Why Forecasting Studies Underestimated the Decline in Output

At the start of the transition period, some Western forecasting studies used models to predict how economic reform could change various countries' agricultural production, consumption, and trade. Liefert et al. (1993) and Tyers (1994) did so for the NIS region, and Cochrane (1990) for Poland. Rather than forecasting major drops in output, the studies generally projected nontrivial increases in grain output, and much smaller declines in meat production than actually occurred (table 4).

In fairness to these studies, it should be noted they were not necessarily predicting what would *actually* happen to the commodity structure of agriculture in the transition economies 5-10 years after reform began. Rather, their intention was to forecast changes based on the general premise (fleshed out with specific assumptions) that fairly ambitious reform would be pursued. Most of the transition economies, and especially those in the NIS region, have adopted agricultural reform programs less ambitious than those that would be consistent with the forecasters' assumptions. Reform has been particularly slow in the area of farm- and enterprise-level restructuring, the key to productivity growth. As a result, agricultural productivity growth in the transition economies has not achieved the levels assumed by the forecasters in their models.

Nonetheless, examining why the studies underestimated the decline in agricultural production during transition can help identify what can be learned about the problems and challenges of agricultural reform that were not sufficiently understood or anticipated at the start of reform. There are three main reasons why the

studies underestimated the fall in agricultural output: (1) they underestimated the magnitude of total pre-reform support to agriculture; (2) they ignored or underrated the extent to which high transaction costs from deficient infrastructure would hurt agriculture; (3) and they assumed productivity in the agro-food economy would grow over the forecasting period by more than it in fact has.

Western estimates of agricultural subsidies in the pre-reform economies were based on the measure of support called producer support estimates (PSE).[13] The PSE for a good equals the difference between producers' "real," or incentive, price and the good's trade or border price (converted to domestic currency with a meaningful exchange rate). The producers' incentive price is the actual monetary price received for a good plus any per unit budget subsidies. The PSE is conventionally expressed as the gap between the producer incentive price and the trade price, divided by the producer incentive price. In figure 4, the pre-reform incentive price is P^5, while the world price is P^2. The PSE for the good equals $(P^5 - P^2)/P^5$.

PSEs measure the per unit transfer of income to producers from government policies that keep the producers' incentive price above the free trade price. PSEs capture two of the general types of subsidies for agriculture that existed in the pre-reform economies and were discussed before—budget subsidies and price

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[13] PSEs are the most commonly used measure of support to agriculture not only for transition economies, but for all countries regardless of systemic considerations. PSEs originally were called *producer subsidy equivalents*. In 1999, the Agricultural Directorate of the OECD, which annually calculates PSEs for all member countries (as well as for some nonmember countries, including transition economies), changed its use of the phrase to *producer support estimates*. This is now the more commonly used term, though some researchers continue to use the original phrase.

Table 4—Forecasts of changes in agricultural production

Country	Grain			Meat	
	Forecast	Actual		Forecast	Actual
			Percent change		
USSR (Liefert et al.)	-5	-39		-10	-57
USSR (Tyers)	14	-39		-8	-57
Russia	14	-39		-10	-52
Ukraine	18	-39		-8	-59
Poland	14	-1		17	-2

Note: The figures in the *Forecast* column give the predicted change in output 5-10 years after reform is implemented. The figures in the *Actual* column give the actual change in average annual output between 1986-90 and 1997-99.

Source: Liefert et al. (1993); Tyers (1994); Cochrane (1990); USDA for actual changes.

support policies that kept domestic producer prices above world trade prices.

In figure 4, eliminating the subsidies captured by the PSEs causes the producer incentive price to drop from P^5 to P^2. The fall in price reduces output from Q^5 to Q^2. (As mentioned earlier, to avoid cluttering figure 4, Q^2 is used to identify not only this new quantity, associated with point H, but also the quantity of production and consumption after economy-wide price liberalization but before trade liberalization, associated with point F.) The greater the pre-reform PSE, the greater will be the decline in output from liberalization.

Table 5 presents pre-reform PSE estimates for various transition economies.[14] The high values indicate that liberalization would initially cause agricultural production to fall, as the forecasting studies anticipated. An examination of the various elements of the PSE values using the sources identified shows that the greater share of the PSEs came from border support rather than budget transfers. This finding supports the point made earlier in the study that pre-reform agricultural producer prices in transition economies generally lay above world trade prices.

