The United Nations University

WIDER

World Institute for Development Economics Research

Working Papers No. 114

July 1993

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THE J-CURVE IS A GAMMA-CURVE: INITIAL WELFARE CONSEQUENCES OF PRICE LIBERALIZATION IN EASTERN EUROPE

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January 1993

Abstract. A one-good, representative consumer model of the pre-reform consumer sector of transition economies is developed. An equation is derived that permits empirical estimation of the welfare effect of price liberalization. Empirical estimates are calculated for Poland and Russia. These estimates indicate that the positive benefits of eliminating the highly inefficient distribution system completely offset the negative consequences of the fall in real income suffered as a result of stabilization and reform.

This paper is an outcome of the research project entitled Transformation of Centrally Planned Economies: The Lessons for Developing Countries under the auspices of the UNU World Institute for Development Economics Research (UNU/WIDER) with financial support from the Finnish International Development Agency (FINNIDA).

The author would like to thank Richard Eckaus, Stanley Fischer, Gordon Hanson, Peter Temin, Andy Berg, Revold Entov, Rick Ericson, Herbert Levine, Michael Marrese, Peter Murrell, Kent Osband, Jeffrey Sachs and participants of the MIT International/Development Seminar and the SSRC Summer Workshop on Soviet and East European Economics for very helpful comments and criticisms. All errors and omissions are the responsibility of the author, except for those due to governmental statistical authorities.

I. Introduction

Polish consumer welfare apparently decreased dramatically after a major stabilization and reform program was initiated in January 1990. The statistically-measured real wage fell by almost 20% in 1990. Estimates of the drop in real private consumption change range from 5% to 16%. Recent stabilization and reform initiatives in Russia have also resulted in a sharp fall in real income and consumption.

However, due to certain characteristics of the pre-transition planned economy and the transition itself, statistical measures of real income are rather incomplete measures of overall economic welfare. Price liberalization resulted in the elimination of queuing and search costs of goods procurement, and import liberalization resulted in a substantial increase in goods variety. Open unemployment has emerged after having been suppressed for decades, and uncertainty concerning job tenure and income is increasing dramatically as the material and psychological security blanket of East European socialism is torn away. At the same time, perverse rigidities in the allocation and remuneration of labor and capital are being eased, and those with initiative and skills can now take advantage of opportunities that had been sharply or fully curtailed. Any account of the total welfare impact of recent reform initiatives must consider all of these factors if it is to be complete[1].

This paper will attempt to measure the change in economic welfare that is easily described by available statistical data. In particular, the joint impact on welfare of the fall in consumption and the elimination of queuing and search costs will be considered. A representative consumer model is developed that incorporates a fixed-price state market, a free

[1] The complexity of evaluating welfare change over the transition in Eastern Europe has been carefully discussed in Lipton and Sachs (1990) and Berg and Sachs (1992), who draw attention to these factors.

market, and queuing and search costs for goods sold in the state market. Plausible empirical estimates of the net change in consumer welfare due to elimination of queuing and search costs and the initial fall in real income are calculated using Polish data. The estimates indicate that welfare gains from queue elimination were significant and in all likelihood fully offset the welfare impact of the initial fall in real income. Elimination of the deadweight loss due to price distortion undoubtedly contributed to the relatively long "honeymoon" enjoyed by the Polish government as they implemented a painful economic program.

II. A Model of a One-Good Economy with Queuing and Free Markets

The application of neoclassical consumer analysis to the pre-transition economies is straightforward. Several researchers have made important contributions modelling consumer choice under conditions of price disequilibrium[2]. The following model extends this work by explicitly considering the supplier's decision problem and deriving an equation that allows for the empirical measurement of welfare improvement after price liberalization.

a. Generation of Price Disequilibrium

Consider the consumer goods market under pre-liberalization conditions. A given quantity of a single consumer good is sold to a representative consumer[3]. There is an official state market, with fixed price p_s, and a free market with price p_F[4]. The state price is set equal to 1, so that p_F is the relative free market price. Price disequilibrium is generated by the assumption that available monetary income for consumption exceeds the value of the consumption good at the prevailing state price:

$$x_T < I \tag{1}$$

where x_T is the total amount of the good purchased in the state market and I is available monetary income for consumption. Because of this disequilibrium, a free market emerges.

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[2] See Stahl and Alexeev (1985), Sah (1987), Weitzman (1991), Polterovich (1991), Boycko (1991), and Osband (1991).

[3] Alternatively, the good is sold to many consumers who all possess identical utility functions.

[4] There were many different kinds of free markets in pre-transformation Eastern Europe. Some were legal, such as the farmers' markets. Others were illegal but tolerated and involved little risk for sellers. The remaining were illegal and involved substantial risk for buyers and sellers alike.

b. Supply of the Consumer Good to State and Free Markets

Storekeeper-pilferers receive the total amount of consumer good available, x_T. They choose an amount to sell on the state market and on the free market. Sales on the free market involve risk, which is positively related to the amount sold on the free market. There is perfect competition on the free market. Sellers maximize expected profits obtained from free-market sales:

$$\alpha\{x_F\}(p_F x_F + [x_T - x_F]) + (1 - \alpha\{x_F\})(x_T - x_F) - x_T \tag{2}$$

$$\text{and } \frac{d\alpha}{dx_F} < 0,\ \alpha\{0\} = 1,\ \alpha\{x_T\} = 0$$

$\alpha(x_F)$ is the chance of not being caught selling on the free market. The first two terms of (2) are expected revenues, and the third term is the cost of procuring x_T at price $p_s = 1$. If the seller is caught, all profits are confiscated, but no further penalty is imposed[5]. (2) can be rewritten as:

$$(\alpha\{x_F\}p_F - 1)x_F \tag{3}$$

Maximization of (3) with respect to x_F and rearrangement of the first-order condition gives

$$x_F = \frac{1 - \alpha\{x_F\}p_F}{\alpha'\{x_F\}p_F} \tag{4}$$

The volume of free-market sales depends on the characteristics of the risk function and the relative price ratio. (4) can be totally differentiated to obtain

[5] Incorporating a punishment function which depends on the level of free-market sales or profits complicates the results derived below but does not fundamentally change the analysis.

