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**Working Paper**

## Liberalization with Endogenous Institutions: A Comparative Analysis of Agricultural Reform in Africa, Asia, and Europe

LICOS Discussion Paper, No. 233

**Provided in Cooperation with:**

LICOS Centre for Institutions and Economic Performance, KU Leuven

*Suggested Citation:* Swinnen, Johan F. M.; Vandeplas, Anneleen; Maertens, Miet (2009) : Liberalization with Endogenous Institutions: A Comparative Analysis of Agricultural Reform in Africa, Asia, and Europe, LICOS Discussion Paper, No. 233, Katholieke Universiteit Leuven, LICOS Centre for Institutions and Economic Performance, Leuven

This Version is available at:

<https://hdl.handle.net/10419/74911>

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## LICOS Discussion Paper Series

Discussion Paper 233/2009

# **Liberalization with Endogenous Institutions: A Comparative Analysis of Agricultural Reform in Africa, Asia, and Europe**

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**A Comparative Analysis of Agricultural Reform in Africa, Asia, and Europe**

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*Version: 6 February 2009*

**Abstract**

Thirty years ago, a vast share of the poor and middle income countries were heavily state-controlled. The effects of the liberalizations in the 1980s and 1990s differed strongly between regions in Africa, Asia and Europe. This paper first documents these differences in reform effects in a comparative framework and then develops a model to formally analyze how liberalization affects production and income distribution when institutions that govern production and exchange are also affected. We derive hypotheses on how the endogenous institutional adjustments affect the supply response to the liberalizations. We use these insights to forward a series of explanations on the differences in performance across countries following liberalization.

Swinnen is professor of development economics and director of LICOS; Vandeplas is a PhD Fellow of the Research Foundation-Flanders and researcher at LICOS; and Maertens is assistant professor at the Centre for Agricultural and Food Economics. The authors thank Chris Barrett, Alexander Sarris, Marie Ruel, Manohar Sharma, Peter Timmer, Will Masters, Rocco Macchiavello, Patrick Legros and participants at workshops in Rome (FAO), Halle (IAMO), Brunel University, and Washington DC (IFPRI) for comments on an earlier version of the paper. This research received financial support from the K.U.Leuven Research Fund (EF), FWO and IUAP.

**Liberalization with Endogenous Institutions:**  
**A Comparative Analysis of Agricultural Reform in Africa, Europe, and Asia**

**1. Introduction**

Thirty years ago, many poor and middle income countries, covering a large share of the world's rural areas and poor people, were heavily state-controlled. This was most extreme in the Communist world, spreading from Central Europe to East Asia, where the entire economic system was under strict control of the state. However, also in many African, Latin-American and South Asian countries the state played a very important role in the economy.

The first major liberalization started in Indonesia in 1968. Some years later, Sri Lanka also implemented liberalization policies. In 1978, China embarked on its reform path by property right reforms, liberalization and a reduction of price distortions in the economy. Vietnam followed in the mid 1980s. The impact has been dramatic. In particular the reforms in China and Vietnam have been heralded as lifting hundreds of millions of people out of dire poverty (World Bank, 2000); as “the biggest antipoverty program the world has ever seen” (McMillan, 2002, p.94) and as having led to “the greatest increase in economic well-being within a 15-year period in all of history” (Fischer, 1994, p.131).

The expectations were high when countries in Sub-Saharan Africa (SSA), in Central and Eastern Europe (CEE) and in the former Soviet Union (FSU) introduced a series of reforms in the 1980s and 1990s to remove state intervention and distortions of producer incentives. Those distortions had been argued to be a major constraint on productivity, income growth and poverty reduction (eg Krueger, Schiff and Valdes, 1988; Lipton, 1977). The liberalization of trade, prices, and exchange rates, and the removal of state control over the commodity chains were to improve incentives to farmers and to yield growth, thereby raising incomes and reducing poverty (Timmer, 1986; Commander, 1989).

However, the effects of the reforms were very different from what was expected *ex ante*. In Eastern Europe and the former Soviet Union, the reforms caused a dramatic decline in economic output and incomes and led to a general increase in poverty following the liberalization reforms (Rozelle and Swinnen, 2004).

In Africa, the effects of the liberalizations – often imbedded in structural adjustment programs – were also disappointing. Barrett (1998) argues that, by the mid 1990s, evidence was inconclusive whether market-oriented reforms brought either poverty reduction or economic growth in SSA. While the World Bank (1994) claimed evidence of real economic growth in response to the reforms, others argued that liberalization has intensified suffering among poor farmers (Cornia et al, 1987; Duncan and Howell, 1992; Stewart, 1995). In an excellent review of the empirical evidence, Kherallah et al. (2002) conclude that, after two decades of reforms in SSA, while there is some progress in most cases, the general consensus is that market reforms have not met expectations in SSA.

Interestingly, there has been hardly any attempt to compare the results of the liberalizations across these regions. Reforms have been compared within regions and between Europe and Asia, but there have been hardly any attempts to include Africa.<sup>1</sup> In addition, the analyses of the unexpectedly poor effects of liberalization in CEE and FSU on the one hand, and SSA on the other hand, have developed into quite different types of literatures with little cross-fertilization. The analyses of the impact of liberalization in Africa were mostly empirical studies (e.g. Barrett, 1997; Jayne et al., 2003; Kherallah et al., 2002) analyzing how various factors can contribute to explain the (lack of) supply response to the market reforms in Africa. In contrast, the poor performance of the Eastern European and Soviet reforms has,

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<sup>1</sup> Reforms have been compared within Asia (e.g. Green and Vokes, 1998), Africa (e.g. Kherallah et al 2002), Europe (e.g. Lerman, Csaki and Feder, 2004; Macours and Swinnen, 2000), and between Europe and Asia (de Melo and Gelb, 1996; de Melo et al, 2001; Macours and Swinnen, 2002; Rozelle and Swinnen, 2004). In particular the comparison between China on the one hand and Russia and East Europe on the other has triggered a large set of papers, including Dewatripont and Roland (1995), Fischer (1994), Qian, Roland and Xu (1999) and Sachs and Woo (1994). However, there have been hardly any attempts to include Africa, with the exception of Ravallion (2008).

besides a series of empirical studies on the causes of the declines in output and productivity (e.g. Macours and Swinnen, 2000), sparked an important theoretical literature on the role of institutions and how they have affected the outcomes of the reform process (e.g. Blanchard, 1997; Roland, 2000).

An important insight of the theoretical analyses of the reforms in Eastern Europe and the Soviet Union is the important role of the change in institutions for governing exchange in the economy and the inherent problems and costs that come with such institutional changes.<sup>2</sup> These insights appear to be highly relevant for understanding the effects of the liberalization and reform programs in Africa since the liberalization of trade, prices and markets have been associated with important changes in the institutions that organize exchanges in the commodity sectors, such as the removal of state control from international and domestic trade and marketing of outputs and the provision of inputs. Indeed, there is considerable discussion in the empirical studies on the role of the institutional organization of the African economy and how it affected the liberalization outcomes. However, there has been no attempt to formally model this interaction and to draw implications from it.

The objective of this paper is therefore two-fold. The first objective is to compare the relative reform performance across Africa, Asia and Europe. The paper presents a series of indicators to compare changes in output and productivity during the reform period. The second objective is to contribute to an explanation of the differences in reform performance by relating these performance indicators to the actual reforms. For this, we develop a general model which allows to formally analyze how liberalization affects production and income

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<sup>2</sup> Seminal papers explaining the importance of these factors as causes of economic declines in the midst of market reforms are Blanchard and Kremer (1997) and Roland and Verdier (1999). Gow and Swinnen (1998, 2001) used similar arguments to explain the decline, and subsequent recovery, of the agri-food sectors in Eastern Europe. Macours and Swinnen (2002) and Rozelle and Swinnen (2004) explain how the differences between China on the one hand and Eastern Europe and the former Soviet Union on the other hand in the liberalizing of prices and reform market institutions has contributed importantly to the different performances of these countries.

distribution when liberalization affects the institutions that govern production and exchange. Specifically, our model integrates key institutional and structural characteristics of developing and transition countries. The first element is that in the pre-reform system, inputs were often provided to farmers through vertically coordinated exchange mechanisms with monopolistic and state-controlled organizations. As we will show, in such an institutional environment, liberalization of the output market will also affect the supply of inputs, which has important indirect effects on production. It is well documented now that farmers in Eastern Europe and in Africa had major problems accessing production factors (such as credit, technology, seeds, fertilizer, etc) after the liberalizations. These empirical observations are consistent with the theoretical predictions of our model.

The second institutional element is the governance of contract enforcement. The liberalization process implied an important change in the organization of exchange in the economy, and had major implications for the institutions to enforce contracts. In general, institutions to enforce state controlled exchanges became less important and institutions to enforce private exchanges were weak or absent in these countries, since it takes much longer to create such institutions than it takes to liberalize the trading system. As we will show, the implications of this are very important for understanding the impact of liberalization.

Our model will integrate these key institutional characteristics of the liberalization process. Using the model, we will derive hypotheses on how these characteristics affect the supply response to the liberalization, and, how the supply response is affected by product characteristics. We use these insights to offer hypotheses to explain empirical observations on post-reform performance. We believe that these insights are not only very important to understand the causes of the poor performance of the agricultural markets in many parts of the world, including in parts of Africa, in response to the reforms, but are also important as predictions for future developments – and hence as a framework for evaluating policy options.

For example, the initial output decline has been reversed in most of the transition economies—albeit with substantial variation among them, reflecting differences in policies and structural conditions—and they have now shown robust growth over several years. Our analysis also provides arguments why the reversal to growth after the initial decline was most rapid and strongest in Central and Eastern Europe, and why such reversal was more difficult in Africa.

Our analysis relates to a number of recent papers trying to draw lessons from the Chinese experience for Africa, such as Ravallion (2008). Our analysis is complementary in that it focuses on more countries, not just China, and offers a formal theoretical model and a more detailed empirical comparison.

While several of the arguments in this paper apply to the economy as a whole, the focus is on agriculture. Focusing on agriculture to analyze which policies contribute to success and failure of economic reform has several benefits. First, the sharpness of the policy changes in agriculture and the fundamental differences among countries provide a good test. Second, 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. Third, a study focussing on agriculture is also inherently interesting for those studying economic development and poverty reduction. There is now wide agreement that agricultural (rural) growth is crucial for poverty reduction in developing countries (Ravallion, 2008; World Bank, 2008). Finally, for many countries covered by our analysis, such as in Africa and in East and Central Asia, agriculture dominated the economy during reforms and the changes in the sector have had an important impact on overall economic performance. When more than 50 percent of a nation's labour 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. Hence, instead of being a limitation, our analysis



of liberalization in agriculture will yield important general lessons for those interested in the more fundamental relationships between reform, institutional change and growth.

The paper is organized as follows. We start by describing and comparing post-reform agricultural performance in different transition and developing regions. We continue by developing a model of vertically coordinated markets. Then we relate this model to the pre-liberalization situation in developing and transition countries, we discuss how to model “liberalization”, and we show the aggregate effect on supply response and how this may be affected by several factors. We relate these findings to empirical observations on agricultural performance and on variations in commodity chain performance across countries and commodities. Then, we draw conclusions.

## **2. Regional trends in post-reform agricultural performance**

Remarkable differences are observed when examining the performance of agriculture in different transition and developing regions in the years after these regions embarked on agricultural reforms and structural adjustment programs. We look at several performance indicators: output, output per capita, land productivity (yields), labour productivity, and, where available, total factor productivity (TFP). For each country, we have chosen the year of the start of the reforms as year 0. For China, the first year of reform is set to 1978. The first year of reform is set to 1985 for Vietnam, 1989 for non-FSU Central & Eastern European countries, and 1991 for FSU countries. For Sub Sahara Africa, the year in which a country got a first structural adjustment loan from the World Bank is taken as the first year of reform. This information was collected from World Bank loan documents.

Agricultural output increased rapidly in the years after the start of reform and liberalization programs (Figure 1) in East Asian (EA) transition countries – in particular China and Vietnam. On the contrary, in countries in Central and Eastern Europe (CEE) and

the Former Soviet Union (FSU) agricultural output fell sharply in the initial years of transition to stagnate and recover slightly in subsequent years<sup>3</sup>. On average in CEE and FSU countries, after a decade of reform, agricultural output was 20% lower than at the start of transition; while in the same time span in China and Vietnam output increased respectively 60% and 40% above its initial pre-reform level. Also, in per capita terms, output fell sharply in CEE and FSU – even more so in FSU – compared to a sharp increase in per capita output in EA (Figure 2).

The performance of Sub Sahara Africa (SSA) countries that embarked on structural adjustment and agricultural liberalization has been in between the EA and the CEE / FSU experience. On average, output grew in SSA countries but at a slower pace than in China and Vietnam and reaching 35% of its initial pre-reform level after a decade of reform (Figure 1). However, in per capita terms the output growth in SSA is much less spectacular<sup>4</sup> – virtually non-existent even (Figure 2). The flat time trend for per capita output changes in SSA is in sharp contrast with the positive trend in EA. However, it is still much better than the negative trend in CEE and FSU countries.

