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Authors

Rausser, Gordon C.
Small, Arthur A.

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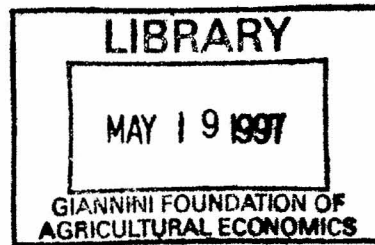
**DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS/
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**ALTERNATIVE TRADE AND
SUPPORT STRATEGIES FOR CAP INTEGRATION**

by

Gordon C. Rausser and Arthur A. Small



The authors are, respectively, Robert Gordon Sproul Distinguished Professor and Member, Giannini Foundation of Agricultural Economics, and Dean of the College of Natural Resources; and Graduate Researcher, Department of Agricultural and Resource Economics, University of California, Berkeley.

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Abstract

The prospect that the nations of Central and Eastern Europe may soon join the European Union (EU) raises a number of questions concerning the treatment of agriculture under the treaties of accession. In order to analyze the implications of alternative accession scenarios, we construct a simulation model of the agricultural economies in Eastern Europe and explore the consequences of various regimes of trade and support policies under different scenarios concerning the terms in the treaties of accession. The analysis focuses on the relationship between different negotiated accession contracts, pre-accession agricultural support policies, restructuring in the agricultural sector, and sectoral performance. The analysis suggests that the choice of transitional policies adopted during the pre-accession period are far more important in determining outcomes in the agricultural sector than are the terms of accession to the EU. The prevailing attention to convergence with EU norms may be misplaced, and perhaps even harmful.

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ALTERNATIVE TRADE AND SUPPORT STRATEGIES FOR CAP INTEGRATION

1. Introduction

1.1 The Importance of Agriculture in the Treaties of Accession

With varying degrees of enthusiasm, the governments of the central and eastern European Countries (CEECs) all aspire to join the European Union (EU). These aspirations were given strong encouragement at the EU's 1993 Copenhagen Summit, at which time associated CEECs were told they would eventually gain membership. Along the path to accession, however, lie difficult policy choices and delicate negotiations concerning the pace and terms of economic integration.

Of these, among the most challenging are those affecting the fate of agriculture in the emerging market economies. Accession to the EU has historically implied the integration of the new member into the community's Common Agricultural Policy (the CAP), a complicated system of interventions whose most prominent and expensive features are designed to support prices of program commodities through intervention purchases, and to shield markets from external competition through tariff barriers. As in previous accession negotiations, EU negotiators will be concerned about the impact of accession agreements on the EU treasury, while CEEC governments will be attentive to their implications for national budgets. Furthermore, many producer groups in the West will be nervous about granting market access to Eastern competitors; the political clout of these interests will constrain the negotiations. As with the accession of southern members Greece, Portugal, and Spain, the new members would be substantially poorer and less technically developed than those currently in the Union, raising the possibility of the need for substantial technical assistance.

In the case of the CEECs, other issues arise that have no clear precedent. First, there is the unusual size and importance of agriculture in these countries. Depending on the chosen measure, these nations would increase the size of the Union's agricultural economy by roughly one third.¹

In each nation, agriculture accounts for a larger share of employment and GDP than is typical in the current Union. Second, these countries share with their western neighbors a similar continental, temperate climate, and similar growing conditions. In the long run, after a period of restructuring, their agricultural sectors could display patterns of comparative advantage similar to those in the current EU member states, a prospect that makes concerns about competition even more pronounced than in past expansions (Anderson, 1990; Hamilton and Winters, 1992). Third, these countries are presently going through a profound process of economic transformation that hopes to shed the legacy of the socialist period in favor of a market-based system of production. Eastern governments will have to consider how an accession agreement will affect the ongoing process of market development and enterprise restructuring currently unfolding in these emerging economies. Finally, the requirements of the Uruguay Round of the GATT will be an important new factor regulating agricultural trade, imposing new constraints on allowable treaty terms.

The overall success of the accession accords may be determined primarily by factors outside agriculture. Nonetheless, the treatment of agriculture promises to play a central, and delicate, role in the accession negotiations.

1.2 Interactions Between Terms of Accession and Pre-Accession Goals

Nearly a decade after the region embraced market economics, their agricultural sectors continue to struggle with the transition from a socialist production system. While it is problematic to make generalizations across the entire region, we can identify a few of the key characteristics of today's CEEC agriculture that are likely to have first-order impacts on the prospects for long-term performance (OECD, 1994).

Farm enterprises in these countries can be broadly grouped, by size, into two types: large enterprises that are primarily the successors to state and collective farms organized during the socialist period; and smaller, usually privately-owned, operations. These latter farms, sometimes covering less than one hectare, have often been established by former members of the collective

farms who have taken their land out of collective enterprises in an attempt to “make it on their own.”

Both types of farms are typically undercapitalized, or have a mix of capital goods inappropriate to the kind of production in which they are engaged. In the face of woefully imperfect capital markets, farms are typically unable to undertake investments to improve their efficiency, even in cases in which such investment would be profitable (Karp and Stafanou, 1993; Swinnen and Roussinov, 1995), depending, of course, on the cost of debt. Short-term finance is typically only available at abnormally high rates of interest. Credit constraints are a particularly severe problem for the smaller farms, which tend to lack either demonstrable collateral or social clout. Persistent problems with land titling, and generally with the development of a market for land, impede the ability to offer land as collateral, further exacerbating problems in the market for long-term credit. Capital market imperfections are, therefore, one of the key barriers preventing an improvement in the technical efficiency of East European farms, which consistently lags that in the EU.

These problems are aggravated by the poorly developed state of public goods in rural areas, including transport and storage infrastructure and market information (OECD, 1994). In the socialist period, much of this rural infrastructure was provided from within the large enterprises. A system of infrastructure supporting independent farms has not yet emerged. These features—the split between large and small farms, the low level of technical development on most farms, imperfections in market for agricultural finance, poor provision of public goods, and a history of government-controlled prices—define the landscape of agriculture in Central and Eastern Europe. These are the initial concerns that government policymakers in the region have to consider as they chart their agricultural strategies over the coming years.

Official statements from CEEC policymakers have expressed multiple goals for agriculture during the transition. To the Czech Ministry of Agriculture, for example, an ideal scenario would include the transformation of agriculture along free-market lines; preparation for eventual integration to the EU’s CAP program, and maintenance of a “domestic equilibrium” that would

keep farm incomes and output from collapsing during an excessively violent transition (Czech Ministry of Agriculture, 1994a). A central motivation for the present paper is the observation, under-appreciated in policy circles, that these goals may be inconsistent, and that there are points of tension between the goal of creating agricultural economies that respond rationally to market signals, and the desire to bring agriculture into alignment with the heavily-regulated CAP programs of the EU. In particular, a single-minded focus on convergence to EU norms can inappropriately distract policymakers from steps that create incentives to improve productive efficiency. Policies that encourage the restructuring of agricultural enterprise during the interim period prior to joining CAP allow factors to flow toward efficient uses.

The terms of agriculture under the treaties of accession will have important implications for CEEC decision makers choosing pre-accession agricultural support policies. If CAP is maintained substantially unchanged from its current form (as modified by 1992 reforms), then producers in the new environment will enjoy higher prices, supported through commodity subsidy programs and trade barriers. If a version of CAP covered Central and Eastern Europe, the current owners of land would reap windfall profits, as these benefits became capitalized into land values.

CEEC governments have a number of instruments that they can deploy in order to encourage such transformation. They can adopt policies to encourage the reorganization of agricultural enterprises, to move from a system dominated by huge (and, in the eyes of many observers, hugely inefficient) state and cooperative agricultural enterprises into one more responsive to market signals, including a mix of large and small farms. CEEC governments can also control spending on relevant public goods such as public information and rural infrastructure. They can vary the degree of the economy's openness to foreign trade, through the erection of tariff and import quotas, export subsidies, and other trade management activities. Commodity price supports and other market manipulation schemes will also continue to offer their rent-seeking temptations.

Indeed, price supports and tariff barriers can have desirable effects, from the theory of the second-best: in the presence of a distortion in one input market—that for credit—a government-imposed distortion in the output market can have beneficial effects, by transferring resources to producers that are able to use it efficiently. At the same time, however, distortive policies can create price instability. In this context, free trade can substitute for price supports as a market-stabilizing mechanism, operating more effectively and at lower cost. Both distortive and laissez-faire approaches may, however, compare unfavorably with policies that address market imperfections directly.

Of course, use of any instruments has associated costs, both directly taxing the government treasury and indirectly imposing adjustment burdens on society. Thus, in bargaining over the treatment of agriculture in accession, and in selecting appropriate pre-accession policies, CEEC policymakers must therefore be prepared to juggle a complicated set of interactions and tradeoffs.

The nature of these tradeoffs can be clarified through a heuristic version of a comparative statics exercise. Suppose that a government knew with certainty the date and terms under which it would join the CAP, and was contemplating a restructuring program that would appropriately position the agricultural sector for successful entry. For a given date of entry, a relatively aggressive restructuring program would create multiple effects, including an increase in the efficiency and flexibility of the agricultural sector; an increase in producer profits and aggregate national wealth in the long term following CAP integration; a short-term decrease in output, as established patterns of production are disrupted; an ambiguous effect on output in the long term; and an increase in the short-term costs of adjustment, including social costs such as unemployment. The government's fundamental decision problem is how to balance these tradeoffs, i.e., how to deploy judiciously the policy instruments at its disposal in order to position the agricultural sector for a successful entry into CAP while keeping it robust during the interim period and, perhaps, subsequent to a major reform in the CAP.

To be sure, a number of questions concerning the interaction between the terms of accession to the EU and pre-accession policies naturally arise. Let us assume that the CAP will not be altered in the near term and, therefore, that the program's current form represents a credible policy commitment by the EU, both to its own farmers and to prospective member states of Eastern Europe.² How will alternative accession scenarios impact the budgets of the EU and the CEEC national governments, respectively? Under what forms of the accession contract, if any, should the CEECs use the pre-accession period to mimic the EU by adopting CAP-like policies? Do price supports encourage or inhibit efficiency-enhancing restructuring of farm enterprises? Should the restructuring process receive public subsidy? In other words, how should the burdens of the restructuring process be divided between the public and private sectors? Can open trading relationships substitute for direct government price supports in order to stabilize markets? More generally, how should CEEC governments allocate a limited budget amongst alternative forms of agricultural support, including commodity price supports, provision of public goods, and subsidies to restructuring?

