Average annual change Year 5-8/10*: -4.1

**Baltics**
- Estonia
  - Year 1
  - ALP index: 76
  - ALP index after 5 years: 139
  - ALP index after 8/10 years: 163*
  - Average annual change Year 0-5: 7.8
  - Average annual change Year 5-8/10*: 4.7*
- Latvia
  - Year 8
  - ALP index: 49
  - ALP index after 5 years: 54
  - ALP index after 8/10 years: 65*
  - Average annual change Year 0-5: -9.1
  - Average annual change Year 5-8/10*: 2.2*
- Lithuania
  - Year 5
  - ALP index: 62
  - ALP index after 5 years: 62
  - ALP index after 8/10 years: 77*
  - Average annual change Year 0-5: -7.7
  - Average annual change Year 5-8/10*: 3.1*

**Central Europe**
- Czech Rep.
  - Year 1
  - ALP index: 99
  - ALP index after 5 years: 126
  - ALP index after 8/10 years: 177*
  - Average annual change Year 0-5: 5.2
  - Average annual change Year 5-8/10*: 10.2*
- Hungary
  - Year 1
  - ALP index: 99
  - ALP index after 5 years: 175
  - ALP index after 8/10 years: 220*
  - Average annual change Year 0-5: 15.0
  - Average annual change Year 5-8/10*: 9.1*
- Poland
  - Year 3
  - ALP index: 96
  - ALP index after 5 years: 99
  - ALP index after 8/10 years: 144*
  - Average annual change Year 0-5: -0.2
  - Average annual change Year 5-8/10*: 9.1*
- Slovakia
  - Year 0
  - ALP index: 100
  - ALP index after 5 years: 110
  - ALP index after 8/10 years: 132*
  - Average annual change Year 0-5: 1.9
  - Average annual change Year 5-8/10*: 4.4*

**Balkans**
- Albania
  - Year 2
  - ALP index: 77
  - ALP index after 5 years: 108
  - ALP index after 8/10 years: 104*
  - Average annual change Year 0-5: 1.6
  - Average annual change Year 5-8/10*: -0.8*
- Bulgaria
  - Year 9
  - ALP index: 60
  - ALP index after 5 years: 69
  - ALP index after 8/10 years: 63*
  - Average annual change Year 0-5: -6.2
  - Average annual change Year 5-8/10*: -1.1*
- Romania
  - Year 9
  - ALP index: 59
  - ALP index after 5 years: 67
  - ALP index after 8/10 years: 63*
  - Average annual change Year 0-5: -6.6
  - Average annual change Year 5-8/10*: -0.8*
- Slovenia
  - Year 3
  - ALP index: 61
  - ALP index after 5 years: 85
  - ALP index after 8/10 years: na
  - Average annual change Year 0-5: -3.0
  - Average annual change Year 5-8/10*: na

* countries with * (China, Vietnam, Central Europe, Baltics and Balkan) have data for 10 years after start of reforms, other countries data for 8 years after the start of reform
Table 3: Growth of Index of Agricultural Yields in Transition Countries (index equals 100 in first year of reform).

<table>
<thead>
<tr>
<th>Region</th>
<th>Country</th>
<th>Grains</th>
<th>Sugarbeet / Cotton</th>
<th>Milk</th>
<th>Average Agric</th>
<th>Av Ag per year</th>
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</table>

*Grains include wheat, rice (milled weight) and coarse grains;*  
*Central Asia: Cotton instead of Sugarbeet; Average agriculture (col. 7 and 8) is average of grains and cotton only.  
*Average agricultural yields is calculated as a simple average of the yields of grains, sugar beet/cotton and milk.*
Source: USDA for grains; sugarbeet yields are from FAO for Central Europe, Balkans and China, and from Zentrale Markt- und Preiseberichtstelle für Erzeugnisse der Land-, Forst-, und Ernährungswirtschaft (ZMP) and FAO for Central Asia, Transcaucasus, and European CIS; milk yields are from ZMP for Central Europe, Balkans, Central Asia, Transcaucasus and European CIS, and from State Statistical Bureau (SSB) for China.
Table 4: Growth of Input Use Indexes for Agriculture in Transition Countries (index equals 100 in first year of reform).

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Table 4: Growth of Input Use Indexes for Agriculture in Transition Countries (index equals 100 in first year of reform—continued)

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* For Slovenia and Armenia, data are for 7 years after the start of reforms
** Since 1995 animal stock refers only to the change in cattle stock, the index for previous years measures an aggregate of 'animal units'
*** average Asia excludes Mongolia

Source: Data on fertilizer, tractor, land use, and animal stock are from FAO; labour data from Asian Development Bank, ILO, national statistics, World Bank
Table 5: Annual Growth Rates of Total Factor Productivity for Agriculture in Various Transition Countries for Selected Years (percent).

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Data Sources: China from Jin et al (2002); Vietnam from Pingali and Xuan (1992) and Benjamin and Brandt (2001); FSU from Lerman et al (2003); Central Europe and Balkans from Macours and Swinnen (2000a)
Table 6: Scope of Property Rights Reform for Agriculture in Transition Countries.

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<th>Individual Ownership Rights</th>
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Table 7: Restructuring of Farming Organization and General Reform Indicators

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* due to data limitations, data are for 8, 9 or 10 years after the start of transition

Table 8: Selected Initial Condition Indicators for Immediate Pre-reform Period in Transition Countries.\(^a\)

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<th>Labor/persons/he</th>
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<th>CMEA % of GDP</th>
<th>Years</th>
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\(^a\) Pre-reform indicators are from 1978 for China, 1981 for Viet Nam, 1986 for Laos, 1989 for the CEECs and Myanmar and 1990 for the FSU and Mongolia

\(^b\) Own estimation

Data Source: Macours and Swinnen (2002)
Figure 1: Changes in Gross Agricultural Output (GAO) Index during First 10 Years of Reform in Transition Countries*

* European CIS excludes Moldova; East Asia includes China and Vietnam only
Data Source: see Table 1.
Figure 2: Changes in Agricultural Labor Productivity (Output per Farm Worker—ALP) Index during First 10 Years of Reform in Transition Countries*

* European CIS excludes Moldova; Transcaucasus excludes Georgia; East Asia includes China and Vietnam only.

Data Source: see Table 2.
Figure 3: Changes in Agricultural Labor Use Index during First 8 Years in Transition Countries*

* European CIS excludes Moldova; Transcaucasus excludes Georgia; East Asia includes China and Vietnam only.
Data Source: See Table 4, columns 7 and 8.
Figure 4: Change in Average Agricultural Yield Index during First 10 Years of Reform in Transition Countries*

* Agricultural yield index is calculated as the average yield index of grains, sugar beet/cotton and milk.
Data Source: See Table 3, columns 7 and 8.
Figure 5: Change in Agricultural Terms of Trade Index (Grain to Fertilizer Price Ratio) during First 10 Years of Reform in Transition Countries*

* Balkans exclude Albania and Bulgaria; Baltics exclude Latvia; European CIS exclude Moldova; East Asia include China and Vietnam only
Data Sources: OECD and national statistics for China
Figure 6: Share of agricultural land used by individual farms (%)*

* Balkans exclude Albania; European CIS exclude Moldova; East Asia includes only China

Data source: see Table 7.
Figure 7: Agricultural Output by Farm Organization in Russia, 1989 - 2002 (%)

Source: Goskomstat