(5) $$\frac{dx_F}{dp_F} = \frac{-\alpha' x_F - \alpha}{\alpha'' x_F p_F + 2\alpha' p_F}$$

The numerator and denominator both have ambiguous signs. If the risk function $\alpha(x_F)$ is concave with respect to x_F, then the denominator is clearly negative. The numerator, however, can be positive or negative depending on the value of x_F. Intuitively, as p_F increases, the shopkeeper wants to sell more on the free market, but these extra sales create more risk. It can certainly be the case that an increase in p_F leads to a reduction in x_F[6].

The supply of the consumer good to the free market x_F and the relative free-market price p_F are determined by (4) and the budget constraint[7]

(6) $$(x_T - x_F) + p_F x_F = I$$

If the risk function is linear in x_F and can be written as

(7) $$\alpha\{x_F\} = 1 - \frac{x_F}{x_T}$$

then the supply equation is

(8) $$\frac{x_F}{x_T} = \frac{1}{2} - \frac{1}{2p_F}$$

The demand curve (derived from (6)) is

(9) $$\frac{x_F}{x_T} = \left[\frac{I - x_T}{x_T}\right] \frac{1}{p_F - 1}$$

The supply and demand curves in x_F/x_T-p_F space are drawn in

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[6] An analogy is the income and substitution effects in the standard consumer utility maximization problem.

[7] Note that supply to the state market, x_S, is automatically determined, as it equals x_T-x_F.

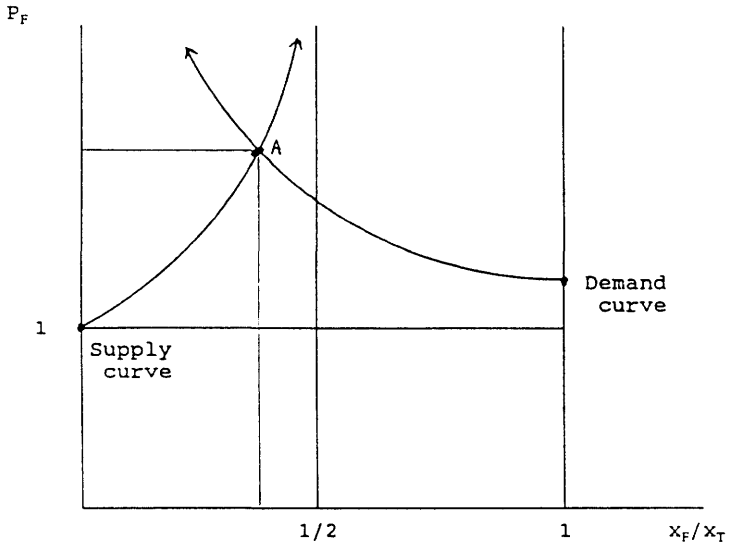

FIGURE 1

figure 1. Equilibrium values for p_F and x_F/x_T are given by point A.

c. Consumer Utility Maximization

Households utility depends on both consumption and leisure and can be written as

$$\psi = U(x_S+x_F,L) \qquad (10)$$
$$and \quad U_1,U_2>0, \; U_{11},U_{22}\leq 0$$

where L is leisure. The total amount of time resources available to the household is T.

Price disequilibrium necessarily generates methods of distributing goods that do not rely on monetary bidding. The most common method used in Poland, Russia, Romania and perhaps some of the other formerly-planned economies was distribution of goods through a time-bidding process[8].

Assume that the average amount of time required to search and queue for a unit of the consumer good sold at the state price is e, so that total time spent on goods procurement is ex_S. Leisure is therefore T - ex_S, and utility is

$$\psi = U(x_S+x_F,T-ex_S) \qquad (11)$$

One important special case is when utility is linear in leisure and takes, for example, the form

$$\psi = U(x_S+x_F)\left\{\frac{T-ex_S}{T}\right\} \qquad (12)$$

[8] Another method can be called "pure rationing," in which goods are distributed according to direct command of the state, and consumers do not have the opportunity to bid for goods with any of their resources.

The utility maximization problem is:

$$\max \psi = U(x_S+x_F, T-ex_S)$$

$$w.r.t.\ x_S, x_F \tag{13}$$

$$s.t.\ x_S + p_F x_F = I$$

First-order conditions are

$$U_1 - eU_2 = \lambda \tag{14}$$

$$U_1 = \lambda p_F \tag{15}$$

where λ is the marginal utility of income and U_1 and U_2 are partial derivatives with respect to consumption and leisure respectively. Substituting (15) into (14) and multiplying by x_S, we obtain:

$$\lambda(p_F-1)x_S = U_2 e x_S \tag{16}$$

If utility is linear in leisure, rents obtained on state market purchases in utility terms are completely offset by procurement costs. The only effect of the fixed state-market price policy is the generation of dead-weight utility loss.

The general-equilibrium model of this one-good economy is fully described by four equations: (4), (6), (14) and (15). The four unknowns endogenously determined are x_F, p_F, λ and e. Of course, the model is not a general-equilibrium model in the full sense, as labor supply and production are neglected[9]. However, leisure does have a shadow value[10].

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[9] See appendix A for this extension.

