

# Governance Structures and Resource Policy Reform: Insights from Agricultural Transition

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## Abstract

New research on the political economy of policy-induced distortions to incentives for optimal resource use in agriculture and insights from the study of the dramatic reforms in former state-controlled economy has led to enhanced insights on the role of governance structures on policy making in agricultural and natural resources. This paper reviews these research developments and key new insights.

## INTRODUCTION

Policy-induced distortions to incentives for optimal resource use come in many forms. In this review we focus on two widely observed forms of policy distortions with important implications for economic development, agricultural production, and food consumption. The first policy (distortion) we focus on is how governments have affected the nature of property rights in resource use, as well as in the production and processing of food and other agricultural-derived commodities. As is well known, the nature of these rights has major effects on both equity and efficiency (de Janvry et al. 2001, Deininger & Feder 2002). The second policy we focus on is how governments have affected the incentives to produce and consume food and agricultural-derived commodities by their interventions that have influenced consumer and producer prices. Such policy initiatives have taken many forms, such as outright bans of markets, impositions of government-controlled supply and exchange, price-setting, the use of trade restrictions (such as import bans and export embargoes, taxes, and quotas), and the manipulation of exchange rates (Anderson 2009a, Krueger et al. 1988).

In the 1960s and 1970s many poor and middle-income countries, representing a large share of the world's rural population, were heavily affected by state interventions. This was most extreme in the Communist world, spreading from Central Europe to East Asia, where the entire economic system was under direct control of the state. However, also outside the Socialist Bloc, in many African, Latin-American, and South Asian countries the state played an important role in the economy.

In the past decades there have been tremendous changes in the nature of these distortions as a result of a series of reforms. The first major liberalization pushes began in the late 1960s in Indonesia and Sri Lanka. The most dramatic set of reforms began toward the end of the 1970s and beginning of the 1980s when China embarked on its reform path by property rights reforms, market liberalization, and a reduction of price distortions in the economy. Vietnam followed in the mid-1980s. 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).

Countries in Sub-Saharan Africa, in Central and Eastern Europe (CEE), and in the former Soviet Union (FSU) introduced a series of reforms in the 1980s and 1990s that were targeted at removing state intervention and distortions to producer incentives, because such policy distortions were thought to pose major constraints on productivity, income growth, and poverty reduction (e.g., Krueger et al. 1988, Lipton 1977, Timmer 1986). Better incentives were expected to yield growth, thereby raising incomes and reducing poverty. However, in contrast to the East Asian reforms, the effects were quite different, causing a rigorous debate on the optimal reform choices (Clague & Rausser 1992, Dewatripont & Roland 1992, Sachs & Woo 1994).

Although there is a large literature on the effects of these reforms (Macours & Swinnen 2002, Roland 2000, Rozelle & Swinnen 2004), in this review we focus on the determinants. Specifically, we are interested in explaining the political economy of these reforms. In addition, within the broader set of the political economy issues, we explore how changes or differences in political governance have affected these reforms. Overall, we show how the study of these reforms has contributed to important new insights on how

(changes in) governance structures, including domestic political regimes, have caused policy (reforms), or not.

Because of the broad nature of these questions, we necessarily need to restrict our analysis to, arguably, the most dramatic reforms in the past decades and on the lessons that can be drawn from them. We present these insights within the framework of the new theoretical developments on the political economy of reforms. The recent decade has yielded a rich new literature on this set of questions. The reforms in the 1980s and 1990s triggered many studies trying to understand the effects and reasons for the reforms. They have also triggered an important growth in the literature on the more general questions of the effects and the determinants of reforms as well as a reinvestigation of older institutional and policy reforms in these areas. Our review also draws upon the new studies covering general issues and older questions to the extent that they contribute relevant new insights for the focus of this paper.

## EXPLAINING POLICY DISTORTIONS: FROM STRUCTURAL CAUSES TO GOVERNANCE

Research in the field of political economy of agricultural policy and distortions was triggered by the puzzling question: Why is agriculture supported in rich countries and taxed in poor countries? Empirical evidence on agricultural protection/taxation that emerged from numerous studies in the 1980s and the 1990s can be summarized by referring to three sets of policies or patterns: the development pattern, the antitrade pattern, and the anticomparative advantage pattern (or relative income pattern). These are documented by Anderson & Hayami (1986), Gardner (1987), Honma & Hayami (1986), and Lindert (1991) for countries of North America and East Asia; Bates (1989) and Krueger et al. (1991) for developing countries; Tracy (1989) for Western Europe; and see Anderson (2009a) for recent global evidence.

The development pattern refers to two observations. First, empirical evidence from countries across the world shows a positive correlation between agricultural protection and average country incomes. Second, historically (over time) most nations shift from taxation of agricultural producers to protection as they develop economically. The antitrade pattern refers to the observation that import-competing sectors (products) tend to be more assisted (or taxed less) than sectors producing exportable products. The anticomparative advantage pattern refers to the observation that protection is lower (or taxation higher) for products with a comparative advantage and that protection increases when the share of farm income in GDP falls relative to the rest of the economy.

The starting point of the literature is the observations that these global patterns of agricultural distortions could not be explained by traditional economic arguments. Drawing on the general theories of “new political economy,” coming out of the University of Chicago—with the important contributions of Stigler (1971), Peltzman (1976), and Becker (1983), the public choice school from Buchanan & Tullock (1962), and the influential work by Downs (1957) and Olson (1965)—the political economy explanations put forward in the 1980s and the 1990s focused importantly on (economic) structural factors. Changes in structural conditions in an economy—for example, those coinciding with economic development or those associated with different commodities for a given level

of development—have an impact on (a) the costs and distribution of the distortions associated with protection,<sup>1</sup> (b) the intensity of political activities,<sup>2</sup> and (c) the ability to organize politically and influence the government<sup>3</sup> (for a review, see de Gorter & Swinnen 2002).

Although the importance of political systems for policy has long been emphasized, for example in the seminal work by Buchanan and Tullock (1962), these arguments received relatively little attention in the early studies. The past decade and a half, however, have witnessed a growing set of studies analyzing the role of political regimes and ideology on policy making. Surveys of recent developments are provided by Dewan & Shepsle (2008a,b), Gawande & Krishna (2003), Grossman & Helpman (2002), Persson & Tabellini (2000, 2003), Rausser et al. (2008), Roland (2000), Swinnen (2009b), and Weingast & Wittman (2006). To relate some of these insights to agricultural and resource policy, it is useful to look at the part of the literature that considers the political regime (or the “constitutional choice” in the framework of, e.g., Aghion et al. 2004) as providing a degree of insulation for policy makers. As such, the political regime determines to what extent the government, once appointed, can rule with ex post control, or not; what type of majorities it needs to ensure its ability to pass legislation; and whether groups have veto power. Different mechanisms can translate the preferences of citizens into controls on the government, majority formations, and, hence, policies (Rausser & Roland 2009). These issues relate to the differential effects of democracy and autocratic regimes (Acemoglu & Robinson 2006, North et al. 2006); to the effect of different electoral systems (Persson & Tabellini 2003), including systems set up on the basis of proportional representation versus majoritarian systems (Roelfsema 2004, Rogowski & Kayser 2002); and to the effect of autonomy given to bureaucrats and implementing institutions (Prendergast 2007).<sup>4</sup>

In terms of empirical predictions, the greater insulation of decision makers implies that they can follow their private preferences to a greater extent. However, this in itself has little predictive power, since there is no direct relationship to be expected between the preferences of rulers and the nature of political regimes on issues such as protectionism or property rights (O’Rourke & Taylor 2002). One implication, however, is that there should be more variation in policy choices under dictatorial regimes than under

<sup>1</sup>See Anderson (1995) and Swinnen (1994) for theoretical analyses of how changes in the structure of the economy affect the political costs and benefits of agricultural protection and thus the government’s political incentives in decision making: for example, the share of food in consumer expenditures as a share in total expenditures, which reduces the opposition of consumers to agricultural protection, as well as the opposition of capital owners in other sectors who oppose the (wage) inflation pressures that come from increased food costs with agricultural protection.

<sup>2</sup>With economic development, incomes in the rest of the economy grow faster than in agriculture. This creates political incentives (both on the demand—or farmers—side and the supply—or politician—side to exchange government transfer in exchange for political support. Farms look for government support either because returns to their investment are larger in lobby activities than in market activities or because the willingness to vote for/support politicians is stronger as the impact on utility is relatively stronger. For similar reasons, governments are more likely to support sectors with a comparative disadvantage than sectors with a comparative advantage (e.g., de Gorter & Tsur 1991, Swinnen & de Gorter 1993, Hillman 1982, Krueger 1990).

<sup>3</sup>With a declining share of agriculture in employment, studies drawing on Olson’s (1965) logic of collection action argument have reasoned that this makes political organization of farmers less costly and is therefore likely to increase the effective lobbying of farmers.