Comparing productivity indicators further nuances the story. In line with their trend of sharp output growth, China and Vietnam experienced strong increases in agricultural labor productivity and in yields (Figure 3 & Figure 4). However, also in CEE countries, labor productivity and especially yields increased dramatically, also in CEE countries, albeit after an initial period of decline lasting for 3 years on average. The period of productivity decline (and stagnation) has been longer for FSU countries (about 5 to 7 years on average) and the decline was stronger than in CEE. However, afterwards these countries seem to follow the same path of productivity growth as in EA and CEE.

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<sup>3</sup> While the general trend of output fall is the same for CEE and FSU countries, there are differences in the length of time between the start of reform and the bottom of the time trend, and the extent of output recovery between sub-regions and countries. These are described in Rozelle and Swinnen (2004).

<sup>4</sup> Differences in time trends between output and per capita output growth are explained by differences in population growth which has been much higher in SSA than anywhere else.

The indicators in Figure 3 and Figure 4 indicate that the average productivity in SSA has not declined, as in CEE and FSU, but has increased since the start of the reforms. This increase has however been much slower than in either East Asia, or CEE and FSU once they started growing again.

Finally, Figure 5 presents data on land use. The sharp agricultural output growth in EA is composed of sharp productivity growth and only modest increases in the agricultural area. In contrast, the growth of SSA agricultural output can be attributed mainly to acreage expansion, while only slight improvements in labor and land productivity were realized. Reform processes in CEE and FSU have resulted in a significant decrease of the cultivated area.

Finally, total factor productivity (TFP) is the most comprehensive indicator of productivity, but 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.

Whatever TFP evidence is available in the literature shows that TFP trends move largely in the same direction as the partial measures. In China, during the first years after reform (1978 to 1984), TFP measures of productivity rose by 5 to 10 percent per year. During the 1990s, TFP continues to rise at a rate of around 2 percent per year.<sup>5</sup> During the early reform period in Vietnam (1980 to 1985), TFP rose by 2 to 3 percent annually and continued to rise later (Benjamin and Brandt, 2001; Pingali and Xuan, 1992).

Estimates of TFP changes in CEE and SSA also show that measures of TFP generally move in a manner consistent with the partial ones. Macours and Swinnen (2000) estimate that

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<sup>5</sup> Several series of TFP estimates have been produced for China's agriculture (McMillan et al., 1989; Fan, 1991; Lin, 1992; Wen, 1993; Huang and Rozelle, 1996; Fan, 1997; Jin et al., 2002).

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.<sup>6</sup> For SSA, Nin Pratt and Yu (2008) estimate that average TFP in agriculture declined consistently in the 1960s and the 1970s. TFP has rebounded since the early 1980s, but slower than in Asia or Europe. The average TFP growth rate was around 1% per year over the past 20 years in SSA.

In summary, the available TFP evidence is consistent with the conclusions from the analysis of the partial indicators: strong productivity growth since the start of the reforms in East Asia (China and Vietnam), initial decline and then strong recovery in CEE, and slow but steady productivity growth in SSA since the mid 1980s.

### **3. A model of liberalization<sup>7</sup>**

The previous section showed that there are important differences among regions (East-Asia, Africa and Europe) and among sectors within the same region, in how the reforms affected economic performance.

#### **3.1. Characteristics of the pre-liberalization economy**

To use a model for explaining reform effects, it is important to take into account the specific characteristics of the pre-liberalization economies. Although there are important differences across regions in certain attributes of the pre-reform economy (see further), countries in CEE, FSU, EA and SSA had several characteristics in common – specifically on the governance of agri-food supply chains, which is relevant for our analysis.

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<sup>6</sup> 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. Rozelle and Swinnen (2004) review TFP evidence for the FSU where studies yield mixed results, mostly due to differences in datasets and methodologies.

<sup>7</sup> The model is based on Swinnen and Vandeplas (2007).

First, government institutions were monopoly buyers of agricultural products. This was most extreme in the Communist world, spreading from Central Europe to East Asia, where the entire agri-food system was under strict control of the state. However, also in most African countries – as well as in many Latin-American and South Asian countries - the state played a very important role in the agri-food chains. In the decades after independence from colonial power, governments in SSA regulated agricultural production, marketing and food processing through marketing boards, government-controlled cooperatives and parastatal companies.<sup>8</sup>

Second, interlinking was widespread in these chains. Again this was most extreme in the Communist system where production at various stages and the exchange of inputs and outputs along the chain was coordinated and determined by the central command system. The agricultural supply system was fully integrated and completely state-controlled (Rozelle and Swinnen, 2004). Production, processing, marketing, the provision of inputs and credit, retailing, etc were all directed by the central planning authorities. Although there were some variations in countries in the extent and scope of control, this was the basic system extending from Central Europe, the Soviet Union to China and Vietnam. However also in SSA government control and interlinking in food supply chains was widespread. Many of the African parastatal organizations provided both inputs to farmers and purchased their outputs.<sup>9</sup>

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<sup>8</sup> For example, marketing of grain and other basic food crops was controlled and organized by government marketing boards e.g. in Malawi, through *ADMARC* (Agricultural Development and Marketing Corporation); in Zambia, through *NAMBOARD* (National Agricultural Marketing Board) and in Kenya through *NCPB* (National Cereals and Produce Board). Also marketing and processing of major export crops was in many countries state-controlled through state-owned processing and exporting companies and organizations; e.g. for cotton in Malawi, through *CMDT* (Malawi Textile Development Company), in Cameroon, through *SODECOTON*, in Ghana, through the Ghana Cotton Development Board and in Kenya through *CLSMB* (Cotton Lint and Seed Marketing Board); for tea in Kenya, through *KTDA* (The Kenyan Tea Development Cooperation); for coffee through coffee marketing boards in Uganda, Kenya, Zimbabwe and Ethiopia; etc. In general, in SSA, these government controlled monopoly organizations were especially important for basic urban food crops, such as cereals, and for important export crops, such as cacao, coffee, cotton, etc; they were less important for crops as yam, cassava, etc.

<sup>9</sup> For example, the government marketing boards *ADMARC* in Malawi and *NAMBOARD* in Zambia provided seasonal inputs to peasant farmers deducting the value of the inputs from the payment made for marketed output at harvest time. Also parastatal cotton companies such as *CMDT* in Mali, *SODECOTON* in Cameroon and the

The dominant form (and often the only source of inputs and credit) was that of seasonal input and credit provisions by state-controlled organizations to small farmers in return for supplies of primary produce.

Third, an important achievement (in historical perspective) of these systems was that they did manage to provide inputs and credits to farms, albeit in a costly way. The monopoly control contributed to enforcement of the interlinked contracts, but there were problems of high costs, enforcement problems with buyers (sometimes) paying with delays and farmers (sometimes) not repaying credit or inputs.<sup>10</sup>

Fourth, government control of the supply chains was also used to set prices, which contributed to massive distortions in agricultural markets. State control of trade and prices in the chains were often motivated by political objectives, such as to provide cheap food for urban markets; the maximization of foreign exchange earnings; the creation of rural employment; ascertaining the viability of certain businesses; etc. While distortions were present everywhere, the nature of the distortions differed strongly across countries. As we will document further, farmers were generally taxed before the reforms in Africa, China and Vietnam while farmers were subsidized in Eastern Europe and the former Soviet Union.

### **3.2. The model**

We will now develop a theoretical model which incorporates these characteristics to explain why differences in pre-reform conditions, differences in specific reforms and differences in

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Ghana Cotton Development Board in Ghana and the Kenyan Tea Development Cooperation provided credit and inputs to cotton farmers (Bauman, 2000; Poulton et al., 1998).

<sup>10</sup> In Africa, several studies conclude that state-controlled outgrower schemes were inefficient and poorly managed, while others point at successes of these systems (Bauman, 2000; Poulton et al, 1998; Warning and Key, 2002). Warning and Key (2002) find low repayment rates, while Poulton et al. (1998) and Baumann (2000) find that some large government outgrower schemes in resp. Malawi and Kenya were successful in achieving high repayment rates. Johnson and Brooks (1983) argue that the inefficiency in the processing and marketing systems and in the central allocation of production factors were one of the primary causes of the inefficiency of the Soviet farming complex. In many instances, there were problems with control of quality, etc.

commodity characteristics, in particular the value of the commodity chain, may cause differences in reform effects.<sup>11</sup>

Consider the situation where a local household or farming company – which we refer to as “the farmer” – can sell farm products to a trader or a retailing or processing company – which we refer to as “the buyer”. This buyer sells the product (possibly after processing) to consumers – either domestically or internationally. For reasons of simplicity, we assume the farmer has the choice between producing a crop with low value added (referred to as “low value product”) or a crop with high value added (referred to as “high value product”).

Define  $p_l$  and  $p_h$  as the per unit consumer prices of the low and high value products. Let  $m$  be the per unit “efficient” processing and extra transport costs; in other words,  $m$  covers the extra costs that are involved in producing the high value product and delivering it to consumers through an efficient market system. We also introduce a cost term  $t$ , with  $t = t_x + t_m$ , where  $t_x$  are government taxes or subsidies (tax for  $t_x > 0$  and subsidy for  $t_x < 0$ ),<sup>12</sup> And  $t_m$  are excess processing and marketing costs, due to inefficiencies in the marketing chain.

The production of high-value commodities requires some (specific) input use (e.g. fertilizers, credit, seeds, technology). Assume that to produce one unit of high value output, the farmer requires specific inputs with a value of  $I$  on top of his basic production cost  $C$  (e.g. labor, land) for production of the low value good. We assume that these specific inputs are not available to the farmer because of factor market imperfections. This assumption reflects the situation in many developing and transition countries at the time of the reforms as local producers and households faced important factor market constraints. These constraints hurt

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<sup>11</sup> Our model is close to Kranton and Swamy (2008), but extends it by introducing a set of new parameters which are relevant to our analysis.

<sup>12</sup> We assume that the government does not impose taxes on low quality products. This is a realistic assumption since such taxation may not be possible because low quality products may be importantly consumed in the household or in the local village. It is also consistent with evidence showing that distortions are much more important in tradable commodities than in non-tradable commodities; as well as that there is an anti-trade bias in government policy (Anderson, 2006; Krueger, Schiff and Valdes, 1989).

both farmers and buyers: they prevent farmers from producing for the market and constrain access to raw materials for the processing firm.

If the processing firm has access to the required inputs, the buyer can act as an intermediary in the input market and provide (sell or lend) the inputs to the farmer. This, again, is a realistic case since the buyer may have better collateral, more cash flow or face lower transport or transaction costs in accessing the inputs. If so, the buyer will consider offering a contract to the farmer, which includes the provision of inputs and the conditions (time, amount and price) for purchasing the farmer's product. We assume that the buyer either provides the farmer with the full amount of required inputs  $I$  per unit of production, or the buyer does not provide any inputs<sup>13</sup>. If the buyer and the farmer decide to collaborate, they can realize a joint surplus  $G$ , with  $G = p_h - m - I - C - t$ .

To determine how this joint surplus  $G$  is divided, we need to take into account what each party could realize outside of the negotiation. Instead of signing an agreement with the concerned buyer, the farmer can negotiate a contract with another company, or continue producing the low-value product for subsistence or for the local market<sup>14</sup>, earning the consumption value of the low-value produce  $p_l$  at a cost  $C$ . The farmer's disagreement payoff is then  $Y_l = \alpha p_h - C$ , with  $\alpha \geq 0$  an indicator of the alternative opportunities of the farmer. If the farmer's only ex ante outside option is to produce low-value products for the local market,  $\alpha p_h = p_l$ . Hence  $\alpha \geq p_l / p_h$  and  $\alpha$  increases if the farmer has other interesting opportunities.<sup>15</sup>

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<sup>13</sup> This implies that the application of any amount of inputs below the optimal amount of inputs  $I$  is resulting in a lack of marketable surplus.

<sup>14</sup> We assume the consumption value of the low-value product equals its local market price.

<sup>15</sup> More generally, one can show that, ceteris paribus,  $\alpha$  is increasing in transaction costs to deal with other buyers (e.g. search costs, switching costs, transport costs), in the degree of supplier concentration, decreasing in the degree of buyer concentration (e.g. Inderst & Mazzarotto 2008), and higher if there are other buyers with access to high value markets (i.e. if the supplier's bargaining partner is not the "gatekeeper" to the high value market (Mazzarotto 2004)).