[10] The constraint $L = T - ex_S$, where L is leisure, has been substituted into the utility function. The maximization problem without substitution gives the following formula for the shadow value of time resources:

In order to develop an estimation equation for the value of utility lost through state-market goods procurement, substitute (15) into (14) to obtain

$$eU_2 = \left[\frac{p_F - 1}{p_F}\right] U_1 \tag{17}$$

This can be rewritten as

$$\left[\frac{p_F - 1}{p_F}\right]\left[U_1 \frac{x_T}{U}\right]\left[\frac{x_S}{x_T}\right] = \left[U_2 \frac{1}{U}\right] ex_S \tag{18}$$

Assuming that real income/consumption x_T does not change, the ratio of post- to pre-price liberalization utilities is

$$\frac{\psi_{POST}}{\psi_{PRE}} = \frac{U(x_T, T)}{U(x_T, T - ex_S)} \tag{19}$$

$U(x_T,T)$ can be approximated as

$$U(x_T, T - ex_S) + U_2 ex_S \tag{20}$$

where the derivative U_2 is calculated at $L = T - ex_S$. Note that if utility is linear in leisure, (20) holds as an equality. Combining (19) and (20),

$$\frac{\psi_{POST}}{\psi_{PRE}} \cong \frac{U(x_T, T - ex_S) + U_2 ex_S}{U(x_T, T - ex_S)} = 1 + \left[U_2 \frac{1}{U}\right] ex_S \tag{21}$$

Substituting (18) into (21), the estimation equation is obtained:

$$\mu = \left[\frac{p_F - 1}{e}\right] \lambda$$

where μ is the shadow price of leisure, which equals the value in utility terms of per-unit rent obtained on the state good normalized by the per-unit time cost of the state good.

(22) $$\frac{\psi_{POST}}{\psi_{PRE}} \cong 1 + \left[\frac{p_F - 1}{p_F}\right]\left[U_1\frac{x_T}{U}\right]\left[\frac{x_S}{x_T}\right]$$

or, in percentage terms,

(23) $$\frac{\psi_{POST} - \psi_{PRE}}{\psi_{PRE}} \cong \left[\frac{p_F - 1}{p_F}\right]\left[U_1\frac{x_T}{U}\right]\left[\frac{x_S}{x_T}\right]$$

Again note that if utility is linear in leisure, then (22) and (23) hold as equalities.

The percentage increase in the level of utility due to the elimination of good procurement costs equals the product of the free-market price premium, the elasticity of the utility function at the point of actual consumption, and the relative weight of state-market purchases in total purchases.

The absolute percentage change in utility due to the elimination of state-market procurement costs will not be calculated. Instead, the ratio of utility gained through elimination of procurement costs to the absolute value of utility lost due to the fall in real income in the first year after price liberalization will be calculated. The absolute value of the percentage change in utility due to a fall in real income can be approximated as

(24) $$\left[U_1\frac{x_T}{U}\right] \times \text{abs}\left[\frac{\Delta x_T}{x_T}\right]$$

where abs(.) is the absolute value operator. The ratio of percentage utility gain to percentage utility loss due to price liberalization and the fall in real income is

$$(25)\qquad \frac{\left[\frac{p_F-1}{p_F}\right]\left[U_1\frac{x_T}{U}\right]\left[\frac{x_S}{x_T}\right]}{\left[U_1\frac{x_T}{U}\right]\times \text{abs}\left[\frac{\Delta x_T}{x_T}\right]} = \frac{\left[\frac{p_F-1}{p_F}\right]\left[\frac{x_S}{x_T}\right]}{\text{abs}\left[\frac{\Delta x_T}{x_T}\right]}$$

The ratio defined by (25) will be empirically estimated in the following section. The ratio indicates the degree to which negative utility consequences due to falling real income are offset by the elimination of procurement costs. If the ratio is greater than 1, then net welfare change is positive. If the ratio equals 0.5, say, then the utility gains offset the fall in utility by 50%.

It should be emphasized that alternative formulations of supplier behavior do not affect the empirical estimation equations. Changes in modelling must affect the first-order conditions resulting from consumer utility maximization for the empirical results of this paper to change.

The model is easily extended to consider issues such as free-market transactions costs, transactions costs in the post-liberalization regime, and labor supply. These modifications and their empirical ramifications are developed in appendix A.

d. Utility Nonlinear With Respect to Leisure

If utility is not linear with respect to leisure, then care must be exercised in interpreting the empirical results. In particular, if utility is concave with respect to leisure, then the percentage utility gain resulting from good procurement cost elimination will be overestimated. Assume that utility can be written as

$$\psi = U(x_S+x_F)h(T-ex_S)$$

If this utility function is concave in leisure, then $h_{11} < 0$. The degree of overestimation of utility gains due to concavity for this function is shown graphically in figure 2.

Another implication of concavity is that rents obtained on state-market purchases are not fully offset by procurement costs. Applying (16) to (26), we obtain

(27) $$\lambda(p_F-1)x_S = Uh'ex_S$$

It is clear that rents exceed procurement costs (see figure 2):

(28) $$Uh'ex_S > Uh(T-ex_S)$$

The following utility function will be used in order to assess the impact of concavity of utility in leisure on the empirical results derived in the next section of the paper:

(29) $$\psi = U(x_S+x_F)\left[\frac{T-ex_S}{T}\right]^B$$

$$where \quad B < 1$$

Rearrangement of the first-order conditions resulting from the consumer maximization problem gives

(30) $$\left[\frac{T-ex_S}{T}\right]^B = \left[1 + \left(\frac{1}{B}\right)\left(\frac{p_F-1}{p_F}\right)\left(U_1\frac{x_T}{U}\right)\left(\frac{x_S}{x_T}\right)\right]^{-B}$$

Consider the following sequence of changes in utility. First, prices are liberalized. Denote the pre-price liberalization utility as ψ_{PRE}, and the post-price liberalization utility level as ψ_{POST}. Second, the real income shock hits. The level of utility prior to the fall in real income is ψ_{POST}, and the level of utility after the real income fall is ψ_{REAL}.