1.3 Objectives and Organization of the Paper

The goal of this paper is to analyze the effect of alternative accession scenarios and policy choices on the performance of CEEC agriculture, with particular attention to the process of enterprise restructuring. We analyze the decision problem facing a CEEC policymaker contemplating integration of his country's agricultural sector into the EU, through use of a simulation model of production, trade, and enterprise restructuring in the agricultural economies of the CEECs. We focus particularly on how pre-accession agricultural trade and support policies affect social welfare, under alternative assumptions concerning the form of the "accession contract," i.e., the terms governing the country's entry into CAP.

We approach the questions highlighted above with a partial equilibrium analysis; we do not address the general equilibrium effects that link agriculture to other economic sectors, nor the

overall macroeconomic performance of these countries. A maintained assumption throughout is that no major reform in the CAP is presumed to be carried out prior to accession.

The paper is organized as follows: Section 2 presents the analytical framework. Section 3 describes the data used to calibrate the simulation model. In section 4, we present the results of several simulation experiments. Section 5 concludes with the key points learned through the exercise.

2. The Model

Simulation experiments were performed using a dynamic model of agricultural production, trade, and enterprise restructuring in a three-region partial equilibrium framework, subject to policy interventions and random shocks. The first region, called the CEEC, represents a generic Central and East European Country in which farmers hire land, labor, and a composite variable input to produce a homogenous output. The effective price of the variable input depends on the CEEC governments' expenditure on infrastructure and other public goods. Profits depend on the realization of random variables governing the domestic harvest and the prices prevailing in the other two regions, the EU and the Rest of the World (ROW). The commodities produced in the regions are perfect substitutes for one another. Trade flows are affected by tariff rates in the EU and the CEEC.

In between production periods, some farm enterprises in the CEEC make investments to restructure their operations, thereby improving production efficiency. There is also a migration of land between the large state and collective farms, and smaller private operations, in response to profit differentials between those types of enterprises. The CEEC government can affect the pace of enterprise restructuring through expenditures on targeted credit subsidies.

2.1 Technology and Costs in the CEEC

We let \bar{N} denote the total area of agricultural land in the CEEC, a constant (measured in hectares). Within a given production year, this area is allocated amongst four types of farms:

$$\sum_{i,j} N_{ij} = \bar{N} \quad (1)$$

where $i \in \{0,1\}$ indexes farm size (with 0 = small, 1 = large), $j \in \{0,1\}$ indexes farm efficiency with 0 = inefficient, 1 = efficient), and N_{ij} denotes the area under production in land of type i,j . We let $\bar{N} = (N_{00}, N_{01}, N_{10}, N_{11})$ denote the entire distribution, as a vector on the simplex defined by equation (1) and the restrictions $N_{ij} \geq 0$.

In addition to land N , agriculture employs labor L (measured in number of workers), and a composite variable input K , representing seeds, chemicals, machinery services, transport services, market information, and all other inputs to production. Equivalently, we can think of K as the credit necessary to buy these inputs (measured in local currency). Farmers combine these inputs to produce an undifferentiated output Y (measured in metric tons), according to a constant returns-to-scale Cobb-Douglas technology:

$$Y = \mu A L^\alpha K^\beta N^{1-\alpha-\beta} \quad (2)$$

where α and β denote the factor shares of L and K , respectively; A is a measure of the efficiency of production; and μ represents the stochastic effects of weather, distributed as a normal random variable with mean 1 and variance σ_μ^2 .

Without loss of generality there is presumed no rental market for land; all land is farmed by its owners. As each producer takes his land allocation as fixed, the technology can also be expressed as the per-hectare production function

$$y = \mu A l^\alpha k^\beta \quad (3)$$

where $y = Y/N$, $l = L/N$, and $k = K/N$. Each producer also takes as given the wage rate w and interest rate r that he must pay for inputs. For a given target level of production $\bar{y} = E_{\mu}[y]$, the associated cost function is

$$c(\bar{y}; w, r) = \nu A^{-1/\nu} (w/\alpha)^{\alpha/\nu} (r/\beta)^{\beta/\nu} \bar{y}^{1/\nu} \quad (4)$$

where $\nu = \alpha + \beta$.

We now turn to characterizing the distinction between the four types of farms, and the role of public goods in lowering production costs. We implement the distinction between efficient and inefficient farms by assuming that inefficient farms have a lower efficiency parameter A ; i.e., that $A_0 < A_1$, where A_j denotes the parameter value for farms of efficiency type j , $j = 0, 1$. Following Berry and Cline (1979), we distinguish small from large farms by presuming that small farms have access to labor (the farmer's own) at an effective wage lower than that prevailing in the labor market. At the same time, smaller farmers face a price for the variable input k effectively higher than that facing large farms. This assumption reflects the observation that larger farms provide internally some of the infrastructure and support services that small farms tend to receive from the public sector, as well as the observation that small farms tend to face tighter credit constraints. We implement these distinctions by assuming that $w_0 < w_1$ and $r_0 > r_1$, where w_i and r_i denote the factor prices facing farms of size i .

Spending on public goods decreases the effective price that producers pay for the variable input k . This effect is more pronounced for the small farms. The simplest way to operationalize these assumptions is to let spending on public goods decrease the price of the variable input by a fraction of the original price. Letting G_P denote the government's outlay on public goods, we have

$$r_i = r_i^0 \lambda_r^{-G_P} \quad (5)$$

where r_i denotes the price of the variable input for farms of size i , r_i^0 denotes this price when $G_P = 0$, and where $\lambda_r > 1$ parameterizes the efficiency of public goods in reducing private production costs.

To summarize: For each of the four organizational forms, $i, j = 0, 1$, there exists a cost function, $c_{ij}(\bar{y}; G_P)$, describing production costs per hectare in state i, j as a function of planned yield \bar{y} and the government's spending G_P on public goods, given by

$$c_{ij}(\bar{y}; G_P) = \gamma_{ij} \bar{y}^{1/v} \lambda_r^{-\beta G_P / v} \quad (6)$$

where γ_{ij} is a constant depending on the farm type.

2.2 Producer Behavior

Each producer chooses a target level \bar{y} of output in order to maximize expected returns to land, given his costs and an "incentive price" \bar{p} for output. We assume that farmers maintain adaptive expectations, basing their production decisions on a weighted average of output prices from previous years. Letting \bar{p}_t denote the incentive price in year t and p_t the actual price of output, as realized later in year t , then \bar{p}_{t+1} is computed using a Kalman filter:

$$\bar{p}_{t+1} = \bar{p}_t + \theta(p_t - \bar{p}_t) \quad (7)$$

where $\theta \in [0, 1]$ is a parameter governing the speed with which farmers adjust their behavior in response to price shocks. The farmer's production problem can then be expressed as

$$\max_{\bar{y}} E\mu[\mu\bar{p}\bar{y} - c_{ij}(\bar{y}; G_P)] = \bar{p}\bar{y} - c_{ij}(\bar{y}; G_P) \quad (8)$$

where the expectation is taken over the (known) distribution of the harvest shock μ . The first-order condition

$$\bar{p} = \frac{\partial c_{ij}(\bar{y}; G_p)}{\partial \bar{y}} \quad (9)$$

determines a per-hectare supply function $\bar{y}_{ij} = \bar{y}_{ij}(\bar{p}|G_p)$. The total output Y of the agricultural sector can then be expressed by the equation,

$$Y = \sum_{i,j} \mu \bar{y}_{ij} N_{ij} = \sum_{i,j} y_{ij} N_{ij}, \quad (10)$$

where $y_{ij} = \mu \bar{y}_{ij}$ denotes the yield realized by farms of type i, j .

2.3 Markets and Trade

Market prices and the level of imports or exports are determined by a standard one-commodity partial equilibrium trade model, subject to a price floor supported by a government intervention purchases. The important specifications concerning the market are that domestic consumer demand is fixed,³ that domestic and foreign products are perfect substitutes, that the world price is a random variable, and that the level of imports or exports adjusts to clear the market. Domestic consumer demand is represented by a constant-elasticity function

$$Q_c(p) = bp^\eta \quad (11)$$

where $Q_c(\cdot)$ denotes the quantity of output sold on the domestic market, $\eta < 0$ is the elasticity of demand and b is a constant. The national production level Y thus determines an autarkic price, $p(Y) = (Y/b)^{1/\eta}$. (Within any marketing year, total output Y is predetermined by farmers' prior production decisions, as given by equation (10).)

Prior to accession, the terms of trade available to CEEC farmers are determined solely by the prevailing world price and by domestic tariffs. Exporters can sell to external markets at the world price, p_W , which is drawn from a set of independent identically normally distributed random variables with mean \bar{p}_W and variance $\sigma_{p_W}^2$. Equilibrium values of domestic consumption Q_c , government intervention purchases Q_g , market price p , and imports M are then jointly determined by the world price, an *ad valorem* tariff rate τ , the government price floor \underline{p} , and the market-clearing condition

$$Q_c + Q_g = Y + M. \quad (12)$$

To simplify and without direct implications for the core of our analysis, surplus stocks Q_g are assumed to be disposed of without further effect on market price.

2.4 *The Restructuring Process*

The success of a set of accession policies will be driven largely by the interaction between those policies and the process by which landowners shift their holdings between large and small enterprises, and undertake costly investments to improve efficiency. To formalize this notion, we suppose that land is held in one of four “states” representing different organizational forms, and that landowners can switch their holdings between states at some cost. In considering whether to effect such a switch, landowners balance the potential benefits of higher returns in a different state against the costs of switching. In the absence of a well-developed market in long-term credit, however, farmers are not able to carry out all restructuring investments that would generate positive net benefits in expectation. We make the limiting assumption that markets provide no access to long-term credit; absent government aid, farmers are able to undertake restructuring only in those cases where the expected benefits will exceed restructuring costs in the year of the transition.

Our model of the restructuring process amounts to specifying, for each period, transition probabilities that land in any one state will switch into any of the other three.⁴ We model this probability as a function that is increasing in the difference in returns to holding land in the two states, decreasing in the cost of making the transition, and increasing in targeted government restructuring support, which may be viewed as a subsidy to long-term credit.

In order to make this discussion exact, we need first to specify notation for the benefits and costs associated with restructuring activities. Recall our notational convention that the subscript i indexes farm size (with $i = 0, 1$ indicating small and large farms, respectively), and that j indexes farm efficiency (with $j = 0, 1$ indicating inefficient and efficient farms, respectively).