<sup>4</sup>In an application of these issues to decision making on agricultural policy in the European Union, Pokrivcak et al. (2007) showed how E.U. agricultural policy reforms are determined by a complex interaction of majority voting rules, changes in the external environment, and the preferences of the European Commission (the agenda-setting bureaucracy in Brussels).

democracy, *ceteris paribus*, if dictatorial leaders are less constrained in setting policies. This hypothesis, in fact, is consistent with the regression model of Olper (2007), which performs better in democracies than in dictatorships, presumably because governmental response to pressure from interest groups is stronger in democracies. This may also be the reason why early studies that focused only on the simple relations between agricultural policy and political regimes in cross-section studies find limited impact (Beghin & Kherallah 1994).

Taking a different tack, Dutt & Mitra (2005) emphasized the role of ideology. In their work they found that left-wing governments (that attach higher weights to the welfare of workers/laborers) are more protectionist when they are in capital-abundant countries, but less protectionist when they are in capital-scarce countries. An application of this argument to agricultural policy, however, is not straightforward because increasing food costs through agricultural protection hurts both workers and those who invest industrial capital. Hence, rulers who support “labor” and “capital” should also oppose agricultural protection—as they did historically in Europe (Findlay & O’Rourke 2007, Kindleberger 1975, Schonhardt-Bailey 1998). Olper (2001) found that, on average, right-wing governments are more protectionist in terms of agriculture than are left-wing ones. This is consistent with studies such as those by Bates (1983), who argues that socialist rulers in Africa imposed lower commodity prices on farmers (or taxed farmers), and by Tracy (1989), who found that right-wing governments in Europe (such as those dominated by Catholic parties and conservative parties, including the Nazi party in Germany) tended to support farm interests and increase protection.

However, a closer reading of the literature suggests that these conclusions require refinement. First, cross-section studies are quite limited in what they are able to illuminate. Longer-run studies, in contrast, allow the researcher to more carefully measure the impact of shifts from one system (or set of political institutions) to another. For example, Swinnen et al. (2001) demonstrated how some changes in voting rules in Belgium had an effect on agricultural protection, whereas other changes had no effect. In particular, those changes in electoral rules that disproportionately benefited people involved in agriculture (e.g., by extending voting rights to small farmers and tenants in the early twentieth century) induced an increase in agricultural protection. However, electoral changes (such as extending voting rights to women) did not affect agricultural protection as they increased voting rights both of those in favor and of those against protection.

Empirical observations also suggest an interaction between the effects of ideology and economic development. Consider, for example, the agricultural policies of extreme left-wing regimes. Communist dictators, such as Stalin in Russia, Mao in China, and Hoxha in Albania, heavily taxed agriculture. However, farmers were subsidized under Brezhnev in the Soviet Union and in most East European Communist countries in the 1970s and 1980s (Rozelle & Swinnen 2009b).

The ideology effect is also conditional on inequality. Despite supporting agriculture less on average, left-wing governments tend to support farmers more in unequal societies (Olper 2007).<sup>5</sup> Interestingly, this is counter to the traditional, Olson-type arguments that large farmers are better in overcoming collective action problems. La Ferrara (2002) argued that inequality may cause collective action problems, which could explain why

<sup>5</sup>Dutt & Mitra (2002) also found that a labor-abundant economy will be affected differently by a rise in asset inequality than a capital-abundant economy will be.

protection is negatively correlated with inequality. Historical evidence on this is also found in Europe (Schonhardt-Bailey 2006, Swinnen 2009a). Strong inequality in England, Germany, and France at the end of the nineteenth century weakened the protariff demands of large grain farmers as they were opposed by small farmers, many of whom were livestock producers. Further highlighting this inequality, in France large and small farms were organized in different unions and associated with different political parties.

The part of the empirical literature that has attempted to quantify some of the assertions has focused on explaining price distortions. The distortions of property rights have been addressed mostly in a separate literature: See, for example, Binswanger et al. (1995b), Hayami et al. (1990), Swinnen (1997), and various chapters in de Janvry et al. (2001). Despite the absence of attention to these issues in the quantitative literature, political fights over policy reforms have focused on property rights as much as they have on price incentives. For example, with highly unequal land distribution, small peasants and landless rural workers are less likely to align with landlords to demand agricultural tariffs and are more likely to fight them to demand a redistribution of rights. Studies on the political economy of property rights reforms generally put a strong emphasis on the interaction with governance issues because land rights reforms were often associated with changes in the political regime (Binswanger et al. 1995a, de Janvry 1981, Rausser et al. 2009).

There is also an interesting hypothesis that important policy reforms require the combination of both a change in political regimes and a “crisis” (Acemoglu & Robinson 2001, 2006). Crises may be needed to overcome the inherent status quo in the political-institutional equilibrium that exists in a society and to break the power of interest groups that are entrenched in the institutions as they exist in a society (Rausser et al. 2008). Examples include reforms in Western Europe in the early twentieth century when the combination of enhanced political rights for farmers and a dramatic rural crisis caused major changes in agricultural policies, including land reforms (Swinnen 2001) and reforms in China in the 1970s when the combination of widespread hunger in the countryside and the death of Mao allowed major reforms to occur (see below).

For these reasons, it is important to complement statistical studies with the analysis of specific reforms into greater detail to understand the complexities of the causal mechanisms. In the rest of this paper we review insights on governance and policy reforms from the most dramatic reforms in the past decades, i.e., those implemented in the transition countries of Europe and Asia.

## POLITICAL CHANGE AND POLICY REFORMS IN TRANSITION AGRICULTURE

The importance of the following nations as well as their political systems is undeniable. Until the late 1970s, a large share of the globe—from the center of Europe to the southeast regions of Asia—was under Communist rule. The lives of more than 1.5 billion people were directly controlled by Communist leaders, and incentives in these states were massively distorted. The leaders of the Soviet Bloc and China were committed to Socialist ideology and designed their economies to be insulated from the world and the global economic market. Even though the reforms implemented since the end of the Cold War have differed among countries, changes in political regimes played an important role in triggering reforms in all countries.

## From Mao to Deng in China

The economic transition in China followed the political transition from Mao Zedong to Deng Xiaoping. Before 1980, the influence of Mao was inescapable. Mao's fear of the outside world, his commitment to Socialism, and his skepticism of markets helped produce the prereform economic system. It was a system fundamentally closed to trade, run without markets, and administered by a controlled pricing system that discriminated against agriculture. It was a system that also failed to raise per capita income and to produce rises in total factor productivity.

There was no dramatic overthrow of the Communist Party after Mao's death. Deng assumed power from within the system. The Communist Party was in control both before and after Deng's accession to the position of supreme leader. Moreover, although Deng had a number of bold ideas, he also was essentially committed to the same system that had been built during the previous three decades (Yang 1996).

Nonetheless, the beginning of the Reform Era is clearly marked by the political rise of Deng in the wake of Mao's death. Committed to a self-taught belief in incentives and pragmatism while also being attracted by the rapid growth that was transforming most of the rest of East Asia, Deng's policy approach could not have been more different from Mao's had there been a revolution. Deng believed in technology whatever its source—from foreign direct investment or an investment into domestic science and engineering. Deng wanted to incentivize the economy.

Although Deng's first reform move was bold—the Household Responsibility System (HRS) reforms decollectivized agricultural production and replaced it with a system of household-based farming (Lin 1992)—the initial years afterward showed no move to continue with radical changes to the economy (Sicular 1995). Prices were administratively raised by officials in the planning bureau who retained control over the economy. It was not until property rights had been fully reformed in the mid-1980s that the leadership decided to move toward marketing and other reforms.<sup>6</sup> McMillan & Naughton (1992) described this process as one that is gradual and deliberate but unplanned.

## From Stalin to Brezhnev in the Soviet Union

Interestingly, the distortions under Mao in China resemble the distortions under Stalin in the Soviet Union of the 1930s much more than the distortions in the Soviet Union in the 1970s (Wädekin 1990). Stalin's desire to modernize quickly and his commitment to heavy industry—and his distrust of the farming population—led to his policy of using his centrally controlled economic system to tax the countryside to finance industrial development. This system, as in Mao's China, reduced incentives for farms to invest and produce and left agriculture stagnant.

Soviet agricultural policy, however, changed after World War II. When Khrushchev took over as Soviet leader following Stalin's death, he initially continued Stalin's agricultural policies. However, he gradually introduced important changes. He reduced taxes on agri-

<sup>6</sup>The subsequent reforms increasingly allowed farmers to sell their output to private traders (Park et al. 2002). Entry by nonstate entities and individuals was gradually allowed. Ultimately, competition forced the entire state-owned marketing system to be disbanded. It took 20 years to replace China's planned agricultural marketing system of the early 1980s with a system of competitive markets (Huang et al. 2004). Tariff reductions and trade liberalization finished the process (Huang et al. 2008). Pingali & Xuan (1992) described largely the same strategy in Vietnam.



culture and started to provide substantial assistance from the state, both in terms of investment support and in terms of higher prices. This proagricultural policy was continued and reinforced under Brezhnev's Soviet leadership in the 1960s and 1970s (Wegren 1998). During the period between 1975 and 1985 almost 30% of total Soviet investment went into agriculture (Gray 1990). A similar situation occurred in Central and Eastern European countries where farm workers lived relatively well as a result of large subsidies to overstaffed and inefficient farms (Liefert & Swinnen 2002).