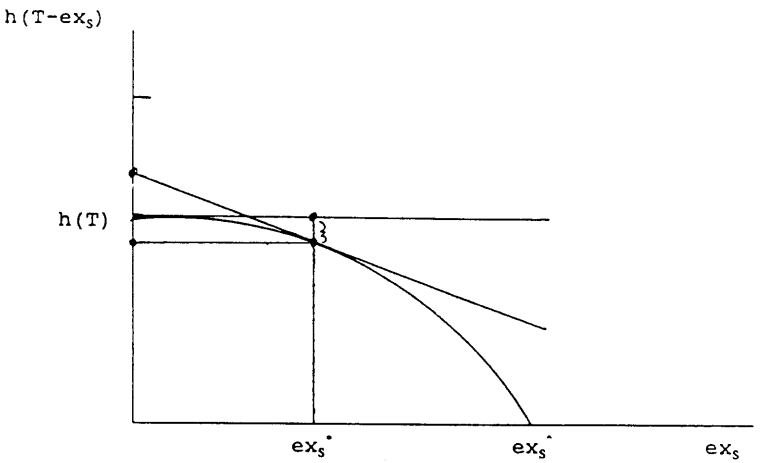

FIGURE 2

Note : x_s is such that $ex_s = T$.
x_s is the equilibrium value of x_s.

The ratio of post- to pre-price liberalization utility is

$$\frac{\psi_{POST}}{\psi_{PRE}} = \frac{U(x_T)}{U(x_T)\left[\frac{T-ex_S}{T}\right]^{B}} = \left[\frac{T-ex_S}{T}\right]^{-B} \tag{31}$$

Combining (29) and (30), we obtain

$$\left[\frac{\psi_{POST}}{\psi_{PRE}}\right]^{\frac{1}{B}} - 1 = \left[\frac{1}{B}\right]\left[\frac{p_F-1}{p_F}\right]\left[U_1\frac{x_T}{U}\right]\left[\frac{x_S}{x_T}\right] \tag{32}$$

The absolute value of percentage change in utility resulting from real income fall can be approximated as

$$\text{abs}\left[\frac{\psi_{REAL}}{\psi_{POST}} - 1\right] = \left[U_x\frac{x_T}{U}\right] \times \text{abs}\left[\frac{\Delta x_T}{x_T}\right] \tag{33}$$

Define A to be:

$$A = \frac{\left[\frac{1}{B}\right]\left[\frac{p_F-1}{p_F}\right]\left[\frac{x_S}{x_T}\right]}{\frac{\Delta x_T}{x_T}} \tag{34}$$

Then it is easily shown that

$$\frac{\psi_{POST}}{\psi_{PRE}} - 1 = \left[A \times \text{abs}\left[\frac{\psi_{REAL}}{\psi_{POST}} - 1\right]\right]^{B} - 1 \tag{35}$$

(34) will be used in the next section to evaluate the effects of concave utility on empirical estimates.

III. Empirical Estimates of the Welfare Impact of Price Liberalization and Reform in Poland and Russia

Values for the three terms in equation (26) must be obtained in order to calculate the net welfare gain resulting from price liberalization and the first year of the stabilization/reform programs. The possibility that utility is concave in leisure must also be considered.

(a). Poland

Estimates of welfare gain are calculated using 1987 price data. Open Polish price inflation accelerated over 1988-1989, and a hyperinflation emerged in the last half of 1989. Even as open inflation intensified, repressed inflation accelerated and shortages worsened. However, it is unlikely that a very high level of shortage lasted for more than a brief time. This can be seen in figure 3, which graphs the ratio of the free-market food price to the state food price. The ratio actually fell slightly during 1983-1986, then slowly rose in 1987 and 1988. There was a brief explosion in mid-1989, which was quickly followed by a spectacular collapse in the second half of 1989 as state food prices were liberalized. It is more sensible to estimate welfare gain on data from the very stable period 1985-1987 rather than the brief and volatile inflationary period of 1988-1989[11]. However, it should be kept in mind that if calculations were based on conditions prevailing in 1988 or early 1989, the estimated welfare gain would be significantly higher.

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[11] Another reason for using 1987 data is that Polish statistical authorities have not yet published the necessary data for 1988 or 1989.

FARMERS' MARKET/STATE FOOD PRICE RATIO

(January 1987 = 100)

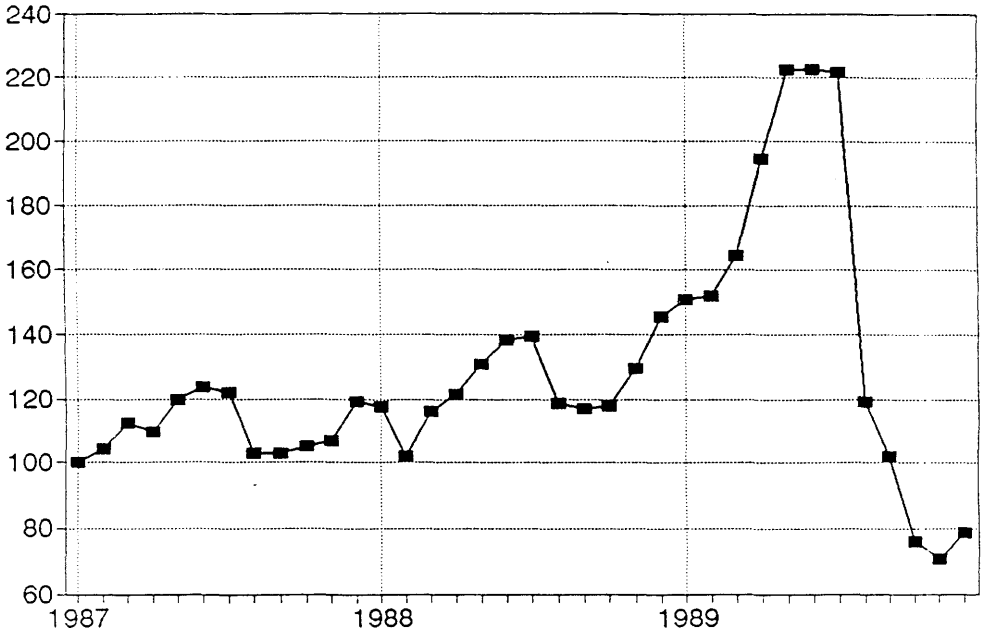

FIGURE 3

(i). Free-market/State-market Price Ratio

The ratio p_F/p_S has been calculated from a variety of official Polish data on prices prevailing in state and free markets. Results are given in table 1. The most important source of data is an annual household budget survey which monitors the receipts and expenditures of some 28,000 families. Separate records were kept on purchases in state and free markets[12], and prices for a large variety of goods were derived from these data. Black-market prices for a limited number of goods were also officially reported[13], and these were used to construct price ratios for consumer durables. Ratios for individual goods and services were aggregated using consumer expenditure shares from the household budget survey and data on the structure of state retail trade sales. Complete details on the construction of the price ratios are given in appendix B.