Let

$$\pi_{ij,t} = p_t y_{ij,t} - c_{ij}(\bar{y}_{ij,t}; G_{P,t}) \quad (13)$$

denote the returns to a hectare of land in state i, j in period t .⁵ These profit levels determine, in any given period, a preference ordering on the four states. Let $\pi_{0,\Delta j} = \pi_{0,1} - \pi_{0,0}$ denote the difference between returns to land held in state $\{0, 1\}$ and state $\{0, 0\}$, i.e., the difference in rents that accrue, per hectare, to small efficient farms and small inefficient farms. This value is a key datum in determining the incentives of small-hold farmers to undertake costly investments to improve efficiency. Suppose that, for these farmers, efficiency can be improved (e.g., through adoption of superior technology or organization), at a one-time cost, $c_{0,\Delta j}$, known in advance. Then $\pi_{0,\Delta j} - c_{0,\Delta j}$ represents the net return on such an investment in the present period.⁶ Let $\pi_{1,\Delta j} = \pi_{1,1} - \pi_{1,0}$ and $c_{1,\Delta j}$ likewise denote the current-period per-hectare benefits and costs of undertaking efficiency-enhancing investments on a large farm. Analogously, we define $\pi_{\Delta i,j} = \pi_{1,j} - \pi_{0,j}$ and $c_{\Delta i,j}$ to be the benefits and costs of shifting land from a large farm to a small one, holding constant the efficiency type j . In general, we will let $\Delta\pi$ denote the net benefits of a switch and c the associated investment cost.

The restructuring process can now be articulated. We assume that farmers will never switch land into a state in which land is currently earning returns less than or equal to the one in which their land is currently held. When a positive difference in rents implies an incentive to switch states, the switching probability s is modeled as an increasing function of the net current-period benefits of switching $\Delta\pi - c$. This probability can be increased through the expenditure of government restructuring subsidies G_R targeted at long-term credit to farmers. For convenience, we assume that s has a modified form of logistic distribution:

$$s = \left(\frac{1 - e^{-(\Delta\pi - c + aG_R)}}{1 + e^{-(\Delta\pi - c + aG_R)}} \right) \chi_{(0, \infty)}[\Delta\pi - C] \quad (14)$$

where $\chi_{(0, \infty)}(\cdot)$ denotes the indicator function of the set characterized by the condition $\Delta\pi - c > 0$, and where the parameter a denotes the effectiveness of the subsidy.

Assuming that farmers make their decisions independently of one another, the law of large numbers applies, and $s(\cdot)$ gives the fraction of farmers in a given state who switch to the higher-value state. These transition probabilities make up the entries in a transition matrix S_t that determines the evolution of farm distribution according to the formula $\vec{N}_{t+1} = S_t \vec{N}_t$. Note, for future reference, that total producer surplus is reduced in the short run by the amount

$$C_R = c_{0,\Delta j} s_{0,\Delta j} N_{00} + c_{1,\Delta j} s_{1,\Delta j} N_{10} + c_{\Delta i,0} (s_{00,\Delta i} N_{00} + s_{10,\Delta i} N_{10}) + c_{\Delta i,1} (s_{01,\Delta i} N_{01} + s_{11,\Delta i} N_{11}) \quad (15)$$

that farmers spend, in aggregate, on restructuring investments.

2.5 CAP Policies and EU Production

By modeling world price as independent of CEEC and EU production, we treat both regions as small countries in a large world market. Thus, EU agricultural policies have no direct immediate effect on the CEEC's production and profit levels prior to accession.⁷ EU production \hat{Y} is presumed to be a normally distributed random variable with mean \hat{Y} and variance $\sigma_{\hat{Y}}^2$. Consumer demand in the EU is represented, as for the CEEC, by a fixed constant-elasticity function:

$$\hat{Q}(\hat{p}) = \hat{b}\hat{p}^{\hat{\eta}} \quad (16)$$

where \hat{Q} denotes EU consumption, \hat{p} the EU market price, and $\hat{\eta}$ the price-elasticity of demand in the EU market; and where \hat{b} is a parameter controlling the size of the EU market. For simplicity, we impose the restriction that the price-elasticity of demand is the same in the CEEC and in the EU, so that $\hat{\eta} = \eta$. The EU market is otherwise modeled analogously to that of the CEEC, with equilibrium EU consumption \hat{Q}_c , CAP intervention purchases \hat{Q}_g , market price \hat{p} , and imports/exports $\hat{\mu}$ determined jointly by the world price, p_w , an EU *ad valorem* tariff rate $\hat{\tau}$,⁸ and the CAP intervention price \hat{p} , within a standard one-commodity partial equilibrium framework, as described in section 2.3, above.

2.6 Accession

We take as given that the CEEC accedes to the EU in 2001. We consider three alternative accession scenarios.

Full Entry to CAP: In this scenario, when the CEEC enters into the CAP, it brings both its tariff rate and its support price into alignment with those prevailing in the EU. Markets are merged, so that a common autarkic price is determined as a function of combined consumer demand, $Q_c^*(p) = (b + \hat{b})p^\eta$, and combined supply $Y^* = Y + \hat{Y}$.⁹ If this price is less than the CAP intervention price, both governments undertake intervention purchases to bring the market

price up to the support price. (The division of the burden of financing these purchases is discussed in section 2.7, below.) The CEEC and the EU trade preferentially with one another at this uniform price; only in the (extremely rare) case when the import price $p_W (1 + \tau)$ exceeds the autarkic price does the CEEC import product from the ROW. Likewise, only when the export price p_W exceeds the CAP price floor \underline{p} do producers export product to the ROW.^{10, 11}

Two-tiered CAP: In this version of the accession agreement, the CEEC sets its tariff rate and support price at a positive level, but below that prevailing in the EU. The price differential between the two halves of the expanded union is maintained with an intra-union tariff that the EU imposes on imports from the CEEC.

No Entry to CAP: In this scenario, agriculture is left out of the treaties of accession between the CEEC and the EU. The CEEC gains no preferential access to EU markets. It keeps its tariff rate at the 20% pre-accession level, and supports no floor beneath the output price.

2.7 Measures of Welfare

The model generates as output several indicators of social welfare, including producer and consumer surplus, and government revenues net of expenditures. Producer surplus is simply the aggregate returns to land ownership, less restructuring costs:¹²

$$PS = \sum_{i,j} \pi_{ij} N_{ij} - C_R. \quad (17)$$

Since our subsequent analysis will depend only on *changes* in consumer surplus, rather than on its actual value, we can operate with the truncated form

$$CS = \int_p^{p_{max}} b \xi^\eta d\xi = \frac{b}{\eta + 1} [p_{max}^{\eta+1} - p^{\eta+1}] \quad (18)$$

where p_{max} is taken to be a large but otherwise arbitrary constant. The rate of public spending on the agricultural sector, net of tariff revenues (when imports are positive) is given by

$$G = G_P + G_R - \tau M \chi_{(0,\infty)}(M) \quad (19)$$

where $\chi_{(0,\infty)}(\cdot)$ is the indicator function of the positive real numbers. Recall here that G_P denotes the level of government spending on infrastructure and other public goods; G_R the level of government credit subsidy in support of enterprise restructuring; M the quantity of imports (defined by equations (8), (12), and (14), respectively); and τ the tariff rate.

Adding the two measures of surplus, and subtracting off government spending, we get a one-period measure, SW , of total social welfare specific to the agricultural sector:

$$SW = PS + CS - G. \quad (20)$$

3. Data, Calibration, and Implementation

Simulation experiments were performed on the model calibrated to data and estimated parameters for the Czech Republic drawn from a variety of sources. The Czech Republic was selected as the subject of the simulation experiments due to the availability of a variety of data sources for the Czech agricultural sector, encompassing both basic statistical compendia and summary analyses. Wage rates in agricultural enterprises are drawn from official statistical sources (Czech Ministry of Agriculture, 1994b). Data on agricultural labor force participation and capital usage are based on Ratinger and Fischer (1993). Ratinger (1994) provides information about the size distribution of farms, national output, tariff rates, national food consumption, farm profits, and other national aggregates. Elasticities of production were based on estimates by Ratinger and Fischer (1993), normalized to correspond to evidence that farming exhibits constant returns to scale. Information about levels of public investment were drawn from publications of the Organization for Economic Cooperation and Development (OECD, 1994). CAP policy parameters, including threshold and intervention prices for cereals, are drawn from Weyerbrock (1994).

The model is designed to answer general, “big picture” questions about the effect of government policies on developments in the agricultural sector rather than detailed questions about the varying effects on different crops, growing regions, and so forth. It therefore treats all production as aggregated into one measure of output. We use the cereal grains as a proxy for all crops when carrying out calculations on production levels and prices. When converting between national aggregate measures (e.g., agricultural labor force participation or capital usage) and measures specific to the cereals sector, we apply a conversion factor reflecting the fraction of cereals in the total value of Czech production (approximately one-third).

In the absence of comprehensive farm-level data on production efficiency, several model parameters had to be calibrated to the available data. Total factor productivity parameters were derived from the production function [equation (3)] using the data on total output and factor intensities described above. The parameters b and \hat{b} governing the size of the CEEC and EU grain markets (equations (11) and (16), respectively) were likewise calibrated from available price and quantity figures using an own-price elasticity of demand for food of -0.3. The costs of enterprise restructuring, and the effectiveness of nondistortive government support for agriculture in lowering production and restructuring costs, are exploratory estimates.^{13, 14}

4. Simulation Experiments

The constructed model was used to explore a set of questions concerning the effect of various government policies on outcomes in the CEECs’ agricultural sectors. These experiments consider policy issues of short-, medium-, and long-term importance: price and output stability, farm enterprise restructuring, and convergence with EU norms. The experiments focus on the interaction between policies that CEEC governments adopt in the current transitional period, and the policies that will apply during the first few years of the CAP.

Four sets of pre-accession policies are considered: a laissez-faire approach, a gradual convergence of policy to EU norms, an immediate implementation of “CAP-like” policies, and an activist approach focusing on targeting government intervention to nondistortive interventions. For each of these policy paths, the effect on prices and output (both their levels and stability); on farm enterprise restructuring; and on the welfare of producer, consumers, and society overall, is investigated.

We then examine the effect of accession to the EU in 2001, under alternative assumptions about the form of the accession contract. Taking as given the state of the economy after the implementation of a consistent transitional policy, the effects associated with full admission to an unreformed CAP; with a two-tier CAP system; and with a no-entry scenario are examined.

4.1 Laissez-faire pre-accession policies

In this set of experiments, the CEEC government follows the advice of “Big Bang” advocates, addressing the agricultural sector with a “hands-off” approach during the 1993-2000 period. No expenditures on credit subsidies, public goods, or intervention purchases are incurred. The sole protection granted the market is a modest 20% tariff on imports.