### Failed Reform Attempts Under Gorbachev

Only a series of timid rights reforms was tried out in the FSU. Although the Soviet Union reduced taxation of agriculture through its pricing policy after World War II, the Soviet leadership never let go of its centrally imposed collective and state farm system. In 1978 shortly after the time that the HRS reforms started in China, there was a state-led effort in the Soviet Union when Mikhail Gorbachev became the head of the agricultural department of the Central Committee of the Soviet Communist Party. Gray (1990, p. 4) argues that, in March 1985, when Gorbachev became the General Secretary of the Communist Party, "the top Soviet leader [was] the main proponent of economic reform" and that "perhaps at few times in history has high authority been so responsive to new ideas from intellectuals, most of whom are acutely aware of foreign examples."

During the Gorbachev years several agricultural reforms were designed and promoted in an attempt to impose financial discipline on farm workers and to reward them by basing remuneration more directly on their performance (Brooks 1990, Wegren 1998). Although the reforms were tried across a widespread region, they largely failed (Lerman & Brooks 2001, van Atta 1993). Similarly, some of the CEE experimented with reforms in the 1970s and 1980s, but these reforms had modest impacts at best (Wädekin 1990) or made things worse (Wyżan 1990).

Initially, the reform experiments were based on collective farming. Later, they moved beyond their initial proposals and made an assault on the basic principles of collective agriculture. Similar to Deng, Gorbachev proposed to allow households to lease land, gain access to factors of production, and claim rights to the residual income after certain payments were made. However, these reforms were met with little success.

What is remarkable is that the Soviet leadership under Gorbachev in the second half of the 1980s introduced reform proposals similar to those of China's leadership almost a decade earlier (van Atta 1993). It is also interesting to note that the early reform path by Gorbachev was preferred by the conservative faction of China's leadership as it was considered to be ideologically less radical than that of the HRS.

The main difference in the reform process appears to be less in the nature of the policies than in the dynamics of the relationships among the actors involved in the reforms. In the Soviet Union, reform was driven primarily by a Communist leadership that was unsatisfied with previous reform attempts. The central leadership in the Soviet Union, however, had little support from farmers or local officials. In contrast, China's leadership, albeit supportive of reform efforts, at times seemed to be driven by the force of the farmers.

### The Fall of the Berlin Wall and the Collapse of Communism in Europe

So why did reform finally happen? In fact, it took a dramatic political reform (the fall of the Communist regimes) to trigger fundamental policy reforms in Europe. The fall of the



Berlin Wall in 1989 signaled the beginning of the collapse of the Communist regimes throughout Eastern Europe and the (former) Soviet Union. It was at this time (of crisis) that many nations implemented a bold series of reform policies—a “big bang”—that often went far beyond the reforms that had been implemented in China and Vietnam. Within a short period of time, prices and trade were liberalized, subsidies cut, property rights privatized, and production and trade organizations restructured. The entire agri-food system was privatized and support for agriculture fell to very low levels (Anderson & Swinnen 2008).

A strong positive relationship has been shown among political reform, market liberalization, and land reforms (Swinnen & Heinegg 2002). However, political changes did not occur everywhere in the FSU. Even now, 20 years after the changes, some of the leaders have not changed. This is the case, for example, in countries such as Belarus, Turkmenistan, and Uzbekistan. In other countries, such as Russia, political freedoms have been reduced again.

### Why Was Reform Possible with the Communist Party in China But Not in the Former Soviet Union?

The above discussion raises an interesting question: Why were radical reforms of the property rights system and further gradual market liberalization possible in China but not in the Soviet Union under the Communist regime? Swinnen & Rozelle (2006) argue that radical property rights reforms under the Communist regimes could occur only when the reforms received support simultaneously from the grass roots and from the top of the Communist Party. Reform failed in China in the 1960s because there was no support from the top leadership (Mao) for radical decollectivization demanded by households at the grassroots level (Lardy 1983). Reform failed in Russia in the 1970s because there was neither grassroots nor leadership support for radical changes (Brada & Wädekin 1988). Agricultural reform failed in the 1980s in Russia because the reform proposals from the top of the Communist leadership under Gorbachev were not supported at the grassroots level (Gray 1990). Only in China at the end of the 1970s and the early 1980s was there a confluence of interests in favor of radical reforms at the top and at the grass roots, from both farm households and local officials.

From this perspective it is important to clarify further the interaction between rural initiatives in HRS and political debate among Chinese leaders. The reforms are the result of a delicate balance between pressure from the grass roots and preference to reform from an important part of the top leadership. In the temporary leadership vacuum that existed after Mao's death, both factors reinforced each other in China (McMillan 2002). The success of the HRS reforms in increasing output, reducing poverty, and maintaining social stability in China's countryside reinforced the positions of the proreform groups in Beijing. Inversely, the enhanced position of the proreform groups created the policy space that was necessary for the grassroots initiatives to spread across rural China.

The HRS reforms started in some of the more drought-prone rural areas of China several years before they began to be openly allowed (or encouraged) by even the more reform-minded leaders in Beijing in the late 1970s. When decollectivization started in China's countryside in 1978, those who favored reform at the top of the Communist Party were still in the midst of a power battle with conservative forces and not yet in charge. The power struggle among different factions continued throughout the 1978–1982 period

(Yang 1996), during which the official party policy did not openly encourage the HRS reforms. It was not until the summer of 1982 that a central policy document was drafted formally praising the HRS. By this time 68% of all households had adopted the HRS in agriculture, and by the time the document made decollectivization official dogma in 1983, more than 90% of China's villages had decollectivized.

The attitudes of Chinese and Soviet farm workers and local officials toward decollectivization were distinct because of differences in technology and price distortions in prereform collective agriculture. In rural China more than 30% of households lived in utmost poverty in the mid-1970s (Lardy 1983, World Bank 1992). Reforms started clandestinely in several regions in China, especially those regions that suffered heavily during the famine that followed the Great Leap Forward (Zhou 1996).

In contrast, farm workers in CEE and the Soviet Union benefited from large government subsidies and high wages, and they were covered by social welfare benefits (OECD 1996). Despite low farm productivity, workers in the Soviet Union's state farms and collectives enjoyed standards of living far higher than those in China's rural sector. In several CEE countries, rural incomes were actually higher than urban incomes (Ellman 1988). With a reduction of distortions, farm incomes would have fallen, effort by farm laborers would have needed to increase, and risk would have been higher. Moreover, with overemployment and soft-budget constraints, agricultural reform would trigger layoffs. Not surprisingly, many farm workers in the Soviet Union and CEE resisted agricultural reforms.

Differences in technology reinforced these differences in attitudes that were being shaped by the preexisting conditions. Farmers in China purchased few of their inputs and sold relatively little of their output to the market. Almost no farmers interfaced with processors. Most importantly, given the high labor factor share, the potential for effort efficiency-enhanced output would mean significantly higher incomes for farmers. In contrast, farms in the Soviet Union and Eastern Europe were more integrated into an industrialized production system and a complex network of relations with input suppliers and processors (Johnson & Brooks 1983). Moreover, they were more capital and land intensive. Under these conditions, farms were less likely to get a large boost from incentive improvements and more likely to face serious disruptions (Macours & Swinnen 2002).

## INTERNAL GOVERNANCE: THE ROLE OF THE BUREAUCRACY AND ADMINISTRATIVE ORGANIZATION

The support by officials for reforms in China was sustained by their personal interests as farm village leaders (Oi 1989). Subsequent bureaucratic reforms as well as rural industrialization and fiscal reforms sustained the initial reforms (Qian & Weingast 1997).<sup>7</sup> These changes stimulated interest by bureaucrats in local economic growth. In the Soviet Union, little change took place in the bureaucracy (Shleifer 1997), and because the interests of local officials were aligned with those of the farm managers, the rational response of both was to resist, not support, reform. Frye & Shleifer (1997) refer to the different

<sup>7</sup>Deng Xiaoping imposed a mandatory retirement program in 1980, effectively removing the old guard and replacing them with younger and more proreform people (Lee 1991). In the mid-1980s, he allowed bureaucrats to quit government positions and join business, which stimulated bureaucrat interest in economic growth and enterprise development (Li 1998).

bureaucratic attitudes in implementing the reforms as the “grabbing hand” in Russia and the “helping hand” in China.

Several authors have argued that the decentralized nature of China’s economy may have given China an advantage over Russia, enabling China to make the agricultural reforms more successful. The differing organizational and hierarchical structures of the central planning systems of China and Russia allowed for more reform experimentation by Communist leaders in China and therefore aided their reform process because China could take a trial-and-error approach (Qian & Xu 1993).<sup>8</sup>

We find little support for these arguments in the case of China’s initial reforms. Although the introduction of China’s HRS reforms was regionally concentrated, this had little to do with the design of planners, but more with grassroots initiatives. In fact, the location of the start of the reforms—often in remote outlying regions—was often determined by the relative absence of control by the planners (Yang 1996), contrary to what would be expected from a government-designed experiment. The spread of the HRS system—across nearly one million brigades and more than ten million teams in less than five years—did not reflect careful planning, but instead, as one village official in China is quoted by McMillan (2002), “HRS spread like the flu.”