The aggregate p_F/p_S ratio is 1.22 in 1987. The average aggregate ratio for 1985-1987 is also equal to 1.22, indicating that repressed inflationary pressures were constant over this period. The 1987 free-market price premium is 18.1%.

It should be noted that this estimate is rather conservative. Price ratios for most services and some consumer durables were not given in the household budget data, and in these cases, the price ratio was assumed equal to 1. However, the ratio for the few services that were given equals 2.04 in 1987. Full coverage of the consumer basket would substantially increase the aggregate ratio.

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[12] More precisely, in the socialist and nonsocialist sectors.

[13] Evidently obtained through "market surveys."

TABLE 1

POLISH FREE-MARKET/STATE PRICE RATIOS

	P_F	$(P_F-1)/P_F$	(Food)	(Alcohol and Tobacco)	(Cloth-ing)	(Consumer Durables)
1985-87	1.22	0.181	1.26	1.19	1.19	1.27
1987	1.22	0.181	1.27	1.18	1.18	1.27

Source : See appendix B.

(ii). Relative Weight of State-Sector Purchases

Evidence on the proportion of consumption goods bought on state markets and free markets were not systematically collected or reported by the statistical authorities. However, enough data exists so that reasonable values of x_g/x_T can be postulated.

In most formerly-planned economies, significant amounts of food were purchased on legal "farmers' markets," where goods were priced freely[14]. Low levels of other free-market private economic activity, for example production and sale of handicrafts and services, were often also tolerated. Data on legal free-market Polish retail sales, total retail trade turnover, and total private consumption are given in table 2. According to this official data, legal free-market sales were surprisingly small. Even if the value of recorded sales is tripled to correct for possible deficiencies in data collection, they never exceeded 12% of total private consumption before 1989[15].

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[14] In Poland, these were known as "targowiski," and in the Soviet Union as "kolkhoznye rynki." Farmers' markets sold fresh food products, including meats, vegetables, fruits, eggs, dairy products, and honey. With the exception of cheese and milk, processed foods were not sold on these markets.

[15] Aslund (1985) provides a thorough critique of official Polish statistical measurement of the legal private sector, particularly turnover data (pp.7-9). He then concludes that "some experts acknowledged that Polish statistics on the turnovers of private enterprises were little more than guesses. The size of biases or their trends cannot be estimated, since it is quite possible that 50 per cent should be added to the GUS estimates of private turnover" (Aslund 1985, p.9; emphasis added). Thus, tripling the official value of private turnover is more than adequate in allowing for undermeasurement of the private sector.

It is certainly true that official series of real growth in socialized and free-market sales seem to be accurate. These indices show that growth of the free-market sector over the 1980's greatly outstripped that of the state sector. In 1989, the real value of state sector sales was exactly equal to the level of 1980, whereas free-market sales had grown by 200%. This development accords well with a priori knowledge about developments in the two sectors over the 1980's, which was that the private sector was beginning to (slowly) crowd out the state sector. Growth rates were evidently measured fairly accurately.

TABLE 2

LEGAL PRIVATE AND STATE SALES AND CONSUMPTION DATA, POLAND

Year	(A) Private retail trade sales	(B) Total retail trade sales	(C) Total private consumption	A/B	A/C
1985	125	4986	6370	2.5%	2.0%
1986	150	6204	7820	2.4%	1.9%
1987	207	8049	10066	2.6%	2.1%
1988	390	13546	16790	2.9%	2.3%
1989	2223	46026	61296	4.8%	3.6%

Value data in billion current zloty.
Source : Rocznik Statystyczny, various issues

TABLE 3

RATIO OF PEWEX TO TOTAL PRIVATE CONSUMPTION

	Total	(Food)	(Alcoholic beverages)	(Nonfood)	(Clothing)
1982	4.3%	1.2%	10.4%	4.9%	13.1%
1983	5.0%	2.3%	7.8%	5.8%	11.9%
1984	4.0%	2.2%	8.2%	4.2%	7.9%
1985	4.0%	2.4%	10.1%	3.7%	6.1%
1986	4.8%	2.7%	11.0%	4.7%	5.9%

Source : Rocznik Statystyczny Handlu Wewnetrznego 1980-1986 and Rocznik Statystyczny, various issues.

Pewex sales are given in millions of US dollars. The dollar values were converted into zloty values through the parallel market exchange rate. Over 1984-1986, imports constituted 70% of Pewex sales.

Another arrangement common to many formerly-planned economies was a network of sales outlets that sold goods for dollars or other hard currencies to domestic citizens. These stores sold both domestically-produced and imported products, and prices were usually set at market-clearing levels. Data on sales of the Polish version of this network, known as Pewex, are available through 1986. The ratio of Pewex sales to total private consumption for a variety of good categories is given in table 3. As in the case of legal free-market sales, the relative weight of Pewex purchases is rather small, averaging 4.5%.

Legal free-market sales in Poland, taken to be the sum of legal private and Pewex sales, evidently ranged from 6.5% to 10.5% of total private consumption in 1985-1986[16]. The major missing element is the volume of sales recorded as being sold at official state prices but which were actually sold at some sort of illegal and presumably market-clearing price. The author knows of no statistical data on these kinds of sales.