The result is stagnation. Inefficient producers, lacking any access to long-term credit, and able to borrow for the short term only at usurious rates of interest, are unable to generate the surpluses necessary to undertake efficiency-enhancing investments. The restructuring process barely moves forward; the only notable changes in farm organization come as already-healthy small farms merge into larger units in search of economies of scale (Figure 1a). As land is under the control of inefficient production units, output remains low, and prices are governed by the need to purchase expensive imports and to make up for domestic shortfalls (Figure 1b).

Since the CEEC is presumed to accede to the European Union in 2001, the fate of the agricultural sector in the period after 2001 is affected by the treatment of agriculture under the treaties of accession. Here three possibilities are explored.

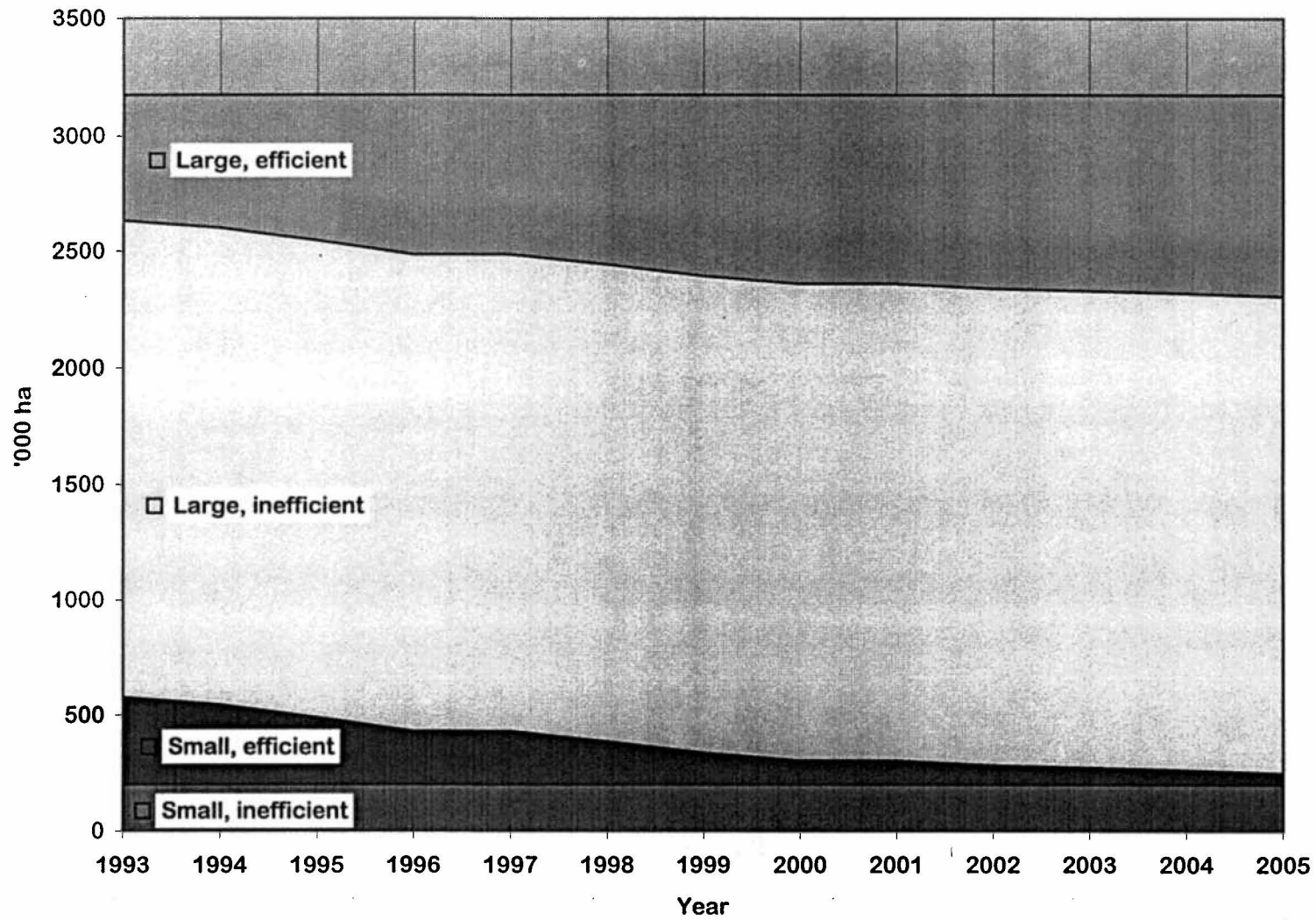


Figure 1a. Farm distribution in the CEEC, under laissez-faire pre-accession policies, followed by full entry to CAP.

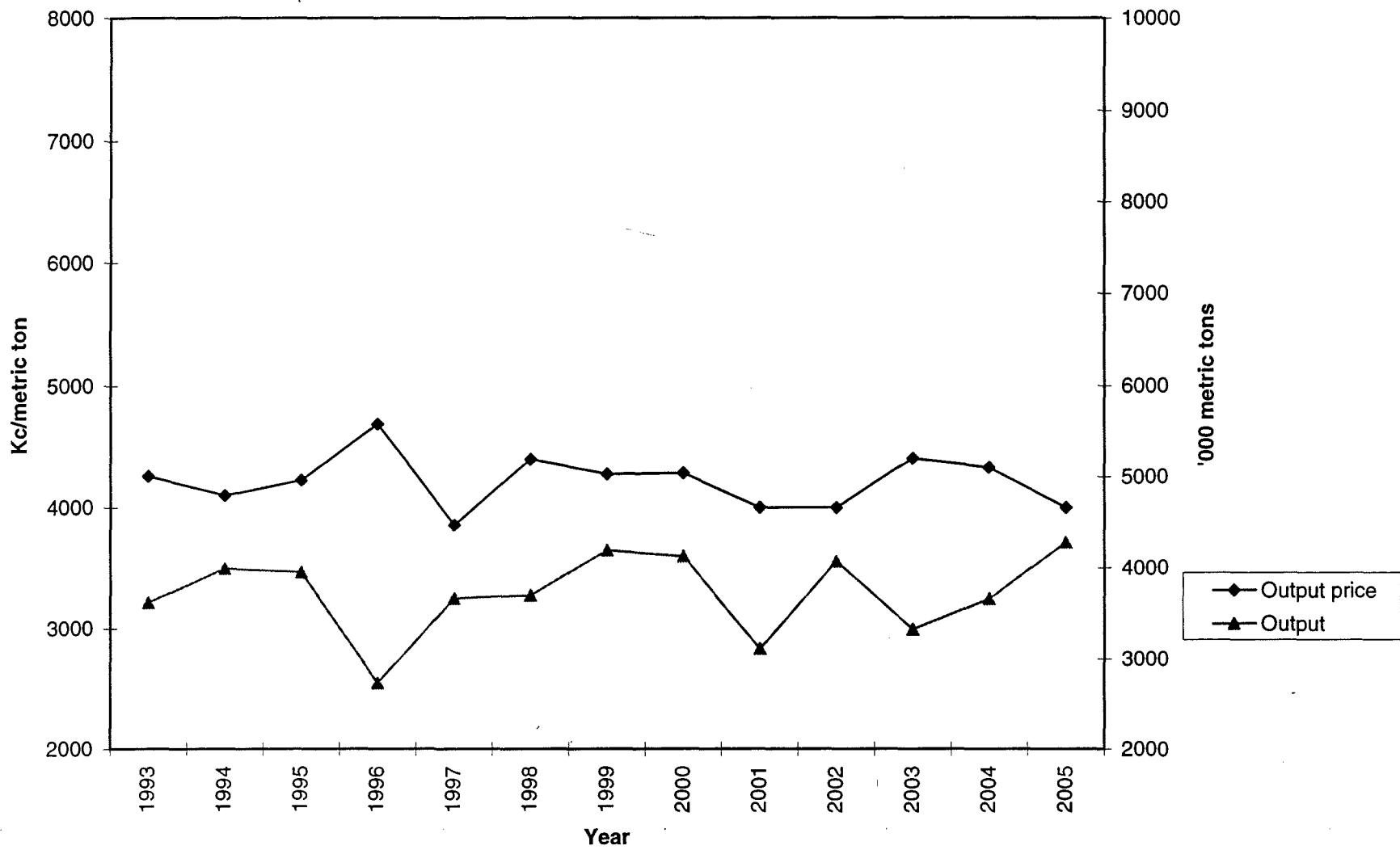


Figure 1b. Output and domestic prices in the CEEC, under laissez-faire pre-accession policies, followed by full entry to CAP.

Full entry to CAP: Under this scenario the CEEC government adopts a set of policies to bring its agricultural sector into alignment with the CAP, adopting high tariffs on imports from outside the community, and a support price equal to that prevailing in the West. The CEEC government therefore targets its support for agriculture toward maintaining this price floor, rather than toward providing public goods or support for the restructuring process. Since laissez-faire pre-accession policies failed to generate a thriving farming sector, production after accession does not meet domestic demand. Access to western markets therefore creates little benefit for producers. CAP entry also involves the loss of tariff revenue for the government, fails to restart the stalled restructuring process, and creates little improvement in agricultural social welfare (Figure 1c). In sum, this scenario demonstrates how the full potential benefits of accession can fail to be realized if farmers are unable to prepare for accession by undertaking efficiency-enhancing investments.

Two-tiered CAP: The small government expenditure on targeted supports shows up as a modest increase in output, a slight movement in restructuring, and consequent increases in producer surplus that make the change welfare-improving overall.

No entry to CAP: Outcomes are little changed from those above. Thus, entry to CAP with an unreformed production sector creates almost no impact on prices, levels of output, or overall welfare (Figure 1d).

The overall message of these experiments is that a “hands-off” free market approach to the pre-accession period, as proposed by advocates of “Big Bang” policies, fails to create conditions for restructuring, virtually precluding the realization of gains from eventual accession. Entry to CAP without appropriate pre-accession policies creates little improvement in economic outcomes.