Similarly, the buyer may have other opportunities. We denote his payoff under disagreement as  $\Pi_l = \lambda p_h$ ,<sup>16</sup> where  $\lambda \geq 0$  is an indicator which reflects the alternative options of the buyer: for example,  $\lambda$  is increasing in the number of suitable contract suppliers. The net surplus that can be achieved when bargaining is successful, is then  $S = G - Y_l - \Pi_l$ . This can be rewritten as:

$$S = \theta - I - t, \quad (6)$$

with  $\theta$  an indicator for the relative value of the product (compared to alternative activities):

$$\theta = (1 - \alpha - \lambda)p_h - m \quad (7)$$

In a perfect enforcement setting, joint profits can be divided according to a simple Nash bargaining process with sharing rule  $\beta$ , such that the respective incomes of the supplier and the buyer under perfect enforcement are  $Y_{pf} = Y_l + \beta S$  and  $\Pi_{pf} = \Pi_l + (1 - \beta)S$ .<sup>17</sup>

When enforcement is costly – as is the case in countries under analysis – opportunistic behavior may lead to hold-ups if one of the agents has an attractive alternative to contract compliance (cfr. Williamson, 1981). To understand under which conditions contracting will be sustainable, we consider the extreme situation where there is no external enforcement – which is equivalent to assuming that external enforcement is prohibitively costly.

First, the farmer can divert the received inputs to other uses, such as selling them or applying them to other production activities (e.g. subsistence crops). This way, he can always at least earn an income  $Y_d = \alpha p_h - C + I - \phi^f$ , where  $\alpha p_h - C$  represents the farmer's income from producing the low value product. The revenue from reselling the specific inputs equals  $I$ . If he violates a contract, the farmer suffers a reputation cost  $\phi^f$ .<sup>18</sup> If held up in this way, the buyer earns a payoff  $\Pi_d = -I$  (assuming that he cannot find alternative suppliers ex post).

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<sup>16</sup>  $\lambda > 0$  is increasing in transaction costs to deal with other suppliers (e.g. search costs, switching costs, transport costs, costs of training...), decreasing in the degree supplier concentration, increasing in the degree of buyer concentration (e.g. Inderst & Mazzarotto 2008). To ensure that  $\theta$  is non-negative, we assume that  $\alpha + \lambda \leq 1$ .

<sup>17</sup> Nash (1953) proposes that the sharing rule be  $\frac{1}{2}$ , but we prefer to take a more general view.

<sup>18</sup> This can be interpreted in a broad sense not only as a pure loss in terms of reputation, but also as a social capital cost, a moral loss, or the loss of future trade opportunities.

An alternative way to hold up the buyer, is when the farmer applies the inputs to the crops, as agreed in the contract, but then sells the high value output to an alternative buyer who offers a higher price because he does not need to account for the cost of the provided inputs. However, the competing buyer may not value the product as much as the contract buyer who outlined the production process from the start according to his specific needs. To account for this, we define  $\gamma$  ( $0 \leq \gamma \leq 1$ ) as the share of the price offered by competing buyers.<sup>19</sup> The farmer's payoff under holdup of the buyer is in this case  $Y_s = \gamma p_h - C - \phi^f$ , the buyer's payoff is  $\Pi_s = -I$ .

For the farmer to voluntarily comply with the contract, his income from the contract  $Y$  must at least be as much as his outside option, obtained from breaching the contract, i.e. his incentive compatibility constraints must be satisfied.<sup>20</sup>

The contract  $(Y, \Pi)$  that satisfies these constraints can then be written as:

$$Y = \alpha p_h - C + \max [\beta(\theta - I - t), I - \phi^f, (\gamma - \alpha) p_h - \phi^f] \quad (8)$$

$$\Pi = p_h - m - I - C - t - Y \quad (9)$$

It follows that, if the contract is enforced, the supplier's income will be increasing in his ex ante as well as his ex post outside options, while decreasing in the buyer's ex ante outside option.<sup>21</sup> However, contracts will only be enforced for a specified range of parameter values.

The conditions for contract feasibility are summarized in the following restriction on  $\theta$ :

$$\theta \geq \theta_{min} = \max (I + t, 2I + t - \phi^f, I + t + (\gamma - \alpha) p_h - \phi^f) \quad (10)$$

This condition captures several reasons for potential contract failure. If  $\theta$  is smaller than  $I + t$ , the net surplus of the transaction will be negative and there is no incentive for contract formation. This can be due to two reasons. If  $\theta < I$ , there is no surplus to be created. We refer to this situation as "efficient separation". If  $I < \theta < I + t$ , there would be a surplus

<sup>19</sup>  $\gamma$  reflects the degree of buyer-specificity of the production standards (the higher the specificity of the product or the quality standards, or the higher the transaction costs of switching, the lower  $\gamma$  is). If quality characteristics are more observable (or cheaper to observe), then  $\gamma$  will increase.

<sup>20</sup> The relevant incentive compatibility constraints are  $Y \geq Y_d$  (ICC<sup>f</sup>1) and  $Y \geq Y_s$  (ICC<sup>f</sup>2).

<sup>21</sup> For a theoretical discussion of opportunistic behaviour by the buyer, see Swinnen & Vandeplas (2007).

under non-distorted conditions, but either taxation or inefficiencies in the chain prevent an effective surplus; we refer to this situation as “distorted separation”. If  $\theta \geq I + t$  but smaller than  $2I + t - \phi^f$ , or than  $I + t + (\gamma - \alpha) p_h - \phi^f$ , there is no price the buyer can offer to the supplier in order to make him comply with the contract. In other words, the premium that the buyer has to pay the supplier not to breach the contract is larger than the buyer’s gross revenues: he cannot afford this. Under these conditions, the contract will not be realized, even if it would be socially efficient to do so. This is referred to as “inefficient separation”.

Condition (8) implies that several factors are crucial for contracting to be sustainable. First, the relative value in the chain ( $\theta$ ) needs to be sufficiently high to realize a net surplus and to overcome enforcement problems. From (7) it follows that  $\theta$  will be higher when the consumer price ( $p_h$ ) is higher, when processing and marketing costs ( $m$ ) are lower, and when there are less alternatives for suppliers and buyers ( $\alpha$  and  $\lambda$  low). Second, a higher investment cost ( $I$ ) reduces contract feasibility. The variable  $I$  is present in each of the three conditions on  $\theta$  which are summarized in equation (8): the higher the input cost the higher the consumer price needs to be to create a surplus, and the higher the chance of contract breach by the supplier.

Third, government taxes or subsidies ( $t_x$ ) will affect contracting. The conditions for contract enforcement will be more restrictive (i.e. a higher  $\theta$  will be required for contract formation) the higher the government tax on farmers ( $t_x > 0$ ), and less restrictive with the government subsidizing the farmers ( $t_x < 0$ ). Fourth, excess processing and marketing costs ( $t_m$ ) have a similar effect on contracting. Contracts can be enforced at lower values of  $\theta$  if excess processing and marketing costs are lower. Fifth, the degree of buyer specificity ( $\gamma$ ) also affects contract feasibility. If there are no alternative outlets for the high-value product, hence if buyer specificity of the product is high (low  $\gamma$ ), contracts are sustainable for a wider

range of  $\theta$ , as  $\theta_{min}$  will be lower. Finally, a higher reputation cost of the farmer ( $\varphi^f$ ) makes contract breach less likely.

In summary, if the relative value in the chain ( $\theta$ ) is sufficiently high, opportunistic behavior can be overcome by paying a higher price to the supplier. Inefficient separation is thus more likely to occur (a) if the value  $\theta$  is low, (b) if the value of required inputs  $I$  is high, (c) if farm reputation costs  $\varphi^f$  are low, and (d) if there are alternative sales outlets for high value products (i.e.  $\gamma$  is high).

Figure 6 illustrates these various separation effects. For illustrative purposes we use specific numerical values for some of the parameters:  $\varphi^f = I$ ,  $m = 0$ ,  $\beta = 0.5$  and  $t_x = t_m = 0.5$ .<sup>22</sup> The figure shows how the gains in farmers' income ( $\Delta Y = Y - Y_l$ ) and in processors' income ( $\Delta \Pi = \Pi - \Pi_l$ ) change with the value of the commodity  $\theta$ . The line  $S^*$  represents the surplus that could be created without distortions ( $t = 0$ ) and with perfect enforcement. Line  $S_t$  represents surplus with distortions ( $S_t = S^* - t$ ), and the kink in the  $S_t$  function reflects the hold-up effect. In the illustrated case with the specific numerical values, contracting and surplus creation will only occur if  $\theta \geq 3I$ . Efficient separation occurs for  $\theta < I$ ; distortion-induced separation occurs for  $I < \theta < 2I$ ; and contracts are not possible due to inefficient separation when  $2I \leq \theta < 3I$ .<sup>23</sup> If  $\theta > 3I$  contracting is feasible. However, note that within the interval  $3I \leq \theta < 4I$ , the processor has to pay the farmer a premium in order to prevent the farmer from breaching the contract. We have defined this an “efficiency premium” (Swinnen and Vandeplas, 2007), similar to the concept of an efficiency wage (Salop, 1979). This results in the farmer's share of the surplus ( $\Delta Y$ ) being larger than  $\beta S$ , as is shown by the dotted line in

<sup>22</sup> Note that these parameter assumptions do not affect our main conclusions.

<sup>23</sup> Another way to enforce contracts is by investing in supervision (or by engaging third party enforcement), if it is not prohibitively costly. Less inefficient separation will then occur, but the total contract surplus will be reduced. With  $M$ , the cost of supervision, the surplus is  $S(M) = \theta - I - t - M$ . If  $(1-\beta) S(M) > \Delta \Pi$  as defined above, the buyer will effectively invest in supervision. See Minten et al. (2009) for an example of an extensive supervision and monitoring system. Alternatively, when the most probable destination of delivered inputs is the non-contract, subsistence crops, buyers have tried to address input diversion incentives by offering farmers additional inputs as fertilizers and pesticides for their own food crops (e.g. Govereh et al. 1999).

Figure 6. If  $\theta \geq 4I$ , contracting is feasible with the  $\beta$  share rule as both partners' incentive compatibility constraints are satisfied.

### 3.3. Liberalization

It is clear from the analysis above that the conditions for contract enforcement under state control differ considerably from those under a market system. Monopolistic state control made contract enforcement more likely, because of the absence of competition (hence low  $\alpha$  as well as low  $\gamma$ ). Monopoly control also implied high reputation costs for farmers (hence high  $\phi^f$ ).<sup>24</sup> Excess marketing costs  $t_m > 0$  made enforcement more difficult, while the impact of price distortions depend on the nature of the distortions: subsidization of farmers in the Soviet Union and Eastern Europe ( $t_x > 0$ ) made enforcement easier, while taxation of farmers such as in Africa and China ( $t_x < 0$ ) made enforcement more difficult.

We now analyze the impact of liberalization. We focus on two crucial, and interrelated, aspects of the liberalization process reform. One is the liberalization of prices meaning that the government no longer sets prices; the other is the liberalization of markets, i.e. the removal of control over the structure of the commodity chains by allowing competition in the chain and no longer dictating trade (internally and externally).<sup>25</sup>

Define  $T$  as the governments' "price policy" and  $C$  as the governments' "market policy". Liberalization of prices is represented by  $\Delta T > 0$  with  $\partial t_x / \partial T > 0$  for  $t_x < 0$  and  $\partial t_x / \partial T < 0$  for  $t_x > 0$ . Market liberalization is represented by  $\Delta Z > 0$ .

<sup>24</sup> An alternative argument is that centrally imposed conditions to source from all farmers (for political objectives) may actually result in lower reputation costs under state organization.

<sup>25</sup> We do not discuss separately the effect of privatization. Its effects are implicit in our model. If privatization leads to more efficient management, and hence to a reduction in excess marketing costs ( $t_m$ ), this will lead to an increase in farm prices, with similar effects as a decrease in tax policies. This effect should lead to an increase in output and in farm incomes. However, privatization may not lead to such reduction if it induces monopolistic/monopsonistic pricing. The key element is competition, which we analyze explicitly.

### *Liberalization of prices*

The liberalization of prices (including cut of taxes and/or subsidies) will affect the profits of farms directly by its effect on the output prices, but also indirectly through its impact on the contracting conditions. Equation (10) implies that  $\partial\theta_{min}/\partial t_x > 0$ . Hence, the effects depend on the nature of the distortions.

First, when farmers were taxed under the pre-reform conditions, it follows that price liberalization will improve contract feasibility by reducing  $\theta_{min}$ . As a result, the domain over which there is “distorted separation” will become smaller, and contracting will be possible over a larger domain of  $\theta$ . The impact on farm income is positive for the domain over which contracting is possible after liberalization, but will not change for the domain where contracting is not possible. This follows from equation (8):  $\partial Y/\partial t_x < 0$  when  $t_x$  is a binding condition for  $Y$ , and  $\partial Y/\partial t_x = 0$  otherwise. One should therefore expect output to increase for the production activities where contracting is possible ex post.

Second, when price liberalization implies a cut of subsidies to agriculture, the farmer’s surplus will fall, either because he receives less for his production or because production will no longer be possible as contracting will no longer be feasible reduced subsidies. Hence, in this case both factors will reinforce each other in inducing output decline.