If there was any tendency for experimenting with reform, it happened mostly in the Soviet Union. In fact, significant experimentation occurred in the former Soviet agricultural system in the late 1970s and early 1980s (van Atta 1993). Experiments with new forms of agricultural management were attempted on a regional basis (Radvanyi 1988). Not until the 1990s would the decentralized nature of China play a more important role, for example in market liberalization, in the implementation of fiscal reforms, and in the emergence of Town and Village Enterprises and similar policies (Wong 1997, Nyberg & Rozelle 1999, Zhang 2006).

## LEGITIMACY AND SEQUENCING OF THE REFORMS: BIG BANG VERSUS GRADUALISM

Unlike the situation in Soviet Union, where the lack of significant reforms ultimately contributed to the fall of the Communist leadership, the radical, though partial, economic reforms in the Chinese countryside did much to reinforce the Communist Party’s power (Oi 1989). The radical reforms on the land rights and production structure in China, which looked like moves away from Socialism, may have done more to consolidate the rule of the Communist Party than any other measures taken during this period. The changes directly affected more than 70% of the population living in the rural areas. The rise in food production also increased food supplies to cities and took a lot of pressure off the government.<sup>9</sup> These conclusions are important to understand the difference in reform sequencing. Once China had successfully implemented property rights reform and restructured its farms (as well as adjusted prices to reduce the implicit tax on farmers),

<sup>8</sup>Qian & Xu (1993) refer to these differences as a U-form (Soviet-Union) versus an M-form (China) hierarchy, based on typologies used by Williamson (1975). Roland (2000) argues that while China’s planning system was based on the regional duplication of industries, the Soviet system was organized to exploit economies of scale and division of labor on a much wider scale. Qian et al. (1999) argue that the benefits from learning relative to the possible costs of reversal of a reform experiment were significantly higher in China’s regionally organized system compared with the Soviet functional organization of central planning.

<sup>9</sup>Many of the same dynamics occurred in Vietnam (Pingali & Xuan 1992, Wurfel 1993).

liberalizing markets became less imperative (Rozelle 1996). The early pricing changes (which were not implemented through markets, but by the planning bureaucracy) and HRS helped the reformers to meet their initial objectives of increasing agricultural productivity, farm incomes, and food output (Sicular 1988, Lin 1992). The reforms fueled economic growth and reduced concerns about food security. The legitimacy of leaders able to run a government that could raise people's standard of living was at least temporarily satisfied. A new set of radical reforms might have exposed the leaders to new risks (Putterman 1993). With the urgency for additional reforms dampened for top leaders (because their goals were met) as well as farmers (because their incomes and control over the means of production both had improved), there was less policy pressure from both the top and the grass roots.

The situation was very different in the Soviet Union and CEE states in the late 1980s. Communist leaders in these regions had failed to reform substantially for decades [see Acemoglu & Robinson (2006, 2008) for an analysis of conditions in which the (in)ability of existing governments to introduce sufficient redistribution through fiscal means will lead to or prevent revolutions that indicate a redistribution of economic and political rights]. Once the Soviet and CEE leaders lost power, the anticommunist political forces that took over were determined to eliminate the Communist system and introduce political changes (e.g., democracy) and economic changes (such as a market economy), each of which reinforced the other (Balcerowicz 1994).<sup>10</sup> Reforms were launched despite resistance by farm managers, workers, and local officials. Reformers chose to push through as much of the reform agenda as possible at the time that they were (still) in charge. Hence, for both political and economic reasons, a comprehensive set of radical reforms was pursued. Because the previous reforms had failed to result in efficiency improvements, yielding only marginal and slow policy shifts, in the view of the reformers a more radical and broad-based reform approach was necessary.

A broad and encompassing reform strategy was also required for technical and administrative reasons. First, the more industrialized nature of the Soviet agricultural production system and the inefficiencies imbedded in the agro-food supply chain required an approach beyond the confines of the farming sector (Johnson & Brooks 1983). Second, the more complicated technologies in Soviet and CEE agriculture meant a more complex set of exchanges between a larger number and greater variety of firms, which required massive information to design an optimal sequence of policies (Goodhue et al 1998, McMillan 2002). Third, unlike in China, agriculture in the Soviet Union and the CEE was less important to the economy, requiring a much broader reform agenda.

## ENDOGENOUS GOVERNANCE AND RIGHTS REFORMS

The mixture of political and economic objectives was especially paramount in property rights reform. The reform of land rights was one of the most hotly disputed issues, as such reform aimed to influence the political constellation, i.e., the distribution of power and

<sup>10</sup>The ultimate political reform objective may still be economic efficiency, which is achieved not only by influencing the economy's production function, but also by how the posttransition governments can distort the economy (Lyons et al. 1994, Rausser & Simon 1992). There are many examples of such mixed political and economic objectives, including Thatcher's privatization policies in the 1980s in the United Kingdom (Studlar et al. 1990) and nineteenth-century rural reforms in Western Europe to stop the growth of socialist influence (Craeybeckx 1973).

wealth in the posttransition period (Swinnen, 1999). Interestingly, the choice of policies differs sharply among countries (Lerman et al. 2004).

The radical approach to reconstitute land rights to former land owners in many Eastern European countries can be interpreted within a political framework. In several countries the objectives of anti-Communist (or anti-Soviet) political parties were made explicit by their use of land restitution policy to break the rural power and organizational structure of (former) communist groups. Two examples are Bulgaria, where the communist party continued to control the countryside (Lyons et al. 1994, Swinnen 1997), and Latvia, where restitution concentrated the land in the hands of the native Latvian population and wrested control away from Russian migrants (Rabinowicz 1997).

In addition to the political factors mentioned above, historical legacies also affected policy reform. In CEE the history of private land rights and the tradition of private farming in the countries provided strong incentives for CEE reformers to privatize land (Rizov et al. 2001). Proximity to the European Union reinforced this approach. In contrast, in Russia and Central Asia where no such tradition existed, there was a popular preference that land should not be privately owned (Swinnen & Heinegg 2002). For different reasons, a similar approach was found in China and Vietnam, where the continuation of the Communist regime and its ideology played an important role (Jacoby et al. 2002). With land as the most basic factor of production in agriculture in a Communist country, leaders believe that the state, or its representative, the collective, should control it. In both nations, reformers also provided (increasingly) well-defined control and income rights, and the de facto difference regarding land ownership decreased.

## DEVELOPMENT AND ANTITRADE PATTERNS IN PRICE DISTORTIONS AND REFORMS

The positive relation between economic development and agricultural support, which is widely observed in market economies (see above), is also found in posttransition countries. On average, current farmer assistance tends to be higher in higher-income countries and for import-competing enterprises than it is for export-oriented ones (Anderson & Swinnen 2008). Heavy negative government intervention in the form of depressed incentives also tends to be concentrated on commodities that have the potential to provide export tax revenue for the government. This is especially the case in the cotton sectors of Uzbekistan, Turkmenistan, and Tajikistan (Pomfret 2008), where the government controls the cotton chain as a means of extracting rents, thereby depressing farm prices and production incentives. In addition, traditional grain-exporting countries such as Ukraine and Bulgaria as well as (surplus regions of) Russia are characterized by regular strong government interventions. For example, in the mid-1990s in Bulgaria, ministers of agriculture had to resign regularly following reports of grain shortfalls or unregulated exports threatening the local grain supply (Swinnen 1996). In Ukraine, ad hoc grain market interventions have continued in recent years (von Cramon-Taubadel et al. 2008).

In the case of China, although farmers were taxed heavily in the past, in recent years they have begun to receive greater assistance from the state (Huang et al. 2008). In 2007, for example, farmers received up to US\$20 per acre (in RMB equivalents) in production subsidies (Rozelle et al. 2008). Although it is unclear if the new subsidies are distorting, the tendency in China is to support agriculture as the nation's economy grows.

An interesting issue arises whether this development pressure is also behind the remarkable switch from agricultural taxation to agricultural subsidization in the Soviet Union over the 1930–1970 period.<sup>11</sup> Rozelle & Swinnen (2009a) analyzed the relationship between income and the shift from taxation to subsidization in the Soviet Union and the current policy developments in China. The data suggest that the change in the Soviet Union occurred when GDP per capita was approximately US\$3500, which is roughly the current level of income in China. Hence, these observations are consistent with the interpretation that the pressure to start subsidizing agriculture is real in China and will lead to a net subsidization of agriculture in the future—in the absence of strict constraints, such as those the World Trade Organization (WTO) may provide.

In addition, improvements in the government's budgetary situation, which allowed more subsidies to be given to farmers than were possible in the early years of transition, also play a role. This situation is particularly important in Russia and some of its neighbors, such as Kazakhstan, where recovery from the post-1998 fiscal crisis has been aided by windfall gains from the dramatic rise in the prices of their oil and gas exports between 1998 and 2008. China's nascent use of subsidies coincides with the rebound of fiscal revenues under the control of the central government.