4.2 Gradual Convergence to CAP

In this set of experiments, CEEC governments anticipate accession to the EU by instituting pre-accession policies that converge gradually with those that will prevail after accession. Thus,

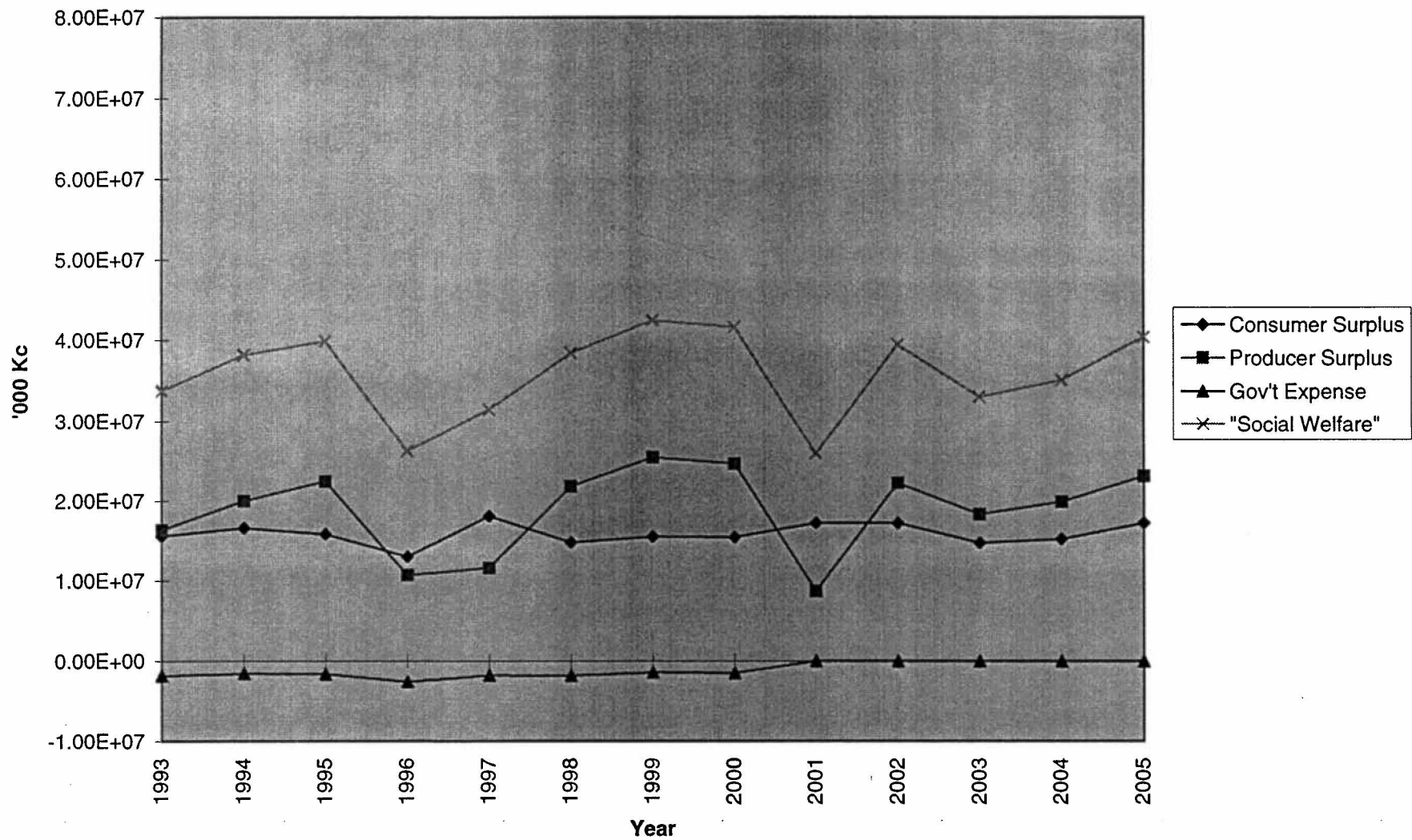


Figure 1c. Welfare Measures, under laissez-faire pre-accession policies, followed by full entry to CAP.

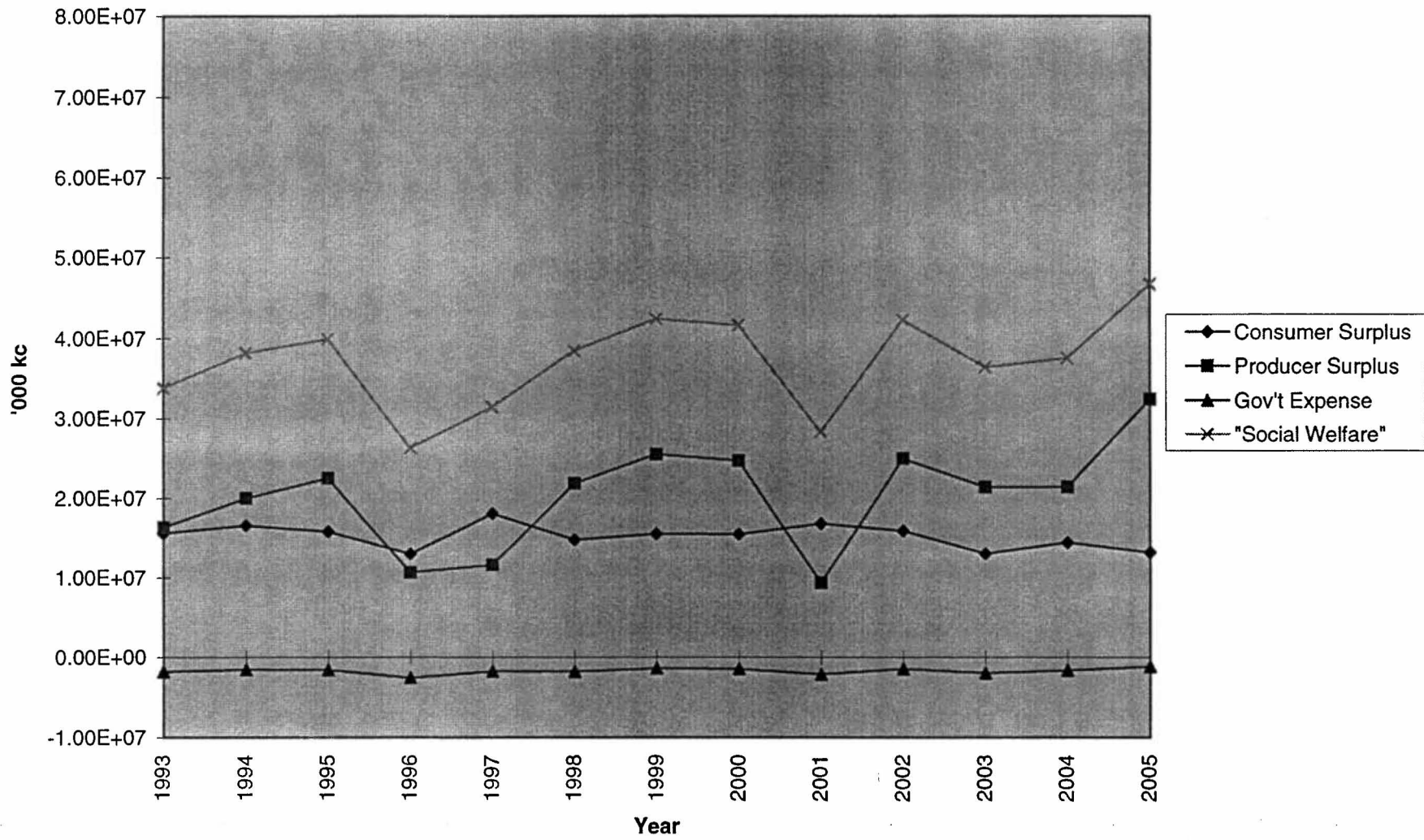


Figure 1d. Measures of agricultural surplus, under laissez-faire pre-accession policies, no entry to CAP.

price supports and tariff rates are slowly increased over the period, 1993-2000. In addition, the government expends funds on public goods and restructuring subsidies at modest levels during this transition period. We explore two possibilities, one in which the final accession contract to which the economy converges involves full entry into the CAP, and a second in which the accession contract is a two-tiered version of the CAP, as described above. We also include a modest budget for public goods and restructuring subsidies.

As the price floor and tariff protection start to bind in 1997-98, output surges, generating producer surpluses large enough to finance restructuring investments. Taking advantage of the restructuring subsidies, farmers move essentially all land held in "inefficient" states into efficient states, so that by 1998 the inefficiency associated with the legacy of socialism has been squeezed out of the system (Figure 2). As production continues to climb, government spending increases, creating a drag on total social welfare.

The EU entry has little effect on these patterns, and there is very little difference in outcomes between the two-tier and full-entry scenarios. Full entry into CAP does involve slightly higher government expenditure on price supports and slightly lower total welfare as a result, but these differences are quite small.

Comparing the gradual convergence policy and the laissez-faire approach, the effect most immediately apparent is the difference in the degree of farm restructuring. Consumer surplus after 2001 is independent of the choice of pre-accession policies, since in both instances the prevailing prices are set by a binding government-imposed floor. However, the combination of modest price supports and non-distortive interventions creates the conditions for farmers to improve production efficiency and generate large gains in producer surplus, thus increasing total welfare, even with the modest increase in expenditures needed to maintain the price supports. Pre-accession policies, rather than trading opportunities, are the most important determinants of this improvement.