### *Liberalization of markets*

The second element of the liberalization policy was market liberalization ( $\Delta Z > 0$ ), i.e. reducing inefficiencies by stimulating private competition. This was done by allowing private traders and buyers to enter the market and/or by privatizing and/or removing the monopoly status of the state companies in the agri-food chain and to allow them to compete. If one only considers effects in the output market, one would expect competition to further increase the farmer’s outside options (through  $\alpha$  and  $\gamma$ ) and increase his share of the contract value.

However, market liberalization also affects contracting. With (increased) competition between buyers, contracting may break down although it would be socially efficient. Using our model, we identify several effects of competition, both ex post and ex ante.

First, the introduction of competition between private buyers will increase the ex ante outside option farmers face at the time of contract negotiation. In our model, this implies an increase in  $\alpha$  ( $\partial\alpha/\partial Z > 0$ ).

The second effect of competition is on company management. There is an extensive literature on how competition (and privatization) changed manager and firm behavior in transition countries (Roland, 2000; Konings and Walsh, 1999). The manager's incentive for innovation and profit maximization will be stronger in a competitive environment. This effect is reinforced when there is no longer a soft budget constraint as there usually was for government-managed state boards. Improved management reduces excess processing and marketing costs  $t_m$  ( $\partial t_m/\partial Z < 0$ ).

Third, competition between buyers will reduce the farmer's reputation cost  $\phi^f$  from breach of contract ( $\partial\phi^f/\partial Z < 0$ ). The number of agents operating in the market is expected to negatively affect the penalty for contract breach (Hoff and Stiglitz, 1998), because the threat of cut-off from future contract arrangements is less stringent, as there are other contract partners available. This argument is in line with Eswaran and Kotwal (1985), who state that reputation is an effective weapon against moral hazard only for suppliers "of those factors that are in excess supply". In other words, a higher demand for the supplier's produce lowers his reputation cost from breaching a contract.

A second reason why the penalty for breaching a contract is lower with more competition, is that reputation effects are less prevalent in a competitive market, where agents are less likely to coordinate and share information (see also Zanardi 2004). This will make it easier for an opportunistic supplier to find an alternative buyer. Local information networks

work less well when the number of agents expands, as it costs more in terms of effort, money, and/or time to let information spread among a larger group of agents.

Fourth, market liberalization may as well give rise to an increased ex post outside option of the farmer through a higher number of opportunistic buyers, i.e. an increased  $\gamma$  ( $\partial\gamma/\partial Z > 0$ ). With more buyers, it will be harder to behave monopsonistically, or to collude. Moreover, more buyers may bring a wider diversity of buyers, including buyers who potentially have a higher valuation of the high quality good.

The impact of market liberalization on contract feasibility and on farm incomes can then be summarized as follows:

$$\frac{\partial Y}{\partial Z} = \frac{\partial Y}{\partial \alpha} \cdot \frac{\partial \alpha}{\partial Z} + \frac{\partial Y}{\partial t_m} \cdot \frac{\partial t_m}{\partial Z} + \frac{\partial Y}{\partial \phi^f} \cdot \frac{\partial \phi^f}{\partial Z} + \frac{\partial Y}{\partial \gamma} \cdot \frac{\partial \gamma}{\partial Z} \quad (11)$$

$$\frac{\partial[\theta - \theta_{\min}]}{\partial Z} = \left[ \frac{\partial \theta}{\partial \alpha} - \frac{\partial \theta_{\min}}{\partial \alpha} \right] \cdot \frac{\partial \alpha}{\partial Z} - \frac{\partial \theta_{\min}}{\partial t_m} \cdot \frac{\partial t_m}{\partial Z} - \frac{\partial \theta_{\min}}{\partial \phi^f} \cdot \frac{\partial \phi^f}{\partial Z} - \frac{\partial \theta_{\min}}{\partial \gamma} \cdot \frac{\partial \gamma}{\partial Z} \quad (12)$$

where  $\partial Y/\partial t_m \leq 0$ ,  $\partial Y/\partial \phi^f \leq 0$ ,  $\partial Y/\partial \gamma \geq 0$ ,  $\partial \theta/\partial \alpha < 0$ ,  $\partial \theta_{\min}/\partial \alpha \leq 0$ ,  $\partial \theta_{\min}/\partial t_m \geq 0$ ,  $\partial \theta_{\min}/\partial \phi^f \leq 0$ ,  $\partial \theta_{\min}/\partial \gamma \geq 0$ ,  $\partial Y/\partial \alpha \geq 0$  (in each case the effect is zero when the constraint is not binding and either positive or negative when the constraint is binding). From equation (11) it follows that market liberalization will generally induce an increase in farm surplus from production and thus an increase in supply (as it was intended to), since all terms of the formula are positive. However, this will only be the case if contracting is feasible. From equation (12) it follows that market liberalization implies several sub-effects which will make contracting less feasible. To assess the effect of  $\alpha$  on contract enforcement, we have to both consider the impact of  $\alpha$  on  $\theta$  and on  $\theta_{\min}$ . The first term of (12) will be zero if  $\alpha$  is binding on  $\theta_{\min}$ ; otherwise it will be negative. In fact, three of the four effects on the right hand side of equation (12) are negative,<sup>26</sup> implying a negative effect on contract feasibility. Only the

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<sup>26</sup> More specifically, each of the terms is strictly negative or zero depending on whether the respective constraints are binding or not.



improvement in excess processing and marketing costs (term 2) will improve contract feasibility, *ceteris paribus*. While the net effect depends on the size of the different components, and is an empirical question, the theoretical results do suggest that important constraints on output growth with market liberalization may be expected if one takes into account the endogenous impact on the emergence and enforcement of contracting.

### **3.4. Implications**

These theoretical results have major implications for liberalization policies and their expected effects. Our findings predict that liberalization will not just affect farmer prices directly but also the institutional organization of the commodity chain. The latter, in turn, will have a major impact on farm incomes and supply responses.

The analysis has major implications for reform effects. In particular, price and competition reforms will have direct and indirect effects on both efficiency (output and productivity) and equity (the distribution of rents between buyer and farm). In terms of efficiency effects (the main focus of this paper), the theory predicts that price increases would improve incentives to produce (direct effect) and improve the provision of inputs as private enforcement would be possible (indirect effect); and vice versa for price decreases. Hence the direct and indirect effects are reinforcing each other, either positively or negatively. With competition the direct and indirect effect may have opposite effects. Increased competition will directly stimulate output by improving benefits for farmers but may indirectly constrain or reduce growth by making enforcement more difficult. Hence the two effects may be opposite, but this depends on the nature of the commodity and the supply chain. To illustrate this further, consider three types of commodities: low value products which require no external inputs; medium value which require external inputs; and high value products which require external inputs. The first type of commodity will not face problems of enforcing interlinked contracting since there is no interlinked contracting. If initially there is no

interlinked input supply, then there will only be direct effects of price and competition reforms. Regarding the second and third type of commodity, the theory predicts that vertical coordination/interlinked contracting by the private sector would be more easy to sustain in higher value commodity chains. Therefore, for commodities which require substantive inputs, we would expect the supply response to be positively related to the commodity value because of the vertical coordination that will (not) emerge due to private sector investment.

### **3.5. Other Reforms**

Before moving to the interpretation of the empirical facts with our model, we should point at some limitations of our theory and mention some additional reform aspects which we have not included in our derivations. Two reforms which are closely related to the model are the liberalization of the capital markets and of trade and investment regimes. Another important reform in some countries were property rights reforms.

The cost of capital in developing and transition countries is typically high, and capital constraints are especially important for (small) farmers. Liberalization may reduce capital constraints by inducing competition in the capital market (e.g. Henry, 2003). However, this effect is conditional on the (change in) profitability of the farm sector and changes in subsidies in the capital market. For example in Eastern Europe and the former Soviet Union, access to capital collapsed and the cost of capital increased strongly during the transition period (Swinnen and Gow, 1999).

Another factor is the impact of liberalization on foreign direct investment (FDI) and its spillovers. There is substantial evidence that market liberalization (and the liberalization of the investment regimes) has induced an increase in FDI. FDI inflows, in turn, have stimulated contracting as foreign companies have lower capital costs or face less capital constraints, so that FDI leads to a decreased capital cost and increased contracting in host

countries (e.g. Dries and Swinnen, 2004; Girma et al., 2008; Gow et al. 2001; Harrisson and Macmillan, 2003; Héricourt and Poncet 2009).<sup>27</sup>

Finally, as we already pointed out earlier, privatization of property rights at the farm level was very important in some countries which we cover, in particular in Asia (China and Vietnam) and in Eastern Europe, and less so in other countries, in particular in Africa.

In the interpretation of the empirical observations we will complement the hypotheses based on our theoretical model with these other reform effects where we think these are essential to understand the overall reform effects and economic performances.

#### **4. Explaining the differences in reform effects**

The analysis in Section 3 implies that different reform strategies or the same reforms in countries with different initial conditions may have different results, not just because of the direct effects on prices or firms, but also because of their impact on the governance of the supply chains. It is therefore important to consider countries' differences in terms of the choice of reform policies and in their initial conditions (initial price distortions and income). Table 1 summarizes these differences by region.

##### **4.1. Initial conditions**

###### *Initial condition 1: price distortions*

As already explained, important price distortions were present everywhere, but the nature of the distortions differed strongly across countries. Farmers were generally taxed (directly or indirectly) in Africa (Anderson and Masters, 2008; Krueger, Schiff and Valdes, 1991) and in China and Vietnam (Rozelle and Swinnen, 2004) while they received (often indirect) subsidies in Eastern Europe and the former Soviet Union (Anderson and Swinnen, 2008).

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<sup>27</sup> In many developing countries, however, the foreign companies' lead over domestic companies is reduced by domestic policies restricting FDI and hereby favouring local companies.

Figure 7 presents indicators of government assistance to farmers which shows that farmers in CEE and FSU were highly subsidized prior to the reforms with producer support estimates (PSE) varying from 40% to 80%. In China and SSA, nominal rates of assistance (NRAs) to farmers were strongly negative: on average around -30% in SSA and lower than -50% in China.<sup>28</sup>

*Initial condition 2: income (average commodity value)*

There are also major differences between the regions in terms of income at the start of the reforms (Table 1). Incomes were much higher in CEE (10,069 \$) and, to a lesser extent, in FSU (4,364 \$) than in China (674 \$) and in SSA (1,429 \$). These income differences are correlated with the average value in the agri-food chains. The value of agricultural production is usually much higher in countries with higher incomes and development levels. The value in food supply chains increases as both quality and safety demands and the level of processing increase with increasing income levels. With rising incomes consumers change their preferences away from basic staple food commodities towards higher value food items such as fruit, vegetables, fish and animal products. If we look at the structure of the total agricultural output at the time of reform we can observe significant differences across the regions (Figure 8). In CEE and FSU countries, on average more than 70% of agriculture production consisted of higher value food products such as fruits, vegetables, milk and meat products; for SSA and EA this was less than 50%. Moreover, in SSA and EA on average 10 to 20% of agricultural production was in very low value staple crops such as roots, tubers and pulses.

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<sup>28</sup> We use two measures because of data availability. The PSE and NRA measures use different ways of calculation but are comparable as general indicators of government support to agriculture. PSE % measures how much of gross farm income is due to government measures. The NRA measures the distortions in farm prices and revenues due to government interventions (see OECD (2008) and Anderson and Valenzuela (2008) for details).

Industrial crops – typically coffee, cocoa, tea, cotton, rubber, and tobacco with an intermediate value – were more important in SSA than in Europe and Asia. These products had an intermediate value because they were mostly produced for exports to higher income (western) countries.

### *Initial condition 3: collective farming system*

While in China, Vietnam, the FSU and CEE the pre-reform situation was characterized by a collective farming-system, this was not the case in SSA. Although in most SSA there were (and still are) no individual private property rights over land, agricultural cultivation was not communal but based on private land user rights.<sup>29</sup>

## **4.2. Reform choices**

While prices were liberalized, private traders were allowed in agricultural trade, and the monopoly status of government marketing boards and parastatal processing companies was removed, in general, the timing and extent of the various reform elements differed among countries.

The main reform approach in Eastern Europe and the Former Soviet Union was a “big-bang” approach. This implied the simultaneous liberalization of prices and trade and the introduction of competition and privatization across the economy.<sup>30</sup>

In contrast, China sequenced various components of the reform package. China first reformed property rights in agriculture and later administratively increased prices to reduce taxation on farmers. Only afterwards, it gradually allowed competition in food markets. The gradual approach to the reforms in China differed also from those in the CEE and the Soviet

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<sup>29</sup> The exception in SSA is Ethiopia which has known a China-style communal agricultural production system from 1975 to 1987.

<sup>30</sup> Within this large set of countries, there was still considerable variation. See Rozelle and Swinnen (2004) for details.