## INTERNATIONAL GOVERNANCE STRUCTURES

So far the discussion has focused on the impact of domestic governance structures. However, an interesting issue is the impact of international governance structures on policy reform (Anania et al. 2004, Bagwell & Staiger 2002, Dutt & Mitra 2009, Josling et al. 1996, Rausser 1995). Examples of these structures include agreements by the WTO, NAFTA, as well as E.U. enlargement.

According to the literature, the impact of the WTO is mixed.<sup>12</sup> Some of the transition countries, such as the Czech Republic, Slovakia, Hungary, Poland, Romania, and Slovenia, were members of the GATT and have been members of the WTO since its creation in 1995. China, Bulgaria, Estonia, Lithuania, Latvia, Kyrgyz, Armenia, Georgia, and Albania joined the WTO later. Ukraine, Russia, and Kazakhstan are in various stages of discussion regarding WTO accession. Countries that were founding members in 1995 have not been strongly disciplined by WTO accession. Their commitments were based on high support levels of the 1980s and therefore produced little constraints on their policies in the 1990s (Bacchetta & Drabek 2002).

However, for those that had to negotiate their entry in the latter 1990s, the constraints on introducing or maintaining distortions are more serious. In China, perhaps more than any other acceding country, the accession process has led to a significant fall in distortions (Huang et al. 2008). China's desire to enter the WTO led to two phases of adjustments in

<sup>11</sup>These processes are consistent with broad patterns of agricultural policy identified by studies that ignored ideology (see Explaining Policy Distortions: From Structural Causes to Governance, section above). Dutt & Mitra (2009), Olper (2007), and Olper & Raimundi (2009), using cross-country evidence, found that there are interactions between ideological preferences of rulers and development in determining support for agriculture, but they came to different conclusions on the source of the effects.

<sup>12</sup>In general, most experts agree that the Uruguay Round Agreement on Agriculture may have constrained the growth of agricultural protection but has done little to reduce it, at least in the countries that were GATT members during the negotiations (Anania et al. 2004). The GATT/WTO impact may have been more important for the instruments than for the level of support. For example, GATT/WTO accession triggered an important change in the instrument choice in the European Union over the past decades, but much less on the level of protection.



protection. Huang & Chen (1999) demonstrated that, even before China's accession, leaders aggressively reduced protection on a number of commodities (including many importables such as soybeans and cotton) in anticipation of the negotiations. Upon accession, protection fell even further (Huang et al. 2004). The constraints imposed on China as a newly acceding country by international agreements have been real and have led to falling rates of the positive protection—especially for a significant number of importable commodities.

For the CEE countries, the most important WTO impact has been indirect: In anticipation of eastward enlargement, the European Union was forced to introduce major changes to its Common Agricultural Policy, which in turn has affected postaccession agricultural distortions. E.U. accession, both prospective and actual, has had obvious and profound influences on policy choices (Swinnen 2002). The CEE countries that joined in 2004 have raised domestic agricultural and food prices toward E.U. levels. These countries had to undertake major regulatory improvements to stimulate their markets, including private investments in the food chain and public rural infrastructure investments. Their trade policies have likewise changed so as to allow free access for all products from other E.U. countries and, in most cases, also freer access for nonagricultural products from non-E.U. countries (Ciaian & Swinnen 2008).

Finally, the role of other international institutions, such as the World Bank and International Monetary Fund, was important at the start of transition, as it provided policy guidance in all these countries. However, in more recent years this guidance has been less effective. In contrast, policy advice from the European Union was perceived as more relevant for those countries joining this collective, especially E.U. accession countries. Countries aspiring to join the European Union (such as most of the Balkan countries and as far east as Ukraine), or those seeing the accession countries as models for their own development strategies, also take seriously any policy advice from the European Union. Another reason for the declining influence of some international financial institutions is that the improved fiscal and macroeconomic situations of many countries have made them less beholden to those institutions requiring reforms as a condition to providing loans or financial assistance.

## CONCLUSION

In this paper we review the literature on governance structures and policy reform related to agricultural price distortions and land rights reform. We draw insights from the theoretical and quantitative literature and from studies on the dramatic reforms in transition countries. Evidence exists supporting the general conclusion that regime changes contribute to policy reforms: Whenever a major policy reform occurred, a regime change (of some sort) preceded it or coincided with it. In some cases, particularly in China, this regime change was within the Communist party. In many other countries economic changes occurred only when the Communist regime collapsed. There is also evidence that a combination of regime change and events that cause strong demand at the grassroots level for policy reform (such as an income crisis) is needed to trigger important policy reforms in an authoritarian political system. In our review of the history of the Communist regimes we find that only in China in the late 1970s was such combination present.

In general, the specific nature of the relationship between (changes in) governance structures and policy reform is complicated and nuanced. This relationship is conditional



on several factors including ideology, inequality, and level of development. The impact of changes in political regimes on policy reform depends on the preference of the rulers (ideology) under the various regimes and the extent to which they can enforce their private preferences. Inequality matters in several ways. For example, whether farming is dominated by large landlords or by small-scale resource poor farmers is likely to affect the policies, either because of their ability to influence the government through lobbying or because of the government's ideological preferences. In addition, the ability of landlords, peasants, and landless workers to form a coalition to demand proagriculture fiscal policies, or the possibility of them spending their political activities on fighting each other over the distribution of property rights, depends on the initial distribution of these rights.

Although it is well known that the structural characteristics of the economy affect trade and fiscal policies toward agriculture, until recently there was much less information on how this process interacts with the nature of the political regimes. Our survey suggests that, even in autocratic regimes, important structural changes in the economy appear to be correlated with commonly observed changes in policy, e.g., subsidies to agriculture are positively correlated with economic development. Changes in agricultural subsidization and taxation under Communist regimes, i.e., over the 1930–1980 period in the Soviet Union and over the past 40 years in China, are consistent with these observations.

In many cases governance and policy reform affect one another in a dynamic and bidirectional fashion, with economic reforms also affecting the governance structure. In China the dramatic success of the early economic reforms contributed to the legitimacy and the survival of the Communist Party and mitigated the pressures for further economic reforms. In the Soviet Union the opposite occurred: The failure of timid reforms contributed to the decline in the legitimacy of the Communist Party, and once changes were possible, opponents tried to implement reforms that were intended both to reform the economic system and to change the future political regime.

An important final issue for future research is the interaction of different reforms within a political economy framework and the normative implications. Most normative studies focus on a single policy and its effects. However, if some specific reform policies are elements of broader reform packages, as our review indicates to be important, such single-policy evaluation may not be the right framework for drawing normative conclusions. In a broader reform strategy, specific policies may play a (political) role to reinforce the overall reform strategy, or they may play a role as compensation instruments. On the one hand, agricultural protection can be part of a “social contract” in which more general reforms are promoted to stimulate productivity growth and restructuring and where agricultural protection is used to cushion the blows for the least mobile—as has been suggested more generally by Rausser (1982) and de Gorter et al. (1992) and for which there is empirical evidence (e.g., Swinnen et al. 2000). On the other hand, policy reform can be one element of a much broader paradigm shift such as in CEE, the FSU, and China. Within this set of policy reforms, specific reforms (such as the restitution of land rights to former owners in CEE) can be an element of a broader reform package to create an irreversible set of direct and indirect changes: The former would affect economic incentives; the latter would stimulate, through an induced change in political preferences, a reduction of distortions in the long run. The welfare effects of these policies should thus be interpreted in this broader perspective. There is an important need for further research to incorporate such interactions for normative interpretations of reform effects.