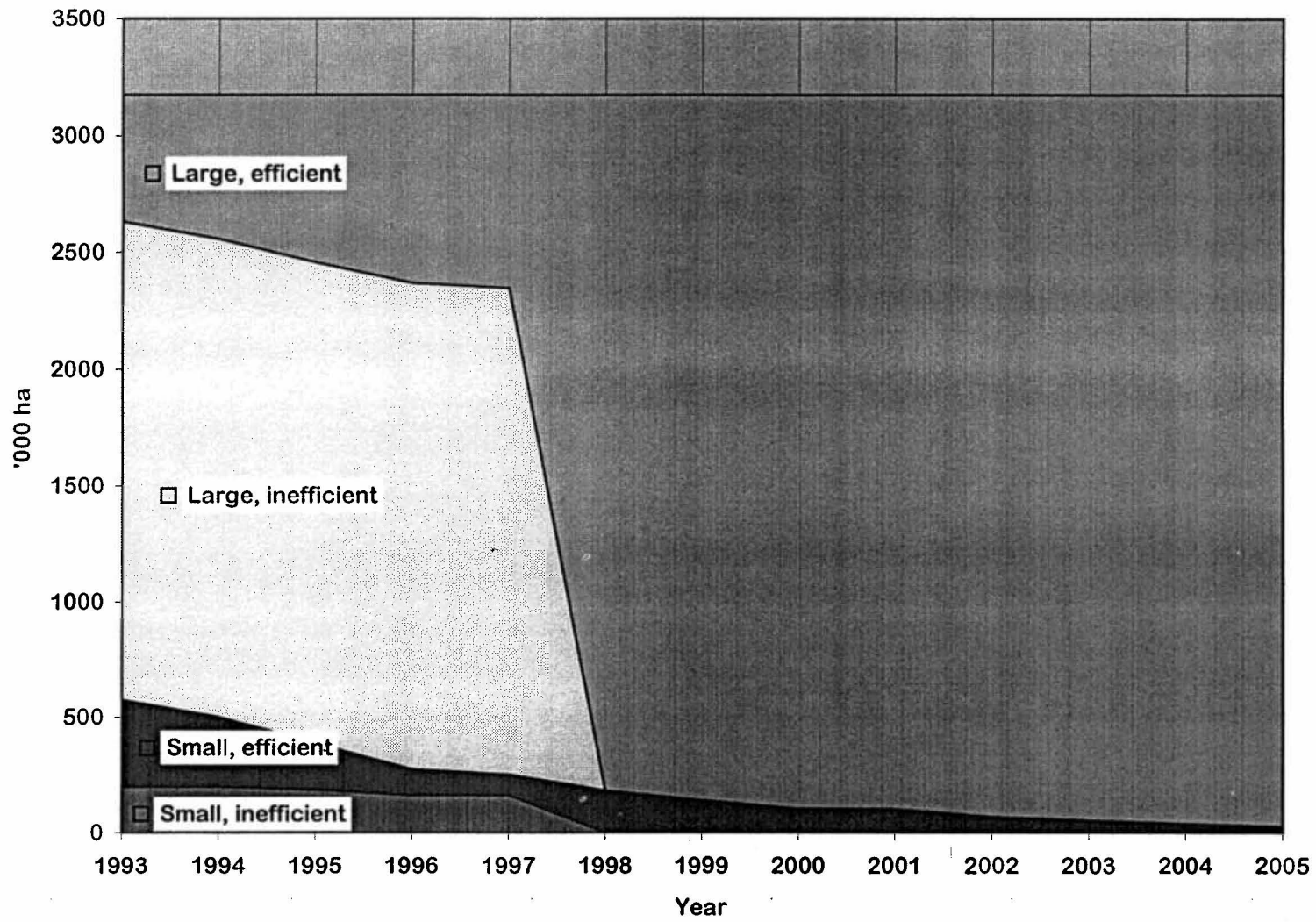


Figure 2. Farm distribution in the CEEC, assuming gradual convergence to CAP.

4.3 Immediate Implementation of "CAP-like" Policies

In this set of simulation experiments, we consider pre-accession policies that seek to bring agricultural supports into immediate alignment with those that will prevail after the accession period. Price floors and tariff rates are raised to CAP levels starting in 1993, and the CEEC government makes no expenditures on non-distortive supports. We again explore two possible forms of the accession contract, one involving full entry into the CAP in 2001, and a second in which a two-tier system is implemented.

Comparing these results with those for the laissez-faire baseline, the immediate difference is that restructuring happens rapidly (Figure 3a). The price supports and market protections act as a form of credit subsidy, allowing for rapid reorganization of inefficient agricultural enterprises into efficient holdings. As a result, output jumps (as shown in Figure 3b). As prices are supported, these increases lead to gains in producer surplus which are overshadowed by sharper increases in government spending. Overall, however, outcomes are superior to those associated with laissez-faire policies, for the same reasons as state above: The key is to find a mechanism to finance restructuring. Side-by-side comparisons of the full CAP scenarios, one preceded by laissez-faire, the second by immediate implementation, show large improvements in social welfare associated with CAP-like pre-accession policies (Figure 3c).

Comparing the full CAP with the two-tier CAP shows modest differences. As might be expected, higher price supports place more cash into the hands of farmers more rapidly, and therefore induces faster enterprise restructuring, and hence generally higher levels of output and, of course, higher prices. Spending on public goods, in the two-tier version of CAP, shows up in higher levels of output in the long-run. Overall social welfare is slightly higher under the two-tier regime than under the full CAP system.

4.4 Targeted Support Strategies

In this section, we consider a set of scenarios in which pre-accession policies target support at nondistorting interventions in the market. Government resources are targeted to the provision of

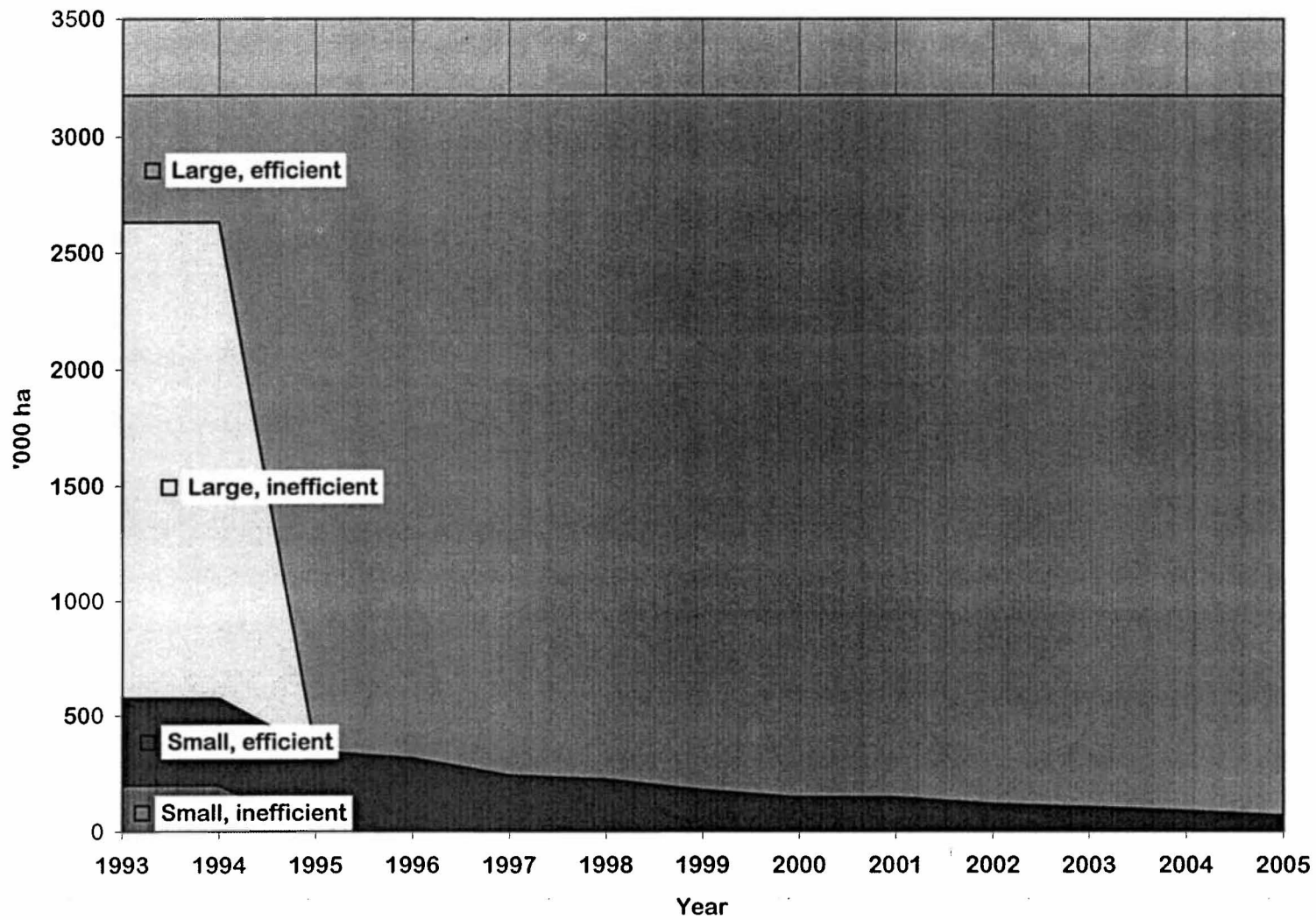


Figure 3a. Farm distribution in the CEEC, under immediate implementation of "CAP-like" policies.

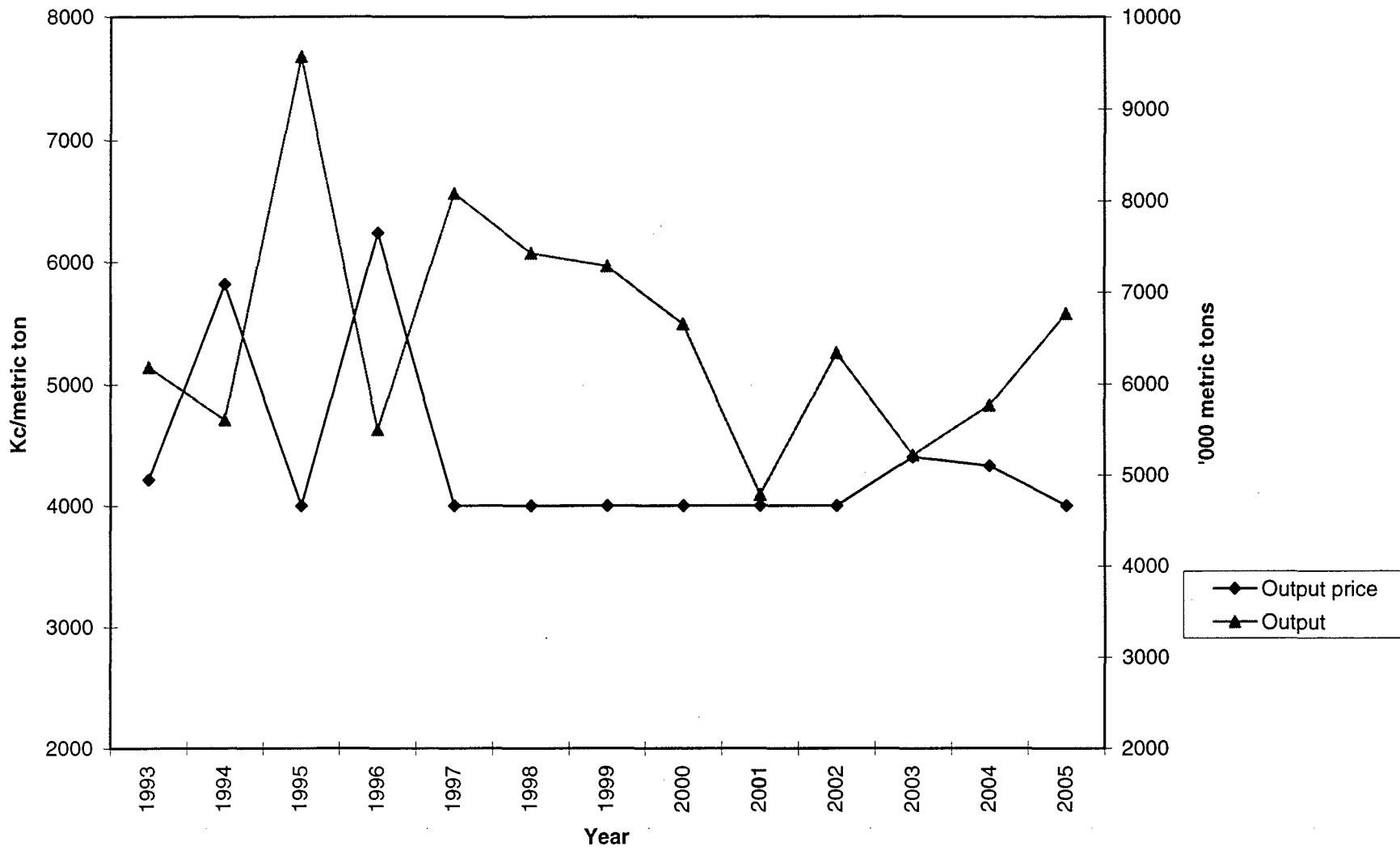


Figure 3b. Output and domestic prices in the CEEC, under immediate implementation of "CAP-like" policies.