Union, because China reduced its control over farm prices while maintaining state control over the institutions that supplied inputs to and purchased outputs (mostly rice) from the farms (Rozelle, 1996; Sicular, 1988; 1995).<sup>31</sup>

In Sub Saharan Africa, reform strategies were a mixture (Kherralah et al., 2002; World Bank, 1994; Akiyama et al., 2003). In most countries, the removal of state control was not as sequenced as in China. A big bang reform approach was launched in some countries such as Nigeria in 1987 with simultaneous removal of price controls, trade restrictions and (para-) state crop procurement and input provision. In many other SSA countries, reforms started at different times in different agricultural sub-sectors.<sup>32</sup> In most countries reforms started in basic food sectors while in export sectors – such as coffee, cocoa, cotton etc. – reform processes started later. In addition, basic food sectors were often completely liberalized while in many export sectors state control was not removed completely. State monopolies still exists in some sectors – most notably in the cotton sector in Western Africa.<sup>33</sup> However, in some specific cases, a sequential approach was used, similar to the one described for China, with first liberalization of prices and subsequently gradual removal of the state monopoly. This was for example the case in the coffee sector in Cameroon and Tanzania, the cocoa sector in Cameroon and the cotton sector in Eastern Africa. However, in some cases, such as the coffee sector in Uganda, the reversed sequencing was used, with first the introduction of competition and later on the removal of direct taxes. In summary, reform strategies were a mixture in SSA.

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<sup>31</sup> The policy evolution is actually more nuanced than “the gradual process” as it is usually summarized. In fact the Chinese government initially retracted from an early policy of allowing competition and re-introduced state control after competition created (implicit) contract break-downs and the vertically coordinated supply of fertilizer to the farms. In fact, China’s initial approach was not that different from that in East Europe (and the Soviet Union) as it liberalized markets and allowed private traders to come in. However, the resulting turmoil on the market and the threat of reduced rice supplies for the cities induced the Chinese leaders to re-take control over the supply chains. See Rozelle (1996) for a fascinating review of these policy changes and their effects.

<sup>32</sup> For example in Tanzania, reforms started for the coffee sector in 1990, for the cashew nut sector in 1991 and for the cotton sector in 1994.

<sup>33</sup> See Akiyama et al. (2003) for an overview of reforms in cocoa, coffee, cotton and sugar sectors in SSA countries.

While the reform choices differed in the three regions, in particular regarding the combination and timing of policies, it is worth emphasizing that in all three regions the share of the private sector increased strongly over the past two decades and much of the price distortions were removed. The latter is clear from Figure 7, which shows how for all regions, the indicators (PSE and NRA) have moved towards low levels (with zero representing the absence of government support/taxation).

### **4.3. An explanation of different liberalization performances**

We now combine the insights from our model and from the analysis of differences in initial conditions and reform choices to offer a set of hypotheses to explain the differences in reform performance.

#### *Europe*

In Eastern Europe and the former Soviet Union, where farmers were subsidized under the state controlled system, the liberalization of prices caused a dramatic reduction in farm support and strong decline in the terms of trade for farmers, i.e. farmers' output prices declined strongly in real terms and compared to input prices. At the same time, farms and the food and agribusiness industry were privatized and state directives were removed. This combination caused a complete collapse of the state controlled vertical coordination system and with it, the provision of inputs to farmers. Along with the removal of subsidies, this collapse has caused an initial sharp decline in agricultural output and productivity, as is reflected in the performance indicators in Figure 1 and Figure 2.

The initial output and productivity decline was reinforced by the fact that the CEE and FSU farms were relatively capital and (external) input intensive, which made them strongly dependent on exchange with suppliers for their inputs. In addition, where large collective

farms collapsed, gains from improved incentives in smaller family farms were initially more than offset by losses in scale economies.<sup>34</sup>

However, the dramatic reforms in a region with relatively high incomes also induced large inflows of foreign investments, much of which went into the food industry and agribusiness (see Figure 9). These investments, in turn, induced a rapid expansion of privately organized vertical coordination through the private agri-food sector with major spillovers on the farms (Gow and Swinnen, 1998; Dries and Swinnen, 2004; World Bank, 2005). In combination with the stabilization of real prices in the mid 1990s, these investments caused a flow of inputs, capital, and technology to the farm sector – as explained by our model – and contributed to strong increases in productivity in Eastern Europe.

Within the European transition region the intensity and speed of this process was related with income, which can be interpreted as being correlated with the value in the commodity chains (which corresponds to  $\theta$  in our theoretical model). The process started earliest and most intensive in the richer countries of Central Europe, and later and slower in poorer transition further East and South (Swinnen, 2002; 2007). Figure 9 documents the inflow of FDI in the regions, and clearly shows how FDI growth was much stronger and earlier in CEE than in FSU or the other regions. Dries et al. (2009) show how the growth of contracting in supply chains is strongly correlated with income – which creates a market for higher value FDI products and thus (endogenous) enforcement of higher value contracts – and progress in reforms – which enhances macro-economic stability and enforcement of contracts and property rights (see Figure 10).

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<sup>34</sup> See Macours and Swinnen (2000) for estimations of the contributions of the various reform elements to the decline in CEE agricultural output.



## *China*

In China, the initial growth came from the property rights reforms – giving land to the rural households. This caused a strong growth in productivity and output during the first 5 years of transition. In contrast to the CEE and FSU farms, Chinese farms were very labor intensive, with very little input from outside, and hence benefited strongly from the enhanced labor intensive effects without any losses of scale economies. These productivity gains (which are not captured by our formal model) explained much of the gains during the first five years of the reforms.

In a second phase, the Chinese rulers gradually adjusted prices towards market price levels, thereby reducing taxation, which benefited farms. In addition, there were no disruptions in exchange since the government remained firmly in control of the agencies buying commodities and providing inputs. In line with the analytically derived results in the model, this reduction and removal of agricultural taxes combined with the initial retaining of state monopolies and state-controlled interlinking and input provision caused a sharp positive supply response.

The subsequent gradual introduction of competition in the food chain (by allowing traders' competition at the margin) removed inefficiencies and improved farmers' bargaining power and income in the chains without leading to contract breaches and input and lead to a further positive supply response.

In summary, the success of China's reform is due to a combination of initial conditions (labor intensive and low input farming) and carefully sequenced reforms, which all in turn contributed to strong growth during the first 15 years of the reform era.<sup>35</sup>

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<sup>35</sup> See Lin (1992) and deBrauw, Huang and Rozelle (2000, 2004) for detailed estimates of the growth contributions of the various reform components.

## *Africa*

Regarding the SSA reform performance, we offer a set of hypotheses to explain (a) why SSA growth is lower than that of China (and Vietnam); (b) why SSA growth was higher than that of CEE and FSU in the initial reform years; and (c) why growth in SSA was slower than in CEE (and FSU) after the initial stage.

(a) SSA growth, on aggregate, was slower than in China for three reasons. First, it did not benefit from an initial boost provided by property rights reform within a labor intensive farming system. Such reform was generally absent in Africa since farming was never collectivized.

A second reason why growth was slower is because there were more market disruptions with the liberalizations in SSA than in China. SSA reform strategies included privatization and the rather abrupt removal of state monopolies at the same time as price liberalization. The introduction of competition in the chains led to break-down in some of the supply chains, reducing access to inputs for farmers in these sectors and impeding output and productivity growth.

A third reason for the slower aggregate growth in SSA is that the average reduction in farm taxation was considerably less in SSA than in China. As Figure 7 shows, in the fifteen years after the start of the reforms, the NRA increased from less than -50% to above zero in China – an increase of approximately 60 NRA points, while the tax reduction in SSA was considerably less: from around -30% to around -10%, representing an improvement of 20 NRA points, which is only one third of that in China.

(b) There are also three reasons why SSA growth was initially stronger than that of the European transition countries. First, SSA did not experience a decline in output and productivity with the privatization of large farms in a capital (or land) intensive farming system because such privatization did not take place. Second, price incentives for SSA

farmers improved with liberalization, while they worsened in CEE and FSU, as is illustrated by Figure 7. Third, on average, the supply chain disruptions were less important in SSA because a smaller share of the SSA production was dependent on externally provided inputs than in the more advanced and more industrialized economic systems of CEE and FSU. A substantial share of SSA production, in particular staple food production, did not rely on such formal input (and output) markets, and hence suffered less from the disruptions.

(c) The latter factors also play a role in explaining why after a few years in CEE (and later in FSU) the decline halts and growth resumes at a faster pace than in SSA. When the initial disruptions of farm privatization and the one-off output fall with the subsidy cuts was absorbed in CEE, growth in the CEE supply chains was stimulated by the massive inflow of investment, often FDI, in agribusiness and the food industry, with strong spillover effects on the farms through vertical coordination. These effects have emerged much slower and much less extensively in poorer countries with more macro-economic (and institutional) instability. This applies to the slower recovery in the FSU compared to CEE, and even more so to SSA. Unlike in CEE, private vertical coordination did not take over (or not to the same extent) after the collapse of state-controlled supply chains as FDI and private investment in the early years after reforms was much more limited in SSA (see Figure 9). In addition to other factors (lack of infrastructure, political and economic instability), the low incomes and the general low value in SSA food chains have constrained the emergence of private sector vertical coordination and market interlinking, and thereby growth in the entire chain.

#### *Variations in commodity sector performance in Africa*

To further document and support these arguments, we disaggregate the average growth in SSA into three subgroups: “staple food crops” (including cereals, roots, tubers, and pulses), “industrial crops” (including coffee, cocoa, tea, rubber, oil crops and tobacco), and “fruits and

vegetables (F&V)”. While these groups also include a mix of different products, we should expect different performances according to our model.

We expect the first group to be less susceptible to market disruptions as it was less dependent on external inputs. The second group represents mostly commodities produced for export which were strongly dependent on interlinked input arrangements. The last group includes both low value F&V for the domestic market, for which the main input is labor, and high value F&V for exports, which require major external inputs.

Figure 11 and Figure 12 show the relative performance of these groups. Staple food crops and F&V crops have experienced a significant output increase while the industrial crops (intermediate-value) performed much below average. After a decade of reform, the output of staple food crops and fruits and vegetables was 50 to 60% higher than the initial pre-reform level. For industrial crops – including coffee, cocoa, tea, rubber, tobacco and oil crops – this is only about 35%.

The lack of output growth for traditional export commodities in SSA is often attributed to decreasing world prices for these commodities. Indeed, during the 1980s – when most SSA countries embarked on economic and agricultural reforms – prices for these commodities deteriorated sharply. However, according to a World Bank study (World Bank, 1994) real producer prices for export crops went up during the 1980s in some SSA countries because the effect of price liberalization offset the effect of decreasing world market prices.

Also labor productivity indicators reveal the same patterns across commodities. Staples and F&V have the highest productivity increases and labor productivity in the industrial crops was essentially stagnant during the decade after the start of the reforms. It is this sector which reduced average growth in SSA agriculture.

These performance variations among sectors are consistent with our model – and thus add support to our general hypotheses on the post-reform performance. The output and

productivity increases in the staple food crop sector were better than the SSA average, albeit still lower than China and second stage CEE (compare with Figure 2 and Figure 3). In the SSA staple food sector the simultaneous liberalization of prices and introduction of competition – and with it the collapse of state-organized public vertical coordination and input provision – did not result in major output and productivity declines. Input requirements in this sector are generally low and therefore output growth has not been very dependent on vertical coordination. Instead, the sector benefited from liberalized prices and enhanced competition on spot markets. However, growth was also limited after the reforms, as new forms of private vertical coordination and market interlinking did not occur in this sector because the value in the staple food chains is generally too low to sustain private interlinking. Marketing activities in this sector have been taken over by a large amount of small private traders and are based on spot market transactions.

In contrast, in the SSA industrial crop sectors – including many traditional agricultural exports - the simultaneous removal of price controls, introduction of competition and the associated collapse in state-controlled vertical coordination have caused major disruptions in input provisions to farmers and lead to stagnating output and productivity growth. Input requirements for the production of traditional export commodities are generally much higher than in the staple food crop sector and therefore the collapse of public input provisions affected output and productivity much more – as in the CEE. Unlike in the CEE however, massive private investments with private sector vertical coordination and input provision have not occurred in the first two decades of reform in the SSA industrial crops sector, leading to continued stagnation.

The highest output and productivity growth in SSA was in the fruit and vegetable sector: slightly higher than the growth in staple foods and much higher than in the traditional export commodity sectors. Our model suggests that this sector may have grown because of

two, quite different, mechanisms. First, low value F&V production for the local market was mostly depending on labor input and benefited thus from the same effects as the staple crops. Second, an important – and increasing – part of the growth has come from high value fruit and vegetable chains for exports. This sector has grown very rapidly after the reforms, as illustrated in Figure 13 and Figure 14. The high value in these chains has sustained post-reform private investments in this sector and the occurrence of private vertical coordination with quality upgrading, market interlinking and input provision to farmers. A series of recent studies show how the vertical coordination mechanisms and their spillovers and productivity growth effects are similar to the growth mechanisms in CEE (e.g. Maertens and Swinnen, 2009; Minten et al., 2009).