## DISCLOSURE STATEMENT

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## LITERATURE CITED

- Acemoglu D, Robinson JA. 2001. A theory of political transitions. *Am. Econ. Rev.* 91:938–63
- Acemoglu D, Robinson JA. 2006. *Economic Origins of Dictatorship and Democracy*. Cambridge, UK: Cambridge Univ. Press
- Acemoglu D, Robinson JA. 2008. Persistence of power, elites and institutions. *Am. Econ. Rev.* 98 (1):267–93
- Aghion P, Alesina A, Trebbi F. 2004. Endogenous political institutions. *Q. J. Econ.* 119(2):565–612
- Anania G, Bohman ME, Carter CA, McCalla AF, eds. 2004. *Agricultural Policy Reform and the WTO: Where Are We Heading?* London: Edward Elgar
- Anderson K. 1995. Lobbying incentives and the pattern of protection in rich and poor countries. *Econ. Dev. Cult. Change* 43(2):401–23
- Anderson K, ed. 2009a. *Distortions to Agricultural Incentives: A Global Perspective*. Washington, DC: World Bank. In press
- Anderson K, ed. 2009b. *The Political Economy of Distortions to Agriculture*. Washington, DC: World Bank. In press
- Anderson K, Hayami Y. 1986. *The Political Economy of Agricultural Protection: East Asia in International Perspective*. London: Allen Unwin
- Anderson K, Swinnen JFM, eds. 2008. *Distortions to Agricultural Incentives in Europe's Transition Economies*. Washington, DC: World Bank
- Bacchetta M, Drabek Z. 2002. *Effects of WTO accession on policy-making in sovereign states: preliminary lessons from the recent experience of transition countries*. Work. Pap. DERD-2002-02, WTO
- Becker GS. 1983. A theory of competition among pressure groups for political influence. *Q. J. Econ.* 98(3):371–400
- Bagwell K, Staiger RW. 2002. *The Economics of the World Trading System*. Cambridge, MA: MIT Press
- Balcerowicz L. 1994. Common fallacies in the debate on the transition to a market economy. *Econ. Polit.* 9(19):17–50
- Bates RH. 1983. Patterns of market intervention in agrarian Africa. *Food Policy* 8(4):297–304
- Bates RH. 1989. *Beyond the Miracle of the Market: The Political Economy of Agrarian Development in Rural Kenya*. Cambridge, U.K.: Cambridge Univ. Press
- Beghin JC, Kherallah M. 1994. Political institutions and international patterns of agricultural protection. *Rev. Econ. Stat.* 76(3):482–9
- Binswanger H, Deininger K, Feder G. 1995a. Agricultural land relations in the developing world. *Am. J. Agric. Econ.* 75:1242–8
- Binswanger H, Deininger K, Feder G. 1995b. Power, distortions, revolt and reform in agricultural land relations. In *Handbook of Development Economics*, Vol. 3, ed. C Hollis, TN Srinivasan, pp. 2659–72. Amsterdam: North-Holland
- Brada JC, Wädekin K, eds. 1988. *Socialist Agriculture in Transition: Organizational Response to Failing Performance*. Boulder, CO: Westview
- Brooks KM. 1990. Soviet agricultural policy and pricing under Gorbachev. In *Soviet Agriculture: Comparative Perspectives*, ed. RG Kenneth, pp. 116–29. Ames, IA: Iowa State Univ. Press

- Buchanan JM, Tullock G. 1962. *The Calculus of Consent: Logical Foundations of Constitutional Democracy*. Ann Arbor, MI: Univ. Mich. Press
- Ciaian P, Swinnen JFM. 2008. Distortions to agricultural incentives in Central and Eastern Europe. See Anderson & Swinnen 2008, pp. 58–87
- Clague C, Rausser GC. 1992. *The Emergence of Market Economies in Eastern Europe*. Cambridge, MA: Blackwell
- Craeybeckx J. 1973. De agrarische depressie van het einde der XIXe eeuw en de politieke strijd om de boeren I. *Belg. Tijdschr. Nieuwste Geschied.* 4:190–230
- de Gorter H, Nielson DJ, Rausser GC. 1992. Productive and predatory public policies: research expenditures and producer subsidies in agriculture. *Am. J. Agric. Econ.* 74(1):27–37
- de Gorter H, Swinnen JFM. 2002. Political economy of agricultural policies. In *Handbook of Agricultural Economics Volume 2B: Agricultural and Food Policy*, ed. BL Gardner, GC Rausser, pp. 2073–123. Amsterdam: Elsevier Sci. Ltd.
- de Gorter H, Tsur Y. 1991. Explaining price policy bias in agriculture: the calculus of support-maximizing politicians. *Am. J. Agric. Econ.* 73(4):1244–54
- de Janvry A. 1981. *The Agrarian Question and Reformism in Latin America*. Baltimore, MD: Johns Hopkins Univ. Press
- de Janvry A, Gordillo G, Platteau JP, Sadoulet E, eds. 2001. *Access to Land, Rural Poverty, and Public Action*. Oxford, UK: Oxford Univ. Press
- Deininger K, Feder G. 2002. Land institutions and land markets. In *Handbook of Agricultural Economics*, ed. B Gardner, G Rausser. Amsterdam: Elsevier Sci.
- Dewan T, Shepsle KA. 2008a. Recent economic perspectives on political economy. Part I. *Br. J. Polit. Sci.* 38(2):363–82
- Dewan T, Shepsle KA. 2008b. Recent economic perspectives on political economy. Part II. *Br. J. Polit. Sci.* 38(3):543–64
- Dewatripont M, Roland G. 1992. The virtues of gradualism and legitimacy in the transition to a market economy. *Econ. J.* 102(411):291–300
- Downs A. 1957. *An Economic Theory of Democracy*. New York: Harper Row
- Dutt P, Mitra D. 2002. Endogenous trade policy through majority voting: an empirical investigation. *J. Int. Econ.* 58(1):107–33
- Dutt P, Mitra D. 2005. Political ideology and endogenous trade policy: an empirical investigation. *Rev. Econ. Stat.* 87(1):59–72
- Dutt P, Mitra D. 2009. Political economy of agricultural distortion patterns: the roles of ideology, inequality, lobbying and public finance. See Anderson 2009b, In press
- Ellman M. 1988. Contract brigades and normless teams in Soviet agriculture. See Brada & Wädekin 1988, pp. 23–33
- Findlay R, O'Rourke KH. 2007. *Power and Plenty. Trade, War, and the World Economy in the Second Millennium*. Princeton NJ: Princeton Univ. Press
- Fischer S. 1994. Structural factors in the economic reforms of China, Eastern Europe, and the former Soviet Union. Discussion. *Econ. Polit.* 9(1):131–35
- Frye T, Shleifer A. 1997. The invisible hand and the grabbing hand. *Am. Econ. Rev.* 87(2):354–58
- Gardner BL. 1987. Causes of U.S. farm commodity programs. *J. Polit. Econ.* 95(2):290–310
- Gawande K, Krishna P. 2003. The political economy of trade policy: empirical approaches. In *Handbook of International Trade*, ed. E Kwan Choi, J Harrigan, pp. 213–50. Oxford: Blackwell
- Goodhue R, Rausser GC, Simon LK. 1998. Privatization, market liberalization and learning in transition economies. *Am. J. Agric. Econ.* 80(4):724–37
- Gray KR, ed. 1990. *Soviet Agriculture: Comparative Perspectives*. Ames, IA: Iowa State Univ. Press
- Grossman GM, Helpman E. 2002. *Interest Groups and Trade Policy*. Trenton, NJ: Princeton Univ. Press
- Hayami Y, Quisumbing MA, Adriano L. 1990. *Toward an Alternative Land Reform Paradigm: A Philippine Perspective*. Quezon City: Ateneo de Manila Univ. Press

- Hillman AL. 1982. Declining industries and political-support protectionist motives. *Am. Econ. Rev.* 72(5):1180–87
- Honma M, Hayami Y. 1986. The determinants of agricultural protection levels: an econometric analysis. In *The Political Economy of Agricultural Protection*, ed. K Anderson, Y Hayami. London: Allen Unwin
- Huang J, Chen C. 1999. *Effect of trade liberalization on agriculture in China: institutional and structural aspects*. Work. Pap. Series N 42, United Nations, ESCAP Cent. Res. Dev. Coarse Grains Pulses Roots Tuber Crops
- Huang J, Liu Y, Martin W, Rozelle S. 2008. Distortions to agricultural incentives in China. In *Distortions to Agricultural Incentives in Asia*, ed. K Anderson, W Masters. Washington, DC: World Bank
- Huang J, Rozelle S, Chang M. 2004. The nature of distortions to agricultural incentives in China and implications of WTO accession. *World Bank Econ. Rev.* 18(1):59–84
- Jacoby H, Li G, Rozelle S. 2002. Hazards of expropriation: tenure insecurity and investment in rural China. *Am. Econ. Rev.* 92(5):1420–47
- Johnson DG, Brooks KM, eds. 1983. *Prospects for Soviet Agriculture in the 1980s*. Bloomington, IN: Indiana Univ. Press
- Josling TE, Tangermann S, Warley TK. 1996. *Agriculture in the GATT*. Basingstoke, UK: McMillan
- Kindleberger CP. 1975. The rise of free trade in Western Europe, 1820–1875. *J. Econ. Hist.* 35(1):20–55
- Krueger AO. 1990. *Government failures in development*. Work. Pap. 3340, NBER
- Krueger AO, Schiff M, Valdes A. 1988. Agricultural incentives in developing countries: measuring the effects of sectoral and economy wide policies. *World Bank Econ. Rev.* 3(2):225–71
- Krueger AO, Schiff M, Valdés A. 1991. *The Political Economy of Agricultural Pricing Policy*. London: Johns Hopkins Univ. Press
- La Ferrara E. 2002. Inequality and group participation: theory and evidence from rural Tanzania. *J. Public Econ.* 85(2):235–73
- Lardy N. 1983. *Agriculture in China's Modern Economic Development*. Cambridge, UK: Cambridge Univ. Press
- Lee HY. 1991. *From Revolutionary Cadres to Party Technocrats in Socialist China*. Berkeley, CA: Univ. Calif. Press
- Lerman Z, Brooks K. 2001. *Turkmenistan: An Assessment of Leasehold-based Farm Restructuring*. Tech. Pap. 500, World Bank
- Lerman Z, Csaki C, Feder G. 2004. *Agriculture in Transition: Land Policies and Evolving Farm Structures in Post-Soviet Countries*. Landham, MD: Lexington Books
- Li DD. 1998. Changing incentives of the Chinese bureaucracy. *Am. Econ. Rev.* 88(2):393–97
- Liefert WM, Swinnen JFM. 2002. *Changes in agricultural markets in transition economics*. Agric. Econ. Rep. 806, ERS, USDA
- Lin JY. 1992. Rural reforms and agricultural growth in China. *Am. Econ. Rev.* 82(1):34–51
- Lindert PH. 1991. Historical patterns of agricultural policy. In *Agriculture and the State: Growth, Employment, and Poverty*, ed. C Timmer, ch. 2. Ithaca, NY: Cornell Univ. Press
- Lipton M. 1977. *Why Poor People Stay Poor: A Study of Urban Bias in World Development*. Cambridge, MA: Harvard Univ. Press
- Lyons R, Rausser G, Simon L. 1994. Disruption and continuity in Bulgaria's agrarian reform. In *Privatization of Agriculture in New Market Economies: Lessons from Bulgaria*, ed. A Schmitz, K Moulton, A Buckwell, S Davidova, pp. 87–117. Norwell, MA: Kluwer Acad.
- Macours K, Swinnen JFM. 2002. Patterns of agrarian transition. *Econ. Dev. Cult. Change* 50(2):365–94
- McMillan J. 2002. *Reinventing the Bazaar. The Natural History of Markets*. New York: WW Norton
- McMillan J, Naughton B. 1992. How to reform a planned economy: lessons from China. *Oxf. Rev. Econ. Policy* 8:130–43