Various estimates of the total size of the Soviet "second" economy have been made by Russian experts. These estimates do include the value of free-market sales recorded as taking place at official state prices[17]. Using their result that second economy turnover was from 60 billion to 170 billion rubles in the late 1980's[18] and the official 1988 value of personal consumption, 441.2 billion rubles, the ratio x_s/x_T ranges from 0.72 to 0.88.

Data on the relative size of free-market sales are available for several important submarkets. An extensive research program on the second economy in the former Soviet Union

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[16] The high value of 10.5% is generated by tripling the recorded value of legal private sales.

[17] The Russian term for the difference between the free-market and state-market price paid in such a transaction was "pereplatiye."

[18] These estimates agree that the annual value of black market turnover in the late 1980s was on average equal to 100 billion rubles. The range used here incorporates the lowest and highest endpoints of the various ranges estimated by the Soviet analysts. See Rutgaizer (1992), p.62.

identifies services as one area of intense black-market activity. Calculations based on 1977 data show that at least 80% of consumer services was supplied by the black market[19]. Studies of the Polish black market also indicate that provision of services was concentrated in the second economy, although to a lesser extent than in the Soviet Union[20]. A survey of the Soviet gasoline market found that 50% of the physical quantity of gasoline was sold at illegal black market prices in the late 1970's[21]. These markets were studied precisely because they were ex-ante believed to be sectors of intense black market activity, and the results confirm these beliefs. In contrast, a review of the housing market in Soviet urban areas revealed that only 3% of all urban households rented housing privately in 1989[22].

Taken together, the evidence on total free-market turnover and various submarkets suggests that a very conservative lower bound for the ratio x_S/x_T is 0.5. An reasonable upper bound is 0.75. Estimates of net welfare change will be made using both of these values[23].

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[19] See Neuhauser and Gaddy 1989, p.15. Their estimate is based on an extensive survey of emigrants from the Soviet Union in the late 1970's and 1980's. Services are a natural candidate for black market provision, as the performance of supplying agents often cannot be monitored closely by state principles.

[20] "In some areas, particularly services, the supply was dominated by various forms of unofficial activity. The second sector accounted for between 27 and 76 percent of total supplies of services provided by private and state-owned firms in the repairs of cars, TV sets, household appliances, and so forth, in 1987." (Kaminski 1991, pp.183-184)

[21] See Alexeev 1988. As in the case of services, one would have expected on the basis of a priori information that the black market for gasoline in the Soviet Union was extensive. Automobile production grew more than 20% per year in the early 1970's, but gasoline production increased much more slowly, at 6-7% per year. Intense shortage inevitably resulted.

[22] See Alexeev 1991, p.3 and p.7.

[23] East Europeans who have reviewed this paper usually argue strongly that the free market was much smaller than 50% of total consumption and are prepared to accept the 75% figure as roughly accurate.

(iii). Change in Real Consumption in 1990

The change in aggregate Polish real consumption over 1989-1990 is the subject of much dispute. The Polish statistical agency GUS asserts that real private per-capita consumption fell 16%[24]. Berg and Sachs (1992) have calculated an alternative estimate of the change in personal consumption using data on the physical consumption of many types of goods obtained from household expenditure surveys and other sources. They find that aggregate consumption fell about 5%.

Another recent effort relies on changes in the food budget share to infer movements in real income[25]. The statistical correlation of growth in the food budget share and growth in the GUS private consumption measure over 1981-1989 can be used to forecast private consumption growth in 1990. The point estimate, -0.92%, is far below the -16% value given by GUS, and even makes the Berg-Sachs estimate look rather conservative.

The Berg-Sachs and GUS estimates will be used to bracket the actual fall in Polish real income. In order to remain consistent with the choice of 1987 as a base year for comparison purposes, the fall in real consumption is calculated over 1987-1990 rather than 1989-1990. The GUS data gives this change as 12%. A corresponding Berg-Sachs estimate is not available, and the 5% value is used. However, if the Berg-Sachs approach was applied to 1987-1990, the fall in real consumption would be less than 5%.

It should be emphasized that there are two serious calculations that show a real income change of 5% or less. Values at the lower end of the range 5%-12% are therefore more plausible as representing the true change in real consumption over 1987-1990.

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[24] Rocznik Statystyczny w 1991 r..

[25] See Roberts (1992).

(iv). Estimates of Net Welfare Change

Table 4 gives the values of the ratios of welfare increase due to the elimination of goods procurement costs to the absolute value of the welfare change brought about by the fall in real consumption. If a ratio is greater than 1, then welfare gain more than offset welfare reduction, and the initial net welfare effect of the reform program was positive.

The welfare gains from price liberalization were very significant. In the case of a fall in real consumption of 5%, gains outweighed losses. In the case of a 12% contraction, net welfare change is positive in one case. It is important to note that welfare gains from increased variety of consumer goods due to import liberalization are not included in these calculations. Their inclusion would significantly increase the values of the ratios.

Increased goods variety, the likelihood that the fall in real income was closer to 5% than 12%, and a state-market consumption share more likely equal to 75% than 50% strongly suggest that in the case of Poland, initial welfare gains due to price liberalization exceeded initial welfare losses. Even in the worst-case scenario, gains offset losses by 75%.

The effects on empirical results of modifying the model to take into account free-market transaction costs, post-liberalization transaction costs, and labor supply are reviewed in appendix A.

TABLE 4

RATIO OF UTILITY GAIN TO ABSOLUTE VALUE OF UTILITY LOSS

(Utility linear with respect to leisure)

	Percentage fall in real consumption	
x_S/x_T	5%	12%
0.50	1.81	0.74
0.75	2.72	1.10

(v). Utility Concave in Leisure

Simulations have been carried out using equation (35) to test the impact of making utility concave in leisure. Assume that the utility of goods consumption function can be written as

$$U(x_S+x_T) = U(x_T) = x_T^{\gamma} \tag{36}$$

Then the elasticity of goods consumption utility with respect to x_T is γ. The value of γ range between 0 and 1. The implications for changes in total utility due to changing levels of lesisure for different values of B are graphed in figure 4.