In summary, the very different experiences of these three subsectors in SSA – which are “hidden” by the average growth rates are consistent with our general arguments that the reliance on external inputs and the value in the supply chains, which affect the endogenous emergence of exchange institutions in a liberalized environment, are crucially important to understand the performance in SSA, both in itself - and in a comparative perspective.

## **5. Conclusion**

This paper has documented the reform performance of African countries and compared it with that of reforms in countries in Asia and Europe. Post-reform growth in SSA was lower than in East Asia, but initially stronger than in Eastern Europe and Central Asia. However, after five (CEE) and ten (FSU) years of transition, growth in Europe and Central Asia has surpassed that in SSA. Within SSA, growth has been relatively strong in staple foods and in F&V, while stagnant in industrial crops.

To explain these relative performances, we have developed a model to formally analyze how liberalization affects production and income distribution with a model that

explicitly integrates the impact of liberalization on the institutions that govern production and exchange in developing and transition countries. Specifically our model integrates that in the pre-reform system, inputs were often provided to farmers through interlinked contracts by monopolistic and state-controlled organizations; and the reform-induced changes in institutions that govern contract enforcement. Our analysis shows how these institutional characteristics have been affected by the liberalization process. Using the model, we derive hypotheses on how these characteristics affect the supply response to the liberalization, and, consequently, on how to explain the poor performance of some countries after liberalization.

In the last part of the paper, we use these hypotheses to relate initial conditions and reform choices to performances. We offer a series of hypotheses to explain differences among commodities, and to explain that the supply effects and the governance of exchange in the post-liberalization economy differ also between commodities; and more particularly that there is a positive correlation between supply response, vertically coordinated market organization, and the value in the chain.

In particular, regarding the SSA reform performance, we offer several hypotheses to explain (a) why SSA growth is lower than that of China (and Vietnam); (b) why SSA growth was higher than that of CEE and FSU in the initial reform years; and (c) why growth in SSA was slower than in CEE (and FSU) after the initial stage.

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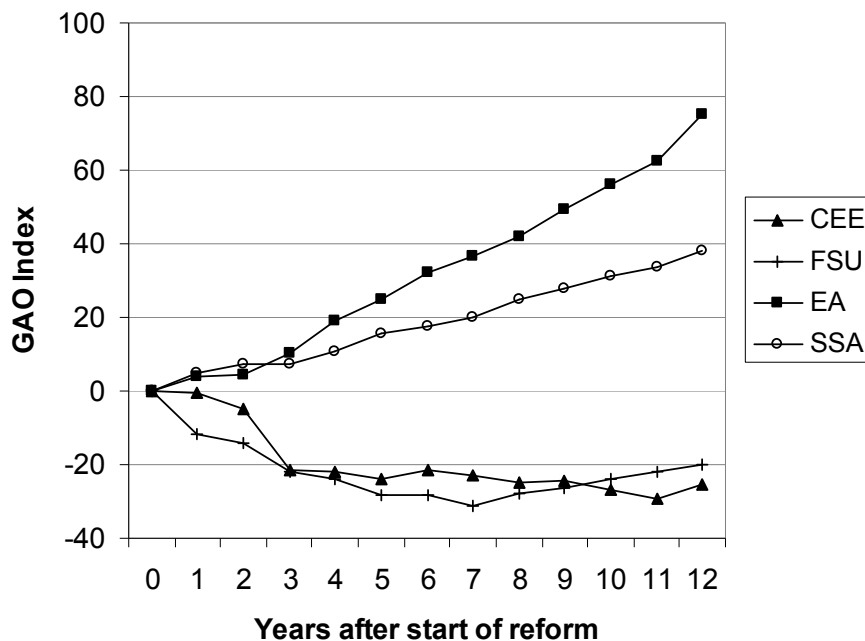
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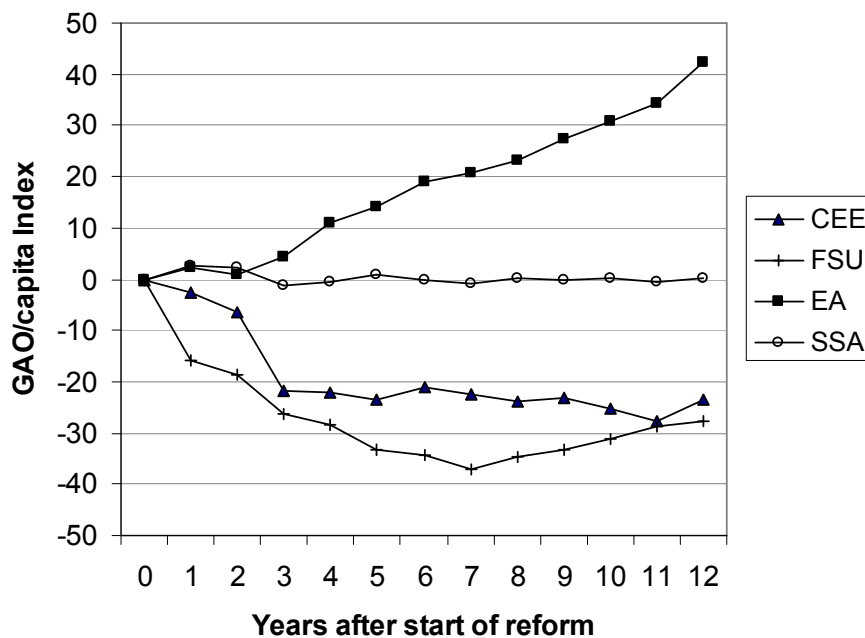
**Figure 1: Reforms and changes in gross agricultural output (GAO)\***



Data source: calculated from FAO statistics.

\* Year 1 is start of reform. For details on country and time coverage, see Appendix.

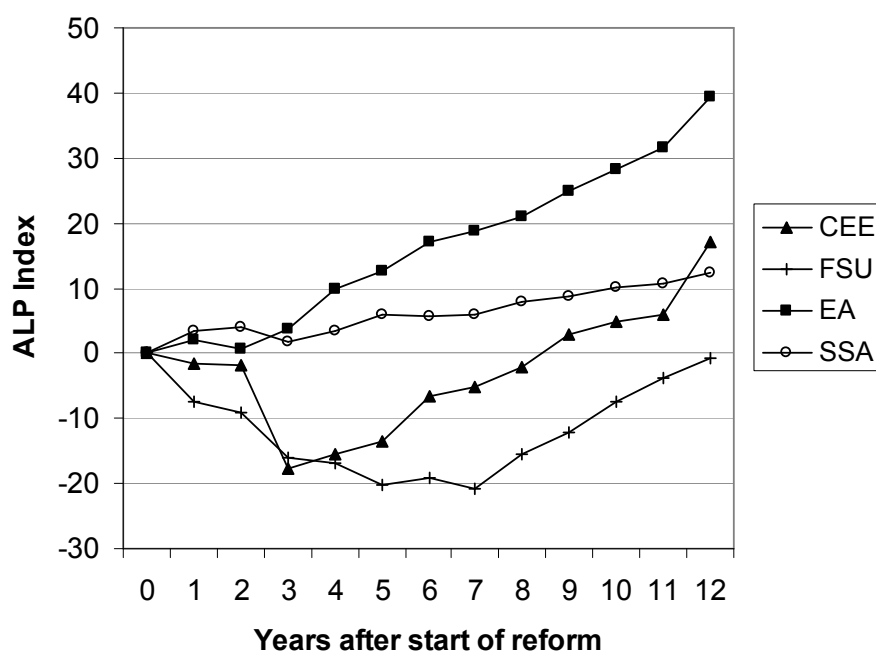
**Figure 2: Reforms and changes in average gross agricultural output (GAO) per capita\***



Data source: calculated from FAO & ILO statistics.

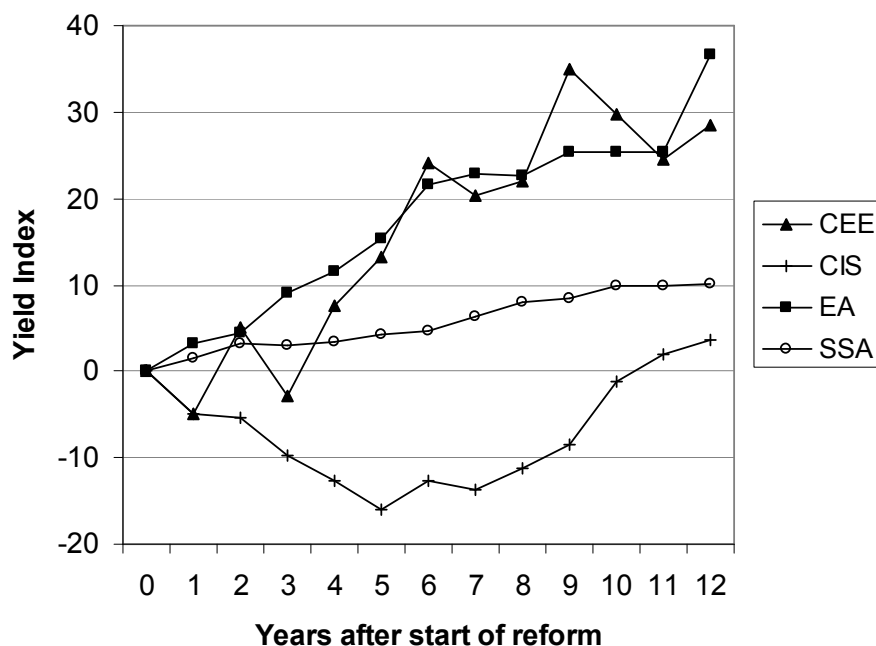
\* Year 1 is start of reform. For details on country and time coverage, see Appendix.

**Figure 3: Changes in average agricultural labour productivity (ALP) index during the first twelve years of reform and structural adjustment in transition and developing countries.**



Data source: calculated from FAO statistics.

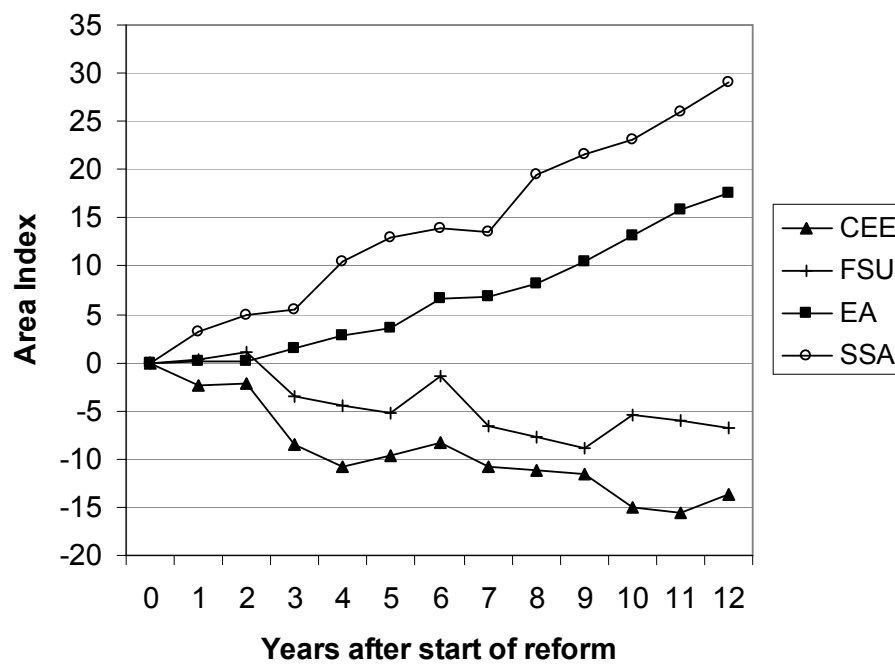
**Figure 4: Changes in average agricultural yield index during the first twelve years of reform and structural adjustment in transition and developing countries.**



Data source: calculated from FAO statistics.