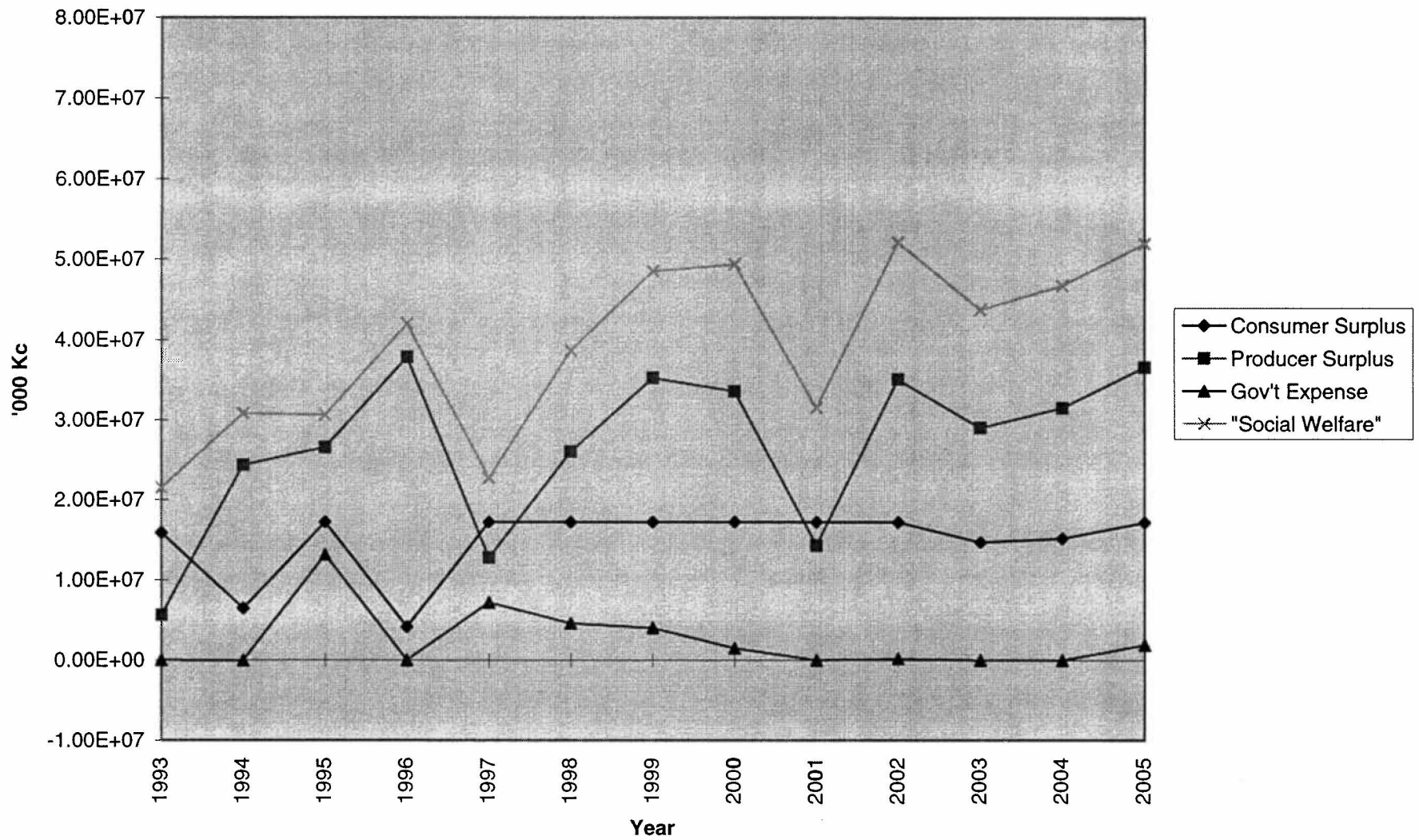


Figure 3c. Measures of agricultural surplus, under immediate implementation of "CAP-like" policies.

public infrastructure that reduces production costs, and to subsidies for long-term credit.¹⁵ We again consider three policy regimes that might apply to agriculture after accession to the EU: full entry to CAP, entry to a two-tiered version of CAP, and no entry.

In the pre-accession period, restructuring takes place somewhat more slowly than in the other scenarios we have considered. However, the availability of long-term credit eventually drives all land into the control of efficient producers. In fact, the takeover of the large, efficient farms is, by the year 2000, almost absolute (Figure 4a). The increased efficiency of production allows for a sharp rise in output, turning the country from an importer to an exporter. Prices nonetheless remain low and stable, dictated more by competition with world markets than by government supports. Low and stable market prices generate large consumer surpluses. Producer surplus increases during the simulation period, reflecting the benefits to farmers of reduced production costs. Agricultural social welfare reaches its highest level amongst all scenarios (Figure 4b).

With respect to alternative accession arrangements, as we move from full CAP to two-tier CAP to no CAP, we are simultaneously decreasing price supports and tariffs while we increase moneys targeted to public goods. This movement corresponds to increase in output decreases in commodity prices, and a dramatic increase in agricultural social welfare. Thus, in this model, entry to CAP can be counter-productive if it requires a diversion of funds away from the maintenance of infrastructure and credit support.

5. Summary and Conclusions

In this paper, a model of the agricultural sector for a generic Central and East European nation is developed that attempts to represent the key characteristics of these transition economies. We then used this model as the foundation for simulation experiments which compare the effects of alternative scenarios regarding agricultural trade and support policies, both before and after accession to the European Union. The purpose of these experiments was to analyze the

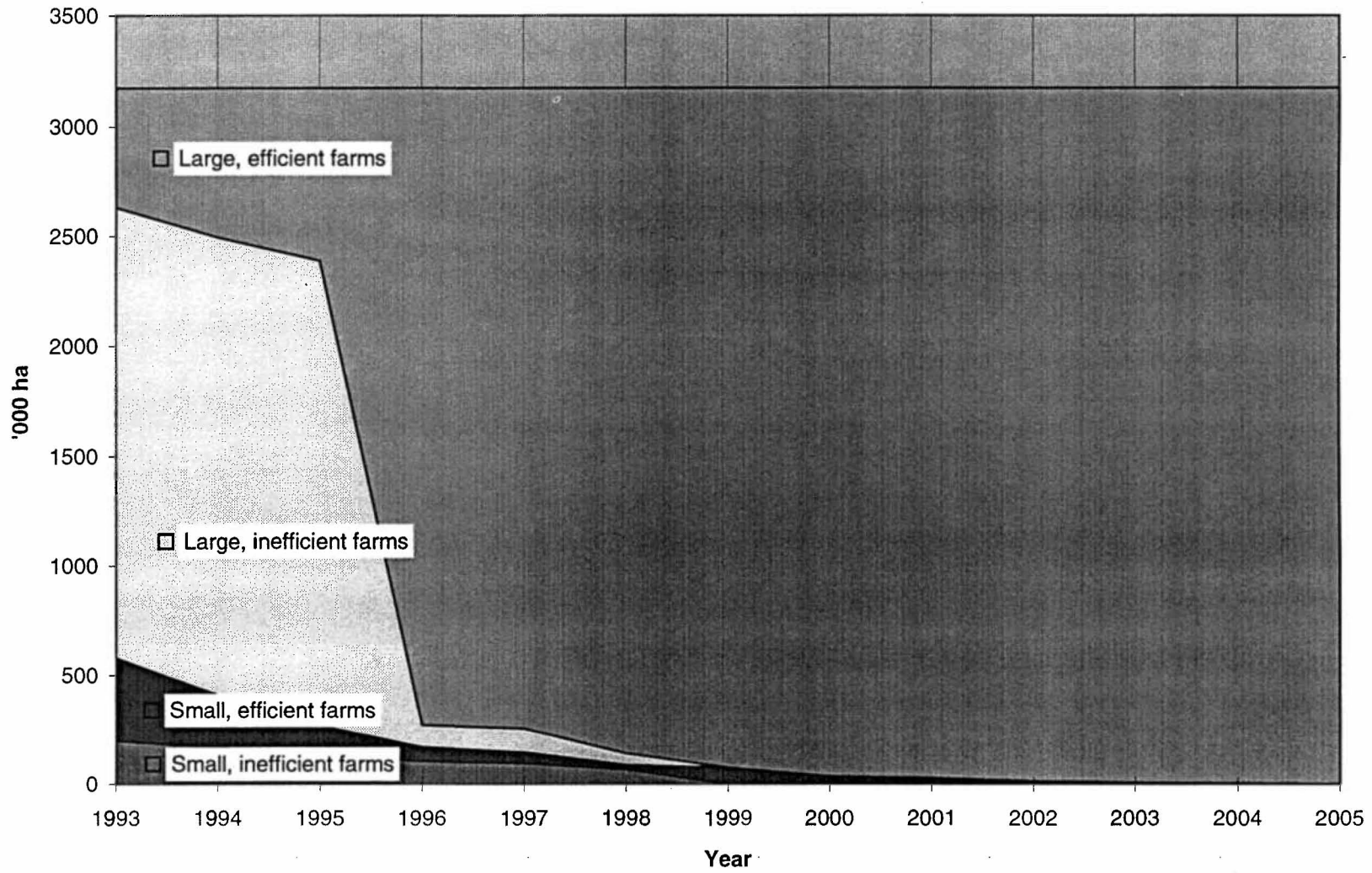


Figure 4a. Farm distribution in the CEEC, following a targeted support strategy.