The simulation procedure is as follows. For various values of B, x_S/x_T, and $\Delta x_T/x_T$, the value of A given by (33) is calculated. A range of values for the absolute value of the percentage change in utility level due to the fall in real consumption, ψ_{REAL}/ψ_{POST} - 1, is postulated: the range is from 1% to 100%. Using the values for A, B, ψ_{REAL}/ψ_{POST} - 1, and equation (34), the implied values of ψ_{POST}/ψ_{PRE} - 1 and associated net welfare gain ratio are calculated. The values of ψ_{REAL}/ψ_{POST} - 1 and $\Delta x_T/x_T$ are used to calculate an implied value of γ. The net welfare ratio associated with $\gamma = 1$ is then obtained: this forms a lower bound to the actual ratio. Ratio values greater than this correspond to values of γ less than 1. The ratio values for $\gamma = 1$ are given in table 5.

Comparing table 4 to table 5, making utility concave in leisure has very little effect on ratio values except in the case where B = 0.1, which is a case of extreme concavity: if leisure falls by 99% due to procurement costs, total utility falls by only 37%. This degree of concavity is highly unlikely to have been the case in reality. The conclusion that procurement cost elimination probably fully offset the fall in real consumption remains unchanged.

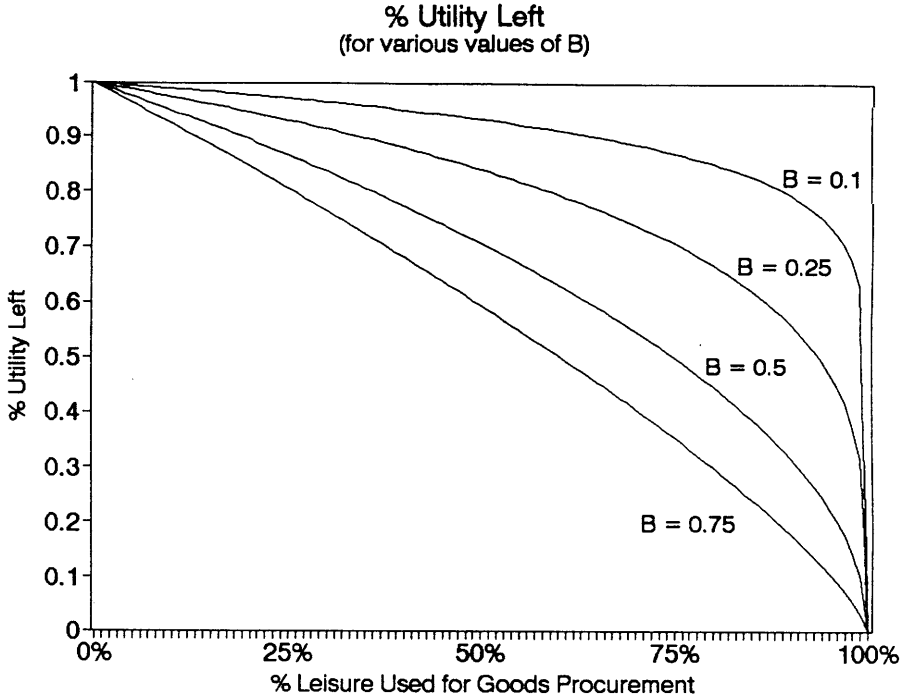
% Utility Left
(for various values of B)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
% Utility Left
B = 0.1
B = 0.25
B = 0.5
B = 0.75
0%
25%
50%
75%
100%
% Leisure Used for Goods Procurement

FIGURE 4

TABLE 5

RATIO OF UTILITY GAIN TO ABSOLUTE VALUE OF UTILITY LOSS, $\gamma = 1$

	B = 0.1	B = 0.25	B = 0.50	B = 0.75
$x_S/x_T = 0.50$ $\Delta x_T/x_T = 0.05$	0.94	1.60	1.73	1.77
$x_S/x_T = 0.75$ $\Delta x_T/x_T = 0.05$	0.88	2.28	2.54	2.64
$x_S/x_T = 0.50$ $\Delta x_T/x_T = 0.16$	0.26	0.67	0.72	0.74
$x_S/x_T = 0.75$ $\Delta x_T/x_T = 0.16$	0.37	0.95	1.06	1.10

(b). Russia

Comprehensive data on Russian free-market/state price ratios have probably never been collected. However, enough data from both official and unofficial sources exist so that a range of possible values can be postulated. Available data are given in table 6.

These ratios are much higher than the equivalent Polish ratios for 1987. The aggregate ratio for Russia in 1991 seems to be between 3 and 4, with implied premiums of 0.66 to 0.75. The welfare gain from price liberalization in Russia in 1992 was probably much larger than that of the January 1990 Polish program. However, it should be kept in mind that 1991 was a year of extreme imbalance in the consumer market in Russia and represented the culmination of a steady build-up of repressed inflationary pressure over the previous five years. It would be desirable to calculate welfare change using as a base year the last year of relative stability before perestroika initiatives began to lead to significant macroeconomic imbalance. Unfortunately, price ratios analogous to those in table 6 are not yet available for other years[26].

There is as yet no estimate of the change in real income associated with the Russian price liberalization-stabilization program, so an assessment of net welfare change cannot be given. However, if values for the free-market price premium and the relative weight of state market purchases are available, the necessary fall in real income such that net welfare change would equal zero can be calculated. A value of $x_S/x_T = 0.25$ is added to the other two values, due to the fact that the volume of goods actually sold at state prices might have fallen to a very low level by mid-1991. Results are given in table 7.