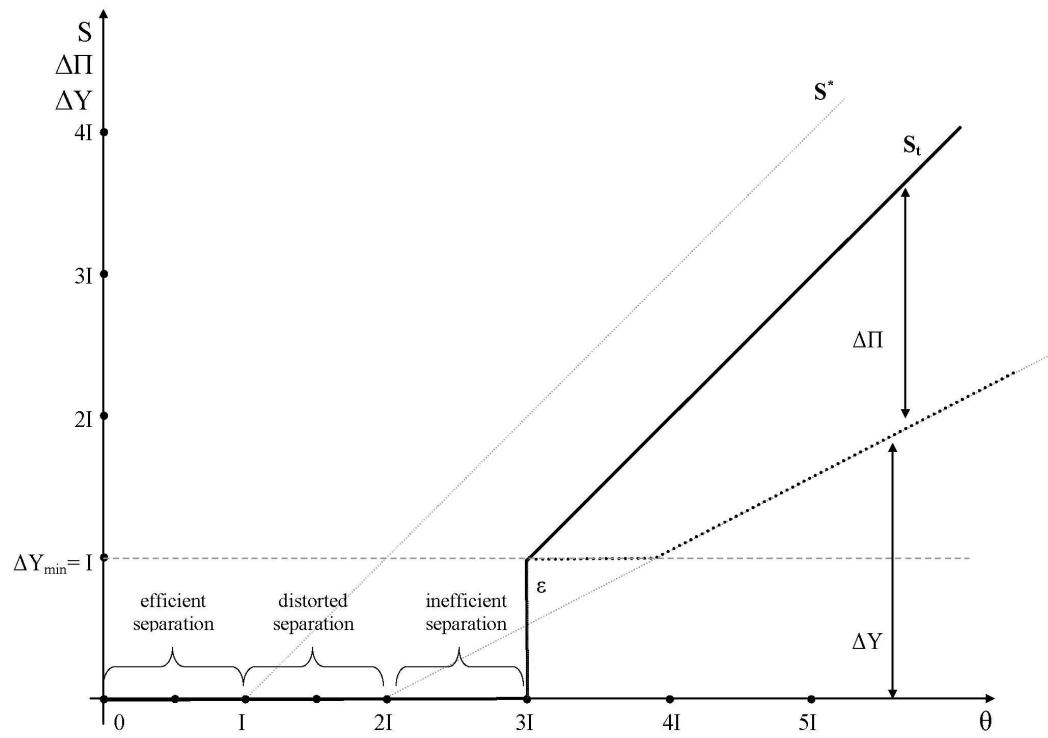
Overall yields are calculated as simple averages of yields of roots & tubers, cereals, fibres, fruits, milk, vegetables, sugar crops, tobacco, nuts, pulses, spices, rubber and tobacco.

**Figure 5: Changes in average Agricultural Area Index during the first twelve years of reform and structural adjustment in transition and developing countries.**



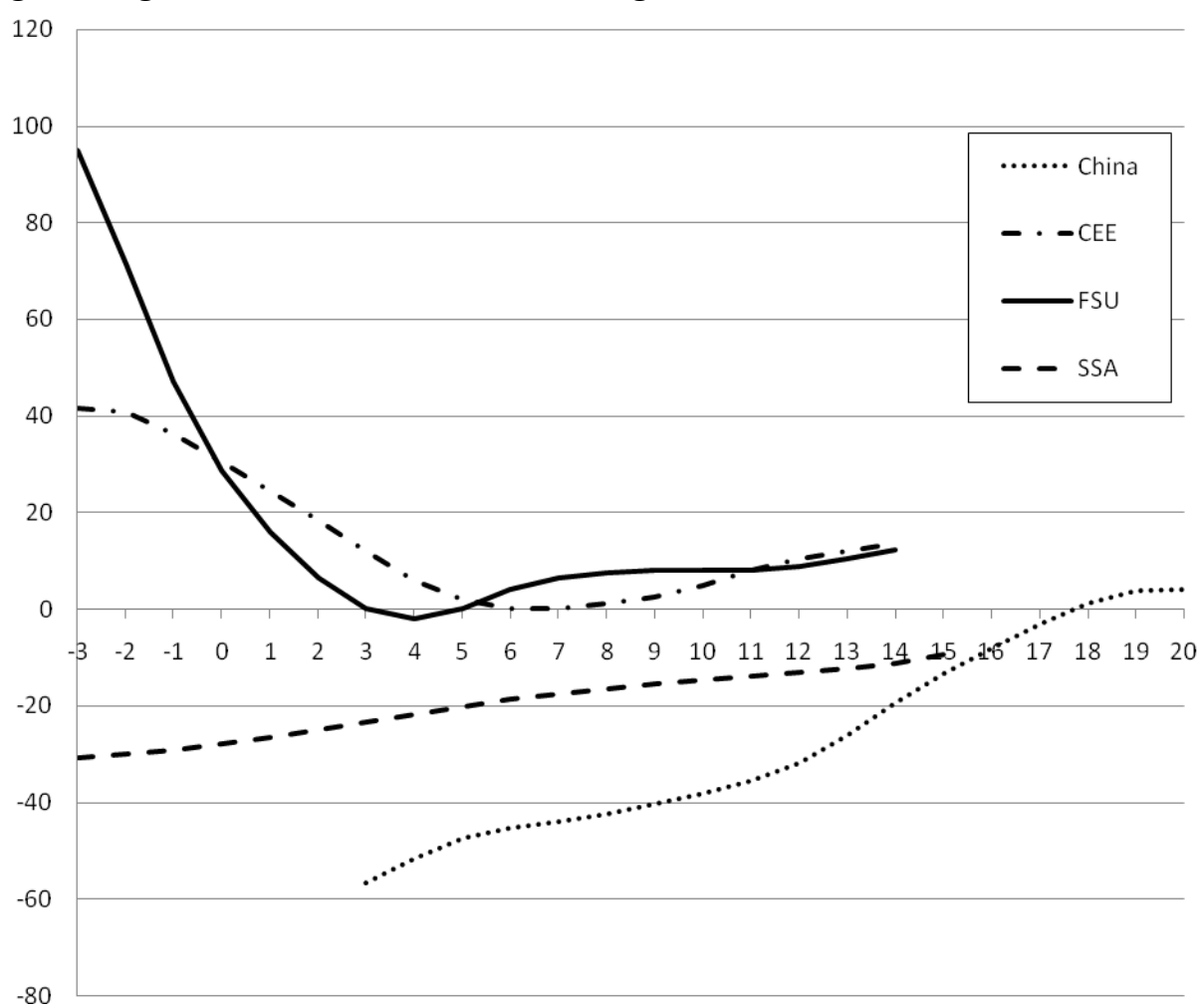
Data source: calculated from FAO statistics.

**Figure 6: Contract separation with one-sided hold-up (with  $t_x=t_m=I/2$ ;  $\varphi^f=0$ )**





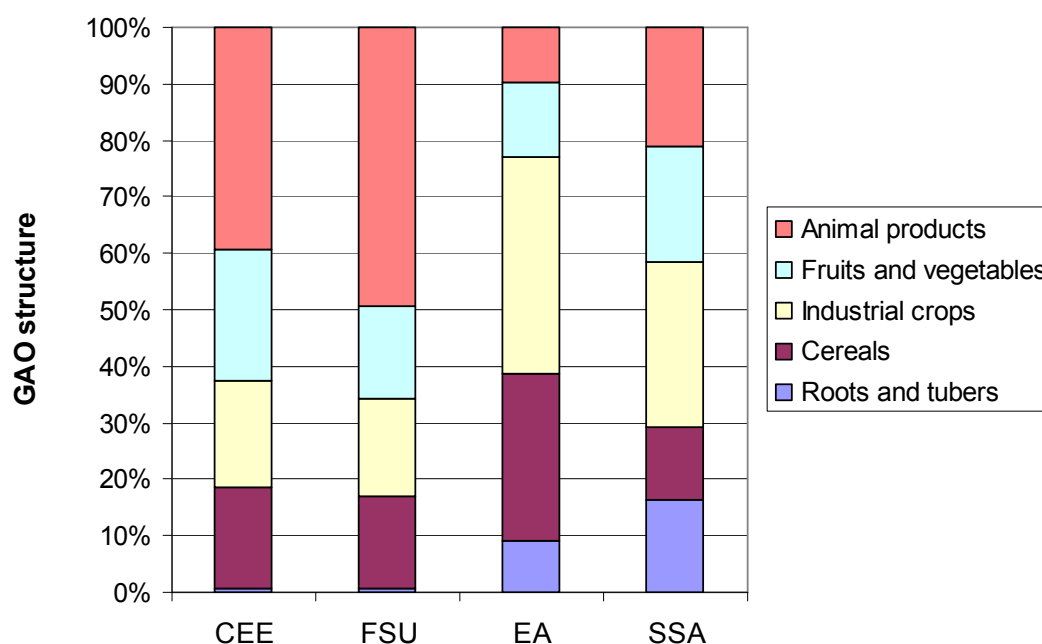
**Figure 7: Agricultural Protection in different regions of the world**



Data Source: OECD (2008) and Anderson and Valenzuela (2008)

CEE includes: Czech Republic, Slovak Republic, Hungary, Poland, Bulgaria, Romania

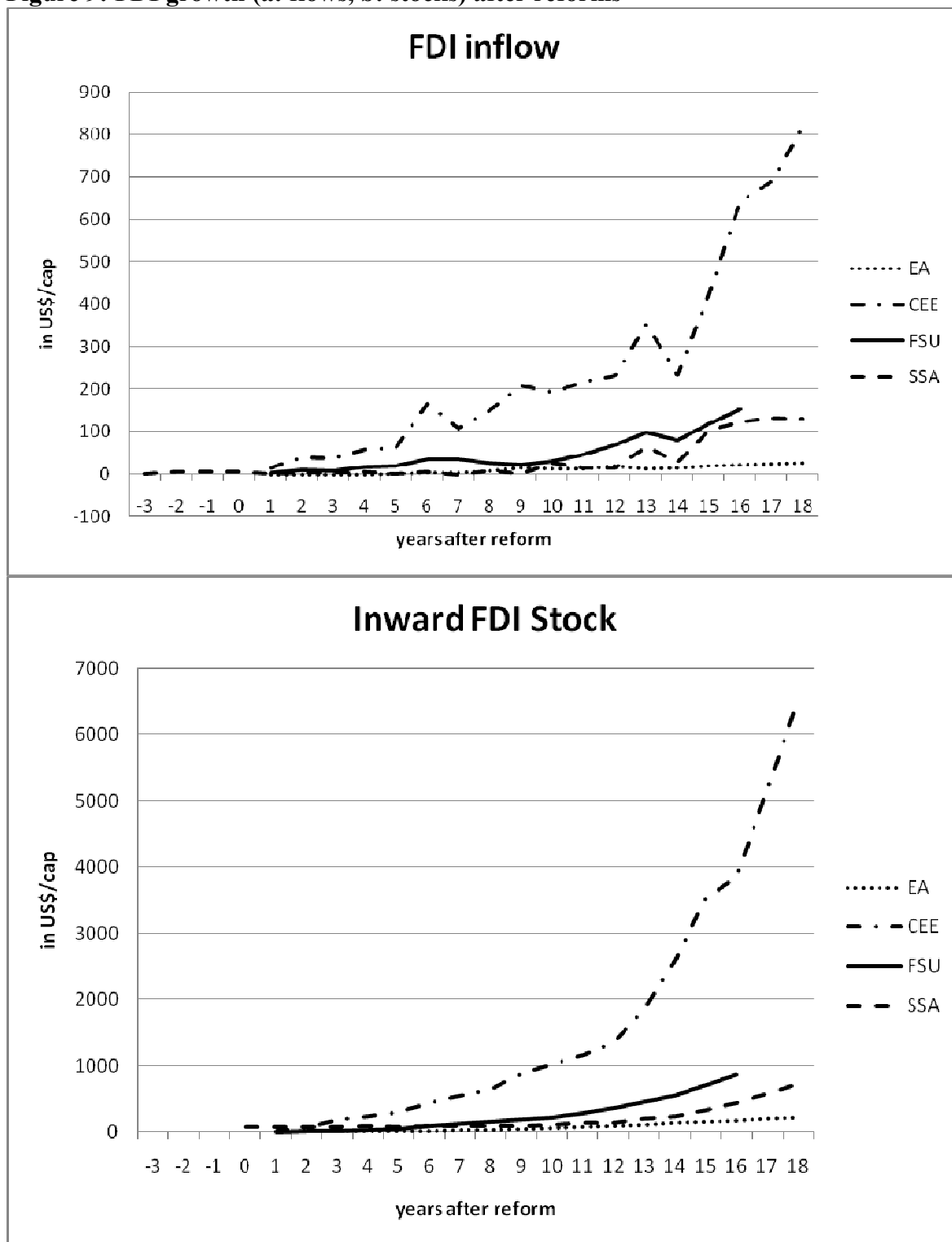
**Figure 8: Structure of Gross Agricultural Output at time of reform and structural adjustment in transition and developing countries.**



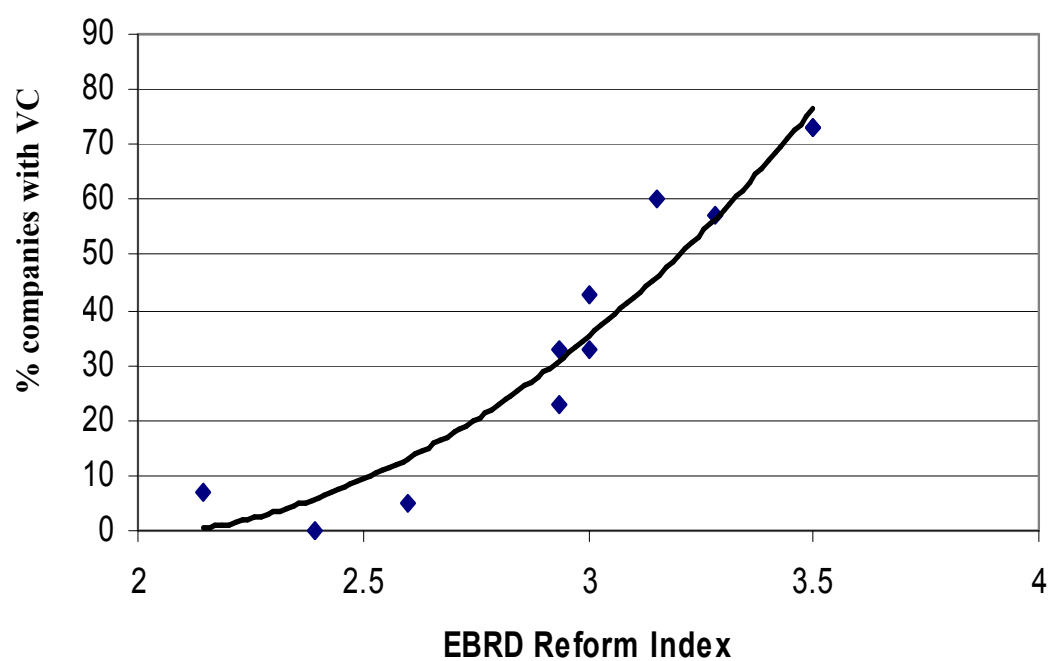
Data source: calculated from FAO statistics.