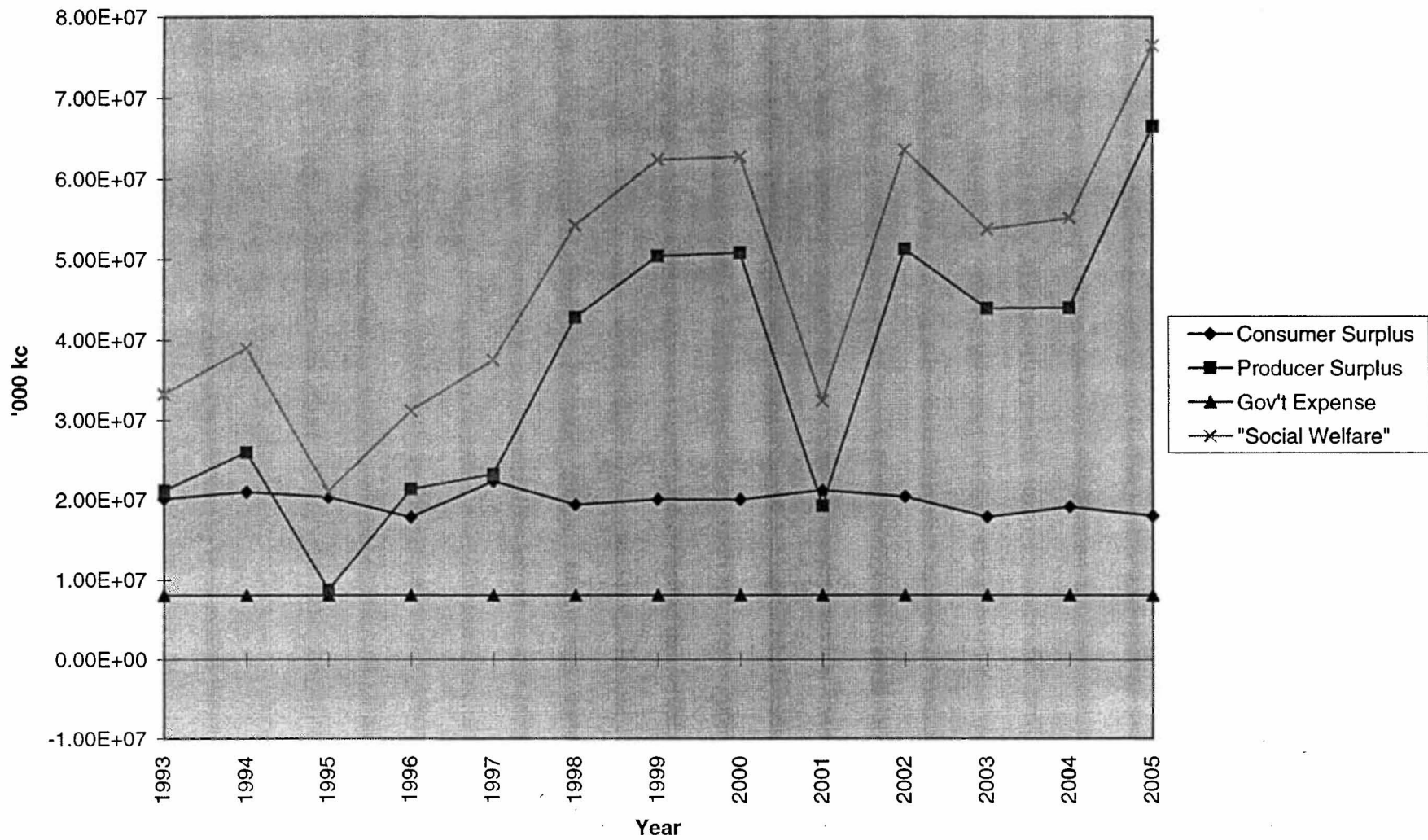


Figure 4b. Measures of agricultural surplus, following a targeted support strategy.

interactions between the accession “contract,” transition policies, sectoral performance, and the pace of enterprise restructuring.

A robust conclusion of the model is that the long-term health of the agricultural sector in these nations is likely to depend more on the choice of transition policies than on the terms of accession to the EU. The defining feature of successful transition programs is that they provide some form of subsidy to long-term investment, some mechanism by which landowners can overcome credit constraints and enhance the productivity of their enterprises.

Mechanisms involving price supports and tariff barriers do have this desired effect. This result follows from the theory of the second-best, due to the presence of the distorted credit market. At the same time, however, and somewhat counter-intuitively, these distortive policies create price instability. Free trade can substitute for price support as a market-stabilizing mechanism, operating more effectively and at lower cost. Both distortive and laissez-faire approaches are dominated by policies that address the credit constraining (market imperfection) directly by subsidizing credit. Such targeted approaches provide superior outcomes at lower cost. Our results also have a methodological implication, *viz.*, that static analyses, or analyses that assume near-equilibrium market behavior, can fail to pick up or properly to address the importance of the transition dynamics associated with enterprise restructuring.

A robust conclusion of the model is that land will tend to shift toward large, efficient holdings. This outcome reflects the lower effective interest rates available to these units. Thus, not only the availability of long-term credit, but the price of short-term credit, are central determinants of the model dynamics. The shift in land towards large farms also reflect to some degree the model’s inability to capture the advantage of smaller units in production of commodities such as vegetables.

On the policy front, our analysis suggests that a focus on achieving “convergence” with EU norms may constitute an unwise distraction from the real business at hand: to create the conditions for enterprise restructuring that will improve the productivity of land and other factors. The central problem with such thinking is that it confuses the behavior of developed

nations with behavior that will *make* a nation develop. It is no more intelligent for the CEECs to undertake the burdens of lavish agricultural price supports than it is for the poor to spend their scarce resources on champagne and caviar in the hope of thereby becoming rich. A desire for *structural* alignment with the EU in no way implies the advisability of *policy* alignment during the transition period.

At the same time, we find a basis for rejecting the laissez-faire approaches advocated by “Big Bang” theorists. Indeed, in a situation in which market institutions are badly underdeveloped, price support can provide a mechanism—albeit a very inefficient one—to counter the deleterious effects of these imperfections. (It may indeed make sense for the poor to spend their last pennies on caviar, if the alternative is hunger.)

Governments can play their most constructive role, however, by fostering the creation of functional market institutions that allow for productivity increases. Identifying the factors that impede such improvements, and designing the mechanisms to correct them, should be the goal for future research on agricultural policy in transition economies. The first task is to take a careful, elaborated look at enterprise restructuring, and of the factors that determine farmers’ investment behavior.¹⁶

Endnotes

¹ Taken together, the arable land of the six largest CEECs (excluding former Soviet and Yugoslav republics) comprises 37.6% of that in the EU-12 (i.e., excluding Austria, Finland, and Sweden). Total cereals production in the CEEC-6 measured 37.2% of the EU-12 total in 1993 (Tangermann and Josling, 1994).

² This is the official position of the EU Commission (Vonthron, 1995). The claim is that the EU's agricultural sector needs time to settle down following a period of turmoil that included the MacSherry reforms, entry into force of the GATT Uruguay Round commitments and the expansion of the EU from 12 to 15 members on January 1, 1995, and that the EU has little political will for more upheaval at present.

³ And, therefore, that production creates no income effects.

⁴ We thank Larry Karp for suggesting that the restructuring process could be modeled with such a probability transition matrix.

⁵ We will drop the time subscript when this would not lead to confusion.

⁶ Here we assume that farmers have the value of the random variable $\pi_{0,\Delta j}$ revealed to them before they make the investment decision, but that the switch does not become effective until the following growing season.

⁷ If we instead treated either or both countries as large players in the world market, the only effect would be to complicate the calculation of the world price. By instead treating the world price as a random variable, we simplify our analysis without substantive impact on our results.

⁸ Traditionally, the CAP has protected EU markets from external competition through maintenance of a "threshold price" that fixes the price at which imports enter the EU. Variable tariffs are levied to maintain the spread between the (fixed) threshold price and (variable) world prices. We assume, however, that by the time of accession the EU will have fully implemented its commitment under the GATT Uruguay Round agreement to convert all trade barriers into fixed-rate tariffs (U.S. Trade Representative, 1993; ERS: Plunkett et al, 1993).

⁹ In practice, EU demand and supply are larger than those in the CEEC and have a greater impact on the autarkic price in the combined market.

¹⁰ We here assume implicitly that the EU's commitments under the GATT Uruguay Round will curtail its use of export subsidies as a means to dispose of surplus commodities. The commitments require that all export subsidies be reduced by 36% in value, and 21% in quantity, from those of the 1986-1989 base period. Export subsidies may not be extended to products not subsidized during the base period (U.S. Trade Representative, 1993; Plunkett and Maxwell, 1994).

¹¹ The model of CAP integration used here is a simplified form of the one specified in Weyerbrock (1994).

¹² Recall our assumption that agricultural land is supplied inelastically. Having no alternative use, its employment in agriculture carries no opportunity cost.

¹³ The model's treatment of the way government spending affects farmers' costs [as summarized in equations (5) and (14)] is, of necessity, highly stylized. The parameters describing the effectiveness of this spending must, therefore, be viewed as reduced forms summarizing a large amount of information about the interaction between public sector spending and private investment. The appropriate choice for such abstract values cannot be measured directly nor resolved through *a priori* theorizing. The claim is, rather, that there exist ranges of parameter values under which the model exhibits the qualitative behavior described. (Section 5 incorporates a discussion of the factors that would need to be addressed in a model focusing more narrowly on private sector investment behavior.)

¹⁴ More details about data sources and calibration are included as online documentation with the simulation model, a copy of which is available from the authors upon request.

¹⁵ Our model presents credit subsidies as idealized instruments for targeting support to those enterprises that will actually undertake such investments. In practice, credit-subsidy schemes can be as vulnerable to corruption and inefficiency as many other forms of government intervention.

Future research should examine ways to design mechanisms by which farmers reveal their true economic condition and willingness to undertake efficiency-enhancing investments.

¹⁶Our model addresses one theory of why CEEC farmers do not immediately undertake all investments that are profitable in expectation—namely, that they are credit-constrained. Alternative explanations are possible: risk aversion, high transaction costs, option value effects associated with investment under uncertainty (Dixit and Pindyck, 1994; Dixit and Rob, 1994), or psychological effects due to behavioral inertia (or “status quo bias”). A fruitful direction for research would focus on identifying how these five determinants of investment behavior interact to determine the willingness of farmers to affect restructuring programs.

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