Another type of pre-reform subsidy to agriculture was indirect support through the domestic price system, whereby the prices farms had to pay for inputs were set low relative to output prices and to the real costs of

production. The PSE method for calculating support ignores this type of subsidy; thus, the PSEs computed for transition economies exclude this indirect support. With respect to figure 4, ignoring this subsidy means that output forecasts based on PSEs fail to account for the drop in production from Q^2 to Q^1. This output fall occurs because liberalization results in much larger rises in prices for agricultural inputs than for agricultural output, thereby worsening producers' terms of trade (fig. 5). The deterioration in the terms of trade is represented in figure 4 by the leftward shift in the supply curve from S^1 to S^2. Transition specialists in general failed to anticipate the extent to which price liberalization would worsen agricultural producers' terms of trade with their input suppliers. The magnitude of the deterioration in the terms of trade under reform reveals how strongly the forecasting studies underestimated liberalization's effect on output from neglecting this indirect type of subsidy.[15]

The second reason the studies underestimated the decline in agricultural output was that they underrated the extent to which high transaction costs from undeveloped market infrastructure would hurt transition agriculture. Wehrheim et al. (2000) argues that undeveloped institutions and infrastructure are the main problem facing the sector. The studies identified wholly ignored the issues of market infrastructure and associated transaction costs.

The third reason the studies underestimated the fall in output is that they assumed that productivity in the agro-food economy would grow more than it has once the transition began. Productivity growth would allow output to rise without a corresponding increase in inputs or even allow output to rise with total input use declining. Also, as the transition economies moved to freer trade, productivity growth, by reducing costs of

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[14] The main reason for the differences between the ERS and OECD PSE calculations is that the OECD uses exchange rates that give higher values for the currencies of the countries being studied relative to Western currencies. These exchange rates give high domestic producer prices relative to world prices when domestic prices are converted from domestic currency values to U.S. dollar values.

Table 5—PSE estimates for pre-reform agriculture

Country	ERS	OECD
	Percent	
USSR	25	NA
Russia	NA	81
Poland	32	43
Hungary	12	46
Romania	NA	49

NA means not available.

Note: The figures are weighted averages of PSEs for individual commodities, where the PSE for a commodity equals the gap between the producer incentive price and the trade price, divided by the producer incentive price. The calculations cover various years between 1986 and 1990, depending on the country.

Source: ERS (1994), OECD (annual for 1996, 1999, 2000).

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[15] Four reasons were identified earlier as to why market liberalization reduces output. The first three reasons followed from domestic price liberalization—the move to market equilibrium from liberalization within a single market, the drop in consumer income, and the rise in inputs' real prices—while the fourth reason was trade liberalization. The fall in output from removing support as measured by PSEs covers the effects from all of these events, except for the rise in inputs' real prices. This last effect is represented by the shift left in the supply curve, while the other three are represented by movement along the supply curve. Note also that once a country opens up to free trade, the drop in consumer income stops being a contributing cause of the decline in output. Once the world price determines the domestic price, it also determines the quantity of output produced. Although the leftward shift in the demand curve from falling income ceases to affect production, it does affect the levels of consumption and imports.

production, would make domestic output more competitive with products sold on the world market. In figure 4, productivity growth would shift the supply curve to the right, thereby increasing production.

The two productivity variables in the forecasting studies are crop yields and feeding efficiency in the livestock sector. Liefert et al. (1993) assumes that reform in the former USSR would increase crop yields 10-15 percent, and feeding efficiency in the livestock sector (output per unit of feed) 20-25 percent. Tyers' (1994) forecasts are based on the assumption that after the initial disruption of reform, agricultural productivity throughout the former USSR would revert to its trend rate of growth. Cochrane (1990) assumes productivity growth for Polish commodities of 10-30 percent (yields for crops and feeding efficiency for livestock products).

Contrary to the forecast assumptions that yields would rise, during the first 5 or so years of reform, they fell heavily in virtually all transition economies. In the second half of the 1990s, yields began to recover in the faster reforming CEECs, such as Hungary and Poland. In the NIS region, however, yields have not rebounded from the large drop. The change in feeding efficiency is less clear, as it varies by country and product, rising in some cases and falling in others. The data, however, do not support a conclusion of overall improvement.