- Nyberg A, Rozelle S. 1999. *Accelerating Development in Rural China*. World Bank Monograph Series, Rural Development Division. Washington, DC: World Bank
- North DC, Wallis JJ, Weingast BR. 2006. *A conceptual framework for interpreting recorded human history*. Work. Pap. 12795, NBER
- OECD. 1996. *Agricultural Policies in Non-Member Countries*. Paris: OECD
- Oi J. 1989. Market reforms and corruption in rural China. *Stud. Comp. Communism* 22(2/3): 221–33
- Olper A. 2001. Determinants of agricultural protection: the role of democracy and institutional setting. *J. Agric. Econ.* 52(2):75–92
- Olper A. 2007. Land inequality, government ideology and agricultural protection. *Food Policy* 32 (1):67–83
- Olper A, Raimundi V. 2009. Constitutional rules and agricultural protection. See Anderson 2009b, In press
- Olson M. 1965. *The Logic of Collective Action*. New Haven: Yale Univ. Press
- O'Rourke K, Taylor AM. 2002. *Democracy and protection*. Work. Pap. 12250, NBER
- Park A, Jin H, Rozelle S, Huang J. 2002. Market emergence and transition: transition costs, arbitrage, and autarky in China's grain market. *Am. J. Agric. Econ.* 84(1):67–82
- Peltzman S. 1976. Towards a more general theory of regulation. *J. Law Econ.* 19(2):211–40
- Persson T, Tabellini GE. 2000. *Political Economics—Explaining Economic Policy*. Cambridge, MA: MIT Press
- Persson T, Tabellini GE. 2003. *The Economic Effects of Constitutions: What Do the Data Say?* Cambridge, MA: MIT Press
- Pingali PL, Xuan V. 1992. Vietnam: decollectivization and rice productivity growth. *Econ. Dev. Cult. Change* 40(4):697–718
- Pokrivcak J, Crombez C, Swinnen JFM. 2007. The status quo bias and reform of the common agricultural policy: impact of voting rules, the European Commission, and external changes. *Eur. Rev. Agric. Econ.* 33(4):562–90
- Prendergast C. 2007. The motivation and bias of bureaucrats. *Am. Econ. Rev.* 97(1):180–96
- Qian Y, Roland G, Xu C. 1999. Why is China different from Eastern Europe? Perspectives from organization theory. *Eur. Econ. Rev.* 43(4):1085–94
- Qian Y, Weingast BR. 1997. Federalism as a commitment to preserving market incentives. *J. Econ. Perspect.* 11(4):83–92
- Qian Y, Xu C. 1993. Why China's economic reforms differ: the M-form hierarchy and entry/expansion of the non-state sector. *Econ. Transit.* 1(2):135–70
- Pomfret R. 2008. Distortions to agricultural incentives in Kazakhstan. See Anderson & Swinnen 2008, pp. 219–64
- Putterman L. 1993. *Continuity and Change in China's Rural Development*. New York: Oxford Univ. Press
- Rabinowicz E. 1997. The political economy of land reform in the Baltics. In *The Political Economy of Agrarian Reform in Central and Eastern Europe*, ed. JFM Swinnen. Aldershot: Ashgate
- Radvanyi J. 1988. The experiments in Georgia, 1974–1984: quest for a new organization in the Soviet agricultural system. See Brada & Wädekin 1988, pp. 110–24
- Rausser GC. 1982. Political economic markets: PERTs and PESTs in food and agriculture. *Am. J. Agric. Econ.* 64(5):821–33
- Rausser GC. 1995. *GATT Negotiations and the Political Economy of Policy Reform*. Berlin/Heidelberg/New York: Springer-Verlag
- Rausser GC, Roland G. 2009. Special interests versus the public interest: the determination of policy instruments. See Anderson 2009b, In press
- Rausser GC, Simon LK. 1992. The political economy of transition in Eastern Europe: packaging enterprises for privatization. In *The Emergence of Market Economies in Eastern Europe*, ed. C Clague, G Rausser, ch. 14, pp. 245–70. Cambridge, MA: Blackwell

- Rausser GC, Swinnen JFM, Zusman P. 2008. *Political power and endogenous policy formation*. *Mimeo*, Univ. Calif. Berkeley
- Rizov M, Gavrilescu D, Gow HR, Mathijs E, Swinnen JFM. 2001. Transition and enterprise restructuring: the development of individual farming in Romania. *World Dev.* 29(7):1257–74
- Roelfsema H. 2004. *Political institutions and trade protection*. Work. Pap. 04-06, Tjalling C Koopmans Res. Inst., Univ. Utrecht
- Rogowski R. 1989. *Commerce and Coalitions. How Trade Affects Domestic Political Alignments*. Princeton NJ: Princeton Univ. Press
- Rogowski R, Kayser MA. 2002. Majoritarian electoral systems and consumer power: price-level evidence from the OECD countries. *Am. J. Polit. Sci.* 46(3):526–39
- Roland G. 2000. *Transition and Economics: Politics, Markets and Firms*. Cambridge, MA: MIT Press
- Rozelle S. 1996. Gradual reform and institutional development: the keys to success of China's rural reforms. In *Reforming Asian Socialism: The Growth of Market Institutions*, ed. J McMillan, B Naughton, pp. 197–220. Ann Arbor, MI: Univ. Mich. Press
- Rozelle S, Huang J, Otsuka K. 2008. Agriculture in China's development. In *China's Great Economic Transformation*, ed. L Brandt, T Rawski, pp. 467–505. New York: Cambridge Univ. Press
- Rozelle S, Swinnen JFM. 2004. Success and failure of reform: insights from the transition of agriculture. *J. Econ. Lit.* 42(2):404–56
- Rozelle S, Swinnen JFM. 2009a. The political economy of agricultural distortions in the transition countries of Europe and Asia. See Anderson 2009b, In press
- Rozelle S, Swinnen JFM. 2009b. Why did the communist party reform in China and not in the Soviet Union? *China Econ. Rev.* In press
- Sachs JD, Woo W-T. 1994. Structural factors in the economic reforms of China, Eastern Europe and the former Soviet Union. *Econ. Polit.* 9(1):101–45
- Schonhardt-Bailey C. 1998. Parties and interests in the 'marriage of iron and rye.' *Br. J. Polit. Sci.* 28:291–330
- Schonhardt-Bailey C. 2006. *From the Corn Laws to Free Trade. Interests, Ideas and Institutions in Historical Perspective*. Cambridge MA: MIT Press
- Shleifer A. 1997. Government in transition. *Eur. Econ. Rev.* 41(3-5):385–410
- Sicular T. 1988. Plan and market in China's agricultural commerce. *J. Polit. Econ.* 96(2):283–307
- Sicular T. 1995. Redefining state, plan, and market: China's reforms in agricultural commerce. *China Q.* 144:1020–46
- Stigler GJ. 1971. The economic theory of regulation. *Bell J. Econ. Manag. Sci.* 2:3–21
- Studlar DT, McAllister I, Ascuí A. 1990. Privatization and the British electorate: microeconomic policies, macroeconomic evaluations, and party support. *Am. J. Pol. Sci.* 34(4):1077–101
- Swinnen JFM. 1994. A positive theory of agricultural protection. *Am. J. Agric. Econ.* 76(1):1–14
- Swinnen JFM. 1996. Endogenous price and trade policy developments in Central European agriculture. *Eur. Rev. Agric. Econ.* 23(2):133–60
- Swinnen JFM, ed. 1997. *The Political Economy of Agrarian Reform in Central and Eastern Europe*. Aldershot: Ashgate
- Swinnen JFM. 1999. The political economy of land reform choices in Central and Eastern Europe. *Econ. Transit.* 7(3):637–64
- Swinnen JFM. 2001. Political reforms, rural crises, and land tenure in Western Europe. *Food Policy* 27(4):371–94
- Swinnen JFM. 2002. Transition and integration in Europe: implications for agricultural and food markets, policy and trade agreements. *World Econ.* 25(4):481–501
- Swinnen JFM. 2009a. Agricultural protection growth in Europe 1870–1969. See Anderson 2009b, In press
- Swinnen JFM. 2009b. The political economy of agricultural policies: the literature to date. See Anderson 2009b, In press