Animal products include eggs, meat and dairy products; Fruits and vegetables includes fruits, vegetables, spices and nuts; Industrial crops include coffee, cocoa, tea, rubber, oil crops, tobacco, sugar crops and cotton; Roots and tubers include roots, pulses and tubers.

**Figure 9: FDI growth (a: flows, b: stocks) after reforms**

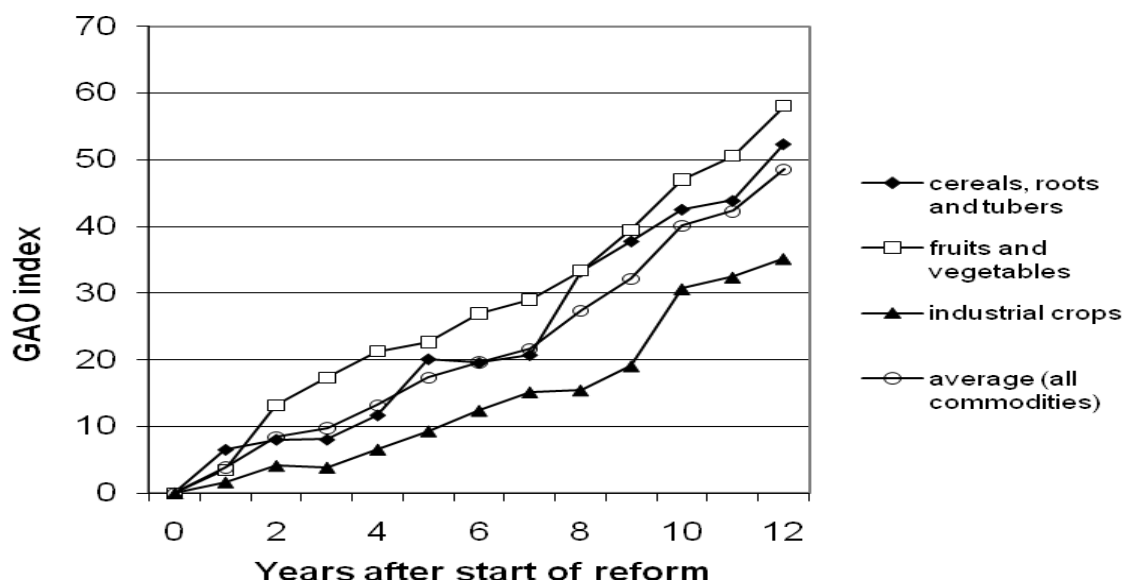


**Figure 10: Impact of economic reforms on vertical coordination (VC) in CEE and FSU\***



Data source: Dries et al. (2009). Data are from surveys of dairy companies in Albania, Bulgaria, Poland, Slovakia, and Russia.

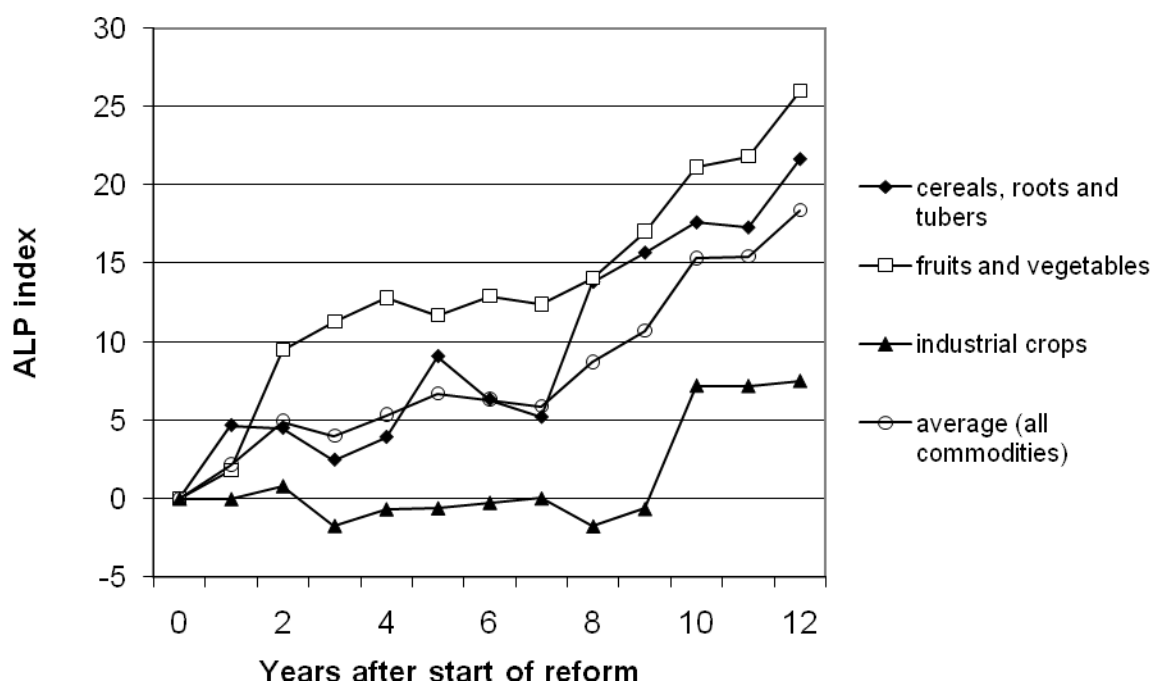
**Figure 11: Changes in Gross Agricultural Output Index for Sub Sahara Africa across different commodity types**



Data source: calculated from FAO statistics.

Cereals, roots and tubers include cereals, roots, tubers and pulses; Fruits and vegetables include fruits, vegetables, nuts and spices; Industrial crops include coffee, cocoa, tea, rubber, oil crops and tobacco.

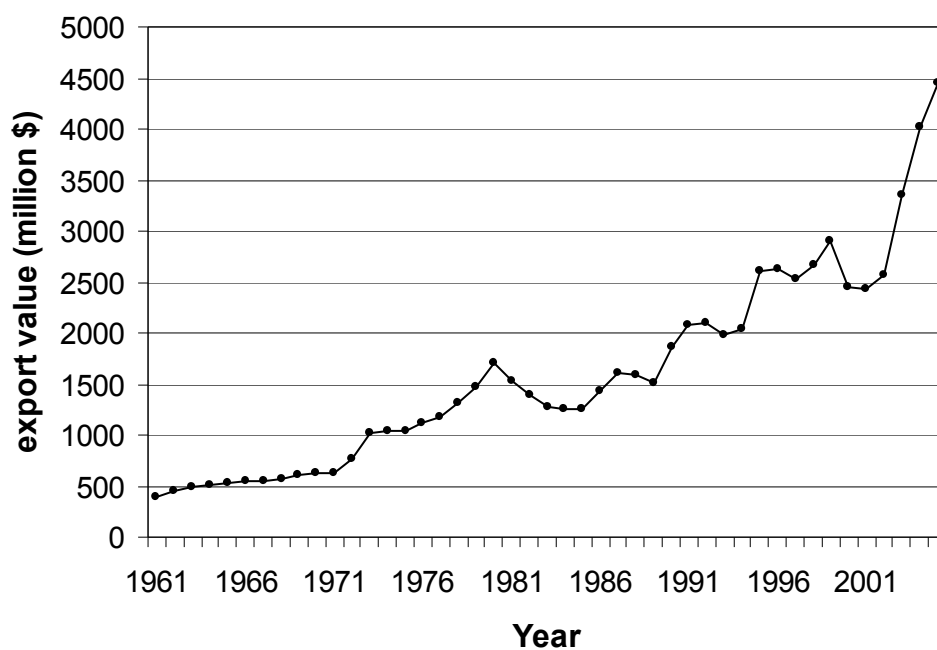
**Figure 12: Changes in Agricultural Labor Productivity Index for Sub Sahara Africa across different commodity types**



Data source: calculated and adapted from FAO statistics.

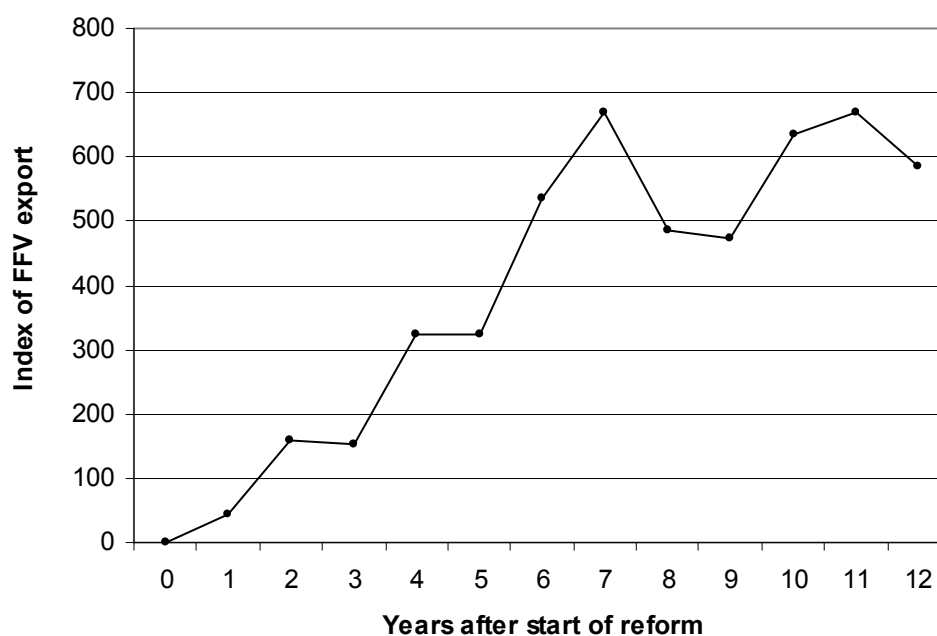
Cereals, roots and tubers include cereals, roots, tubers and pulses; Fruits and vegetables include fruits, vegetables, nuts and spices; Industrial crops include coffee, cocoa, tea, rubber, oil crops and tobacco.

**Figure 13: Growth in Fruit and Vegetable Exports in Africa, 1961 - 2005**



Data source: calculated from FAO statistics

**Figure 14: Growth of Fruit and Vegetable Exports in SSA countries (% change)**



Data source: calculated from FAO statistics

**Table 1: Regional Comparison of Reforms and Initial Conditions**

	<b>CEE</b>	<b>FSU</b>	<b>East Asia</b>	<b>SSA</b>
<b>Initial Conditions:</b>				
a. Income (PPP\$ 2000)	10,069	4,364	674	1,429
b. Agricultural price distortions	Subsidized	Subsidized	Taxed	Taxed
<b>Reforms:</b>	Big bang	Big bang	Gradual	Mixed

Data Source: World Bank (2006)

With CEE= Bulgaria, Estonia, Hungary, Latvia, Slovakia

With EA= China

With FSU= as in appendix, but without Azerbaijan & Uzbekistan

With SSA= as in appendix, but without Somalia & Tanzania

## **Appendix**

CEE – Central & Eastern Europe includes Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia.

FSU – Former Soviet Union includes Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgystan, Moldova, Mongolia, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.

EA - East Asia includes China and Vietnam.

SSA - Sub Sahara Africa includes all African countries south of the Sahara except for Angola, Botswana, Djibouti, Eritrea, Liberia, Namibia, Reunion, Seychelles, South Africa and Swaziland.

Year of reform is set to 1978 for China; 1985 for Vietnam; 1989 for non-FSU Central & Eastern European countries; 1991 for FSU countries; first year of structural adjustment for SSA countries, i.e. the year in which the concerned country got its first structural adjustment loan from the WB (data collected from World Bank loan documents).