- Swinnen JFM, Banerjee AN, de Gorter H. 2001. Economic development, institutional change, and the political economy of agricultural protection: an econometric study of Belgium since the 19th century. *Agric. Econ.* 26(1):25–43
- Swinnen JFM, de Gorter H. 1993. Why small groups and low income sectors obtain subsidies: the ‘altruistic’ side of a ‘self-interested’ government. *Econ. Polit.* 5(3):285–96
- Swinnen JFM, de Gorter H, Rausser GC, Banerjee AN. 2000. The political economy of public research investment and commodity policies in agriculture: an empirical study. *Agric. Econ.* 22(2):111–22
- Swinnen JFM, Heinegg A. 2002. On the political economy of land reforms in the former Soviet Union. *J. Int. Dev.* 14(7):1019–31
- Swinnen JFM, Rozelle S. 2006. *From Marx and Mao to the Market: The Economics and Politics of Agricultural Transition*. New York: Oxford Univ. Press
- Timmer CP. 1986. *Getting Prices Right: The Scope and Limits of Agricultural Price Policy*. New York: Cornell Univ. Press
- Tracy M. 1989. *Government and Agriculture in Western Europe 1880-1988*. New York: Harvester Wheatsheaf, 3rd ed.
- van Atta D. 1993. *The ‘Farmer Threat’: The Political Economy of Agrarian Reform in Post-Soviet Russia*. Boulder, CO: Westview
- von Cramon-Taubadel S, Nivjevskiy O, von der Malsburg EE, Movchan V. 2008. Distortions to agricultural incentives in Ukraine. See Anderson & Swinnen 2008, pp. 175–217
- Wädekin K-E. 1990. Determinants and trends of reform in communist agriculture: a concluding essay. In *Communist Agriculture: Farming in the Soviet Union and Eastern Europe*, ed. K-E Wädekin, pp. 321–39. London/New York: Routledge
- Wegen SK, ed. 1998. *Land Reform in the Former Soviet Union and Eastern Europe*. London: Routledge
- Weingast BR, Wittman D, eds. 2006. *The Oxford Handbook of Political Economy*. New York: Oxford Univ. Press
- Williamson OE. 1975. *Markets and Hierarchies*. New York: Free Press
- Wong CPW, ed. 1997. *Financing Local Government in the People’s Republic of China*. Hong Kong: Oxford Univ. Press
- World Bank. 1992. *China: Strategies for Reducing Poverty in the 1990s*. Washington, DC: World Bank
- World Bank. 2000. *World Development Report 2000/2001: Attacking Poverty*. Washington, DC: World Bank
- Wurfel D. 1993. Doi Moi in comparative perspective. In *Reinventing Vietnamese Socialism: Doi Moi in Comparative Perspective*, ed. W Turley, M Selden, pp. 165–207. Boulder, CO: Westview
- Wyman ML. 1990. The Bulgarian experience with centrally planned agriculture: lessons for Soviet reformers? In *Soviet Agriculture: Comparative Perspectives*, ed. KG Gray, pp. 220–42. Ames, IA: Iowa State Univ. Press
- Yang D. 1996. *Calamity and Reform in China: State, Rural Society, and Institutional Change Since the Great Leap Famine*. Stanford, CA: Stanford Univ. Press
- Zhang X. 2006. Fiscal decentralization and political centralization in China: implications for growth and inequality. *J. Comp. Econ.* 34:713–26
- Zhou KX. 1996. *How the Farmers Changed China: Power of the People*. Boulder, CO: Westview





# Contents

## Prefatory Article

An Amateur Among Professionals

*Robert M. Solow* ..... 1

## Policy Analysis and Design

Agriculture for Development: Toward a New Paradigm

*Derek Byerlee, Alain de Janvry, and Elisabeth Sadoulet* ..... 15

Governance Structures and Resource Policy Reform:

Insights from Agricultural Transition

*Johan F.M. Swinnen and Scott Rozelle* ..... 33

Distortions to Agricultural Versus Nonagricultural

Producer Incentives

*Kym Anderson* ..... 55

Public-Private Partnerships: Goods and the Structure of Contracts

*Gordon Rausser and Reid Stevens* ..... 75

Environmental Regulations and Economic Activity:

Influence on Market Structure

*Daniel L. Millimet, Santanu Roy, and Aditi Sengupta* ..... 99

The Development of New Catastrophe Risk Markets

*Howard C. Kunreuther and Erwann O. Michel-Kerjan* ..... 119

The Curse of Natural Resources

*Katharina Wick and Erwin Bulte* ..... 139

Experiments in Environment and Development

*Juan Camilo Cárdenas* ..... 157

Behavior, Environment, and Health in Developing Countries:

Evaluation and Valuation

*Subhrendu K. Pattanayak and Alexander Pfaff* ..... 183

## Resource Dynamics

### Irreversibility in Economics

*Charles Perrings and William Brock* . . . . . 219

### Whither Hotelling: Tests of the Theory of Exhaustible Resources

*Margaret E. Slade and Henry Thille* . . . . . 239

### Recent Developments in the Intertemporal Modeling of Uncertainty

*Christian P. Traeger* . . . . . 261

### Rent Taxation for Nonrenewable Resources

*Diderik Lund* . . . . . 287

### Land Use and Climate Change Interactions

*Robert Mendelsohn and Ariel Dinar* . . . . . 309

### Urban Growth and Climate Change

*Matthew E. Kahn* . . . . . 333

### Reduced-Form Versus Structural Modeling in Environmental and Resource Economics

*Christopher Timmins and Wolfram Schlenker* . . . . . 351

## Ecology and Space

### Integrated Ecological-Economic Models

*John Tschirhart* . . . . . 381

### Integrating Ecology and Economics in the Study of Ecosystem Services: Some Lessons Learned

*Stephen Polasky and Kathleen Segerson* . . . . . 409

### The Economics of Urban-Rural Space

*Elena G. Irwin, Kathleen P. Bell, Nancy E. Bockstael,  
David A. Newburn, Mark D. Partridge, and Junjie Wu* . . . . . 435

### Pricing Urban Congestion

*Ian W.H. Parry* . . . . . 461

### The Economics of Endangered Species

*Robert Innes and George Frisvold* . . . . . 485

### On the Economics of Water Allocation and Pricing

*Yacov Tsur* . . . . . 513

## Technology and Innovation

### The Economics of Agricultural R&D

*Julian M. Alston, Philip G. Pardey, Jennifer S. James, and  
Matthew A. Anderson* . . . . . 537

Supply and Demand of Electricity in the Developing World <i>Madhu Khanna and Narasimha D. Rao</i> . . . . .	567
Energy Efficiency Economics and Policy <i>Kenneth Gillingham, Richard G. Newell, and Karen Palmer</i> . . . . .	597
Recent Developments in Renewable Technologies: R&D Investment in Advanced Biofuels <i>Deepak Rajagopal, Steve Sexton, Gal Hochman, and David Zilberman</i> . . .	621
Fuel Versus Food <i>Ujjayant Chakravorty, Marie-Hélène Hubert, and Linda Nøstbakken</i> . . .	645
The Economics of Genetically Modified Crops <i>Matin Qaim</i> . . . . .	665

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#### TABLE OF CONTENTS:

- *What Is Statistics?* Stephen E. Fienberg
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- *The Role of Statistics in the Discovery of a Higgs Boson*, David A. van Dyk
- *Brain Imaging Analysis*, F. DuBois Bowman
- *Statistics and Climate*, Peter Guttorp
- *Climate Simulators and Climate Projections*, Jonathan Rougier, Michael Goldstein
- *Probabilistic Forecasting*, Tilmann Gneiting, Matthias Katzfuss
- *Bayesian Computational Tools*, Christian P. Robert
- *Bayesian Computation Via Markov Chain Monte Carlo*, Radu V. Craiu, Jeffrey S. Rosenthal
- *Build, Compute, Critique, Repeat: Data Analysis with Latent Variable Models*, David M. Blei
- *Structured Regularizers for High-Dimensional Problems: Statistical and Computational Issues*, Martin J. Wainwright
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- *Event History Analysis*, Niels Keiding
- *Statistical Evaluation of Forensic DNA Profile Evidence*, Christopher D. Steele, David J. Balding
- *Using League Table Rankings in Public Policy Formation: Statistical Issues*, Harvey Goldstein
- *Statistical Ecology*, Ruth King
- *Estimating the Number of Species in Microbial Diversity Studies*, John Bunge, Amy Willis, Fiona Walsh
- *Dynamic Treatment Regimes*, Bibhas Chakraborty, Susan A. Murphy
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