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[26] With the exception of the farmers' market ratio. One possible way to extend the 1991 aggregate ratio estimates back in time is to use time series on the farmers' market ratio and the black-market exchange rate.

TABLE 6

RUSSIAN FREE-MARKET/STATE PRICE RATIOS

Good Category	P_F
Farmers' market	3.6
Black market foodstuffs	2.2-4.8
Clothing	2.8-3.6
Footwear	3.5-4.8
Household items	2.5-4.0
Electrical goods	2.6-5.6
Consumer electronics	2.5-2.6

Note : The farmers' market ratio is for 1990. The other ratios are for 1991.
Sources : Farmers' market ratio : Boycko (1991), p.15.
All other ratios : Rutgaizer (1992), p.73

TABLE 7

IMPLIED FALL IN REAL INCOME FOR NET WELFARE CHANGE = 0

	Value for P_F :	
x_S/x_T	3	4
0.25	16.7%	18.8%
0.50	33.3%	37.5%
0.75	50.0%	56.3%

Unless state-market purchases had fallen to extraordinarily low levels in 1991[27], it is unlikely that real income will fall so much in the first year of the program that net welfare change is negative. However, the price liberalization program in Russia in 1992 was seriously incomplete. Controls remained in force for many "basic" products, and regional authorities used informal pressure to keep producers from raising prices to market-clearing levels in many instances[28]. Conditions of shortage and associated queuing continued through 1992 for many products in many different regions, and the full increase in utility due to elimination of procurement costs was not obtained.

[27] Russians who have reviewed this paper assert that a value of 25% for the state-market share is "ridiculously low."

[28] See Koen 1992 for an in-depth discussion.

IV. Conclusions

Those familiar with the pre-reform East European economies are aware that substantial welfare gains were to be had from reform of the highly inefficient distribution system. That the gains were so large, as this paper has shown, is surprising. Given the tenor of current discussion about reform in Eastern Europe and its impact on living standards, few would have expected initial net welfare change as defined in this paper to be positive.

This empirical finding has general implications for the reform of economies characterized by considerable expenditure of real resources on goods procurement, rent seeking and the like. Thoroughgoing, credible reform efforts can result in immediate positive net welfare effects. The received wisdom has been that such initiatives generate a welfare "J-curve," in which net welfare falls initially and begins to increase only after the positive effects of reform begin to bear fruit. This impression is driven in large part by the empirical fact that sharp contraction of economic activity in certain sectors usually follows major reforms.

It has been demonstrated here that the experiences of Poland and Russia correspond more to a gamma-curve[29]. Net welfare initially does not change or even rises a bit and is hopefully followed by significant increases as the benefits of restructuring and greater integration into the world economy are obtained.

Of course, the analysis of welfare change made in this paper is incomplete. First, the effect of the reduction of real balances is not considered. The issue of real balance contraction

[29] A Γ-curve.

is complex, as a large fraction of accumulated monetary holdings was considered by many to be a "monetary overhang." It is not clear that their elimination entailed utility loss[30].

Second, the assumption that there is a single consumer, so that distributional issues are completely neglected, is clearly open to criticism. Many observers and analysts have focused precisely on distributional effects as one of the most undesirable consequences of price liberalization. Much work needs to be done on the distributional consequences of Eastern European reforms.

Finally, as pointed out in the introduction, the analysis does not take into account the significant increase in uncertainty about economic futures. This factor, rather than realized contraction in welfare, underlies much of the negative reaction so prevalent throughout Eastern Europe to the dramatic changes now rapidly unfolding. The economically active population of these countries are aware that restructuring is barely underway, and although this restructuring does not necessarily result in the lowering of the living standard of a given agent, the uncertainty and other costs associated with such fundamental change nonetheless impact on welfare defined in a broad sense.

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[30] Changes in real balances are only part of the broader question of what is happening to total household assets over the course of transition. This question is very important and constitutes a major challenge for future empirical research.

Appendix A : Extending the Basic Model

The basic model can be modified in order to consider various other factors that might affect welfare over the transition. Three specific cases will be considered in this appendix.

(a). Free-Market Transactions Costs

An important implicit assumption of the basic model is that there are no procurement transaction costs in the free-market. This is unrealistic, as free-market activity was often illegal and certainly inefficient. Free-market transaction costs can be incorporated in the model by rewriting the utility function as

$$\psi = U(x_S + x_F, T - e_S x_S - e_F x_F) \tag{1}$$

where e_F is the time cost of procuring a unit of the free-market good. Of course, it must be the case that $e_F < e_S$ if the model is to have an interior solution.

Taking first-order conditions and carrying out manipulations similar to those in the main text[31], it is easily shown that the difference between the actual percentage increase in utility and the measured increase in utility,

$$\frac{\psi_{POST} - \psi_{PRE}}{\psi_{PRE}} - \left[\frac{p_F - 1}{p_F}\right]\left[U_1 \frac{x_T}{U}\right]\left[\frac{x_S}{x_T}\right] \tag{2}$$

equals the following expression:

---

[31] The reader might note that a system of four equations in five unknowns results, so that the model is underidentified. However, this is so only if e_F is an endogenously-determined variable, which is not the case. The forces determining e_F are not supply-demand equilibriating forces but arbitrary rules and regulations inhibiting trade. e_F is properly treated as an exogenous variable.

(3) $$\left[\frac{U_2}{U}\right]\left[e_F x_F + \frac{e_F x_s}{p_F}\right]$$

(3) is always positive, and welfare gains from price liberalization are underestimated if there are transaction costs in the pre-reform free-market.

(b). Post-Liberalization Transaction Costs[32]

Another implicit assumption is that there are no transaction costs in procuring goods after prices are liberalized. This possibility can be dealt with by rewriting the post-liberalization to pre-liberalization utility ratio as

(4) $$\frac{\psi_{POST}}{\psi_{PRE}} = \frac{U(x_T, T-e_M x_T)}{U(x_T, T-ex_S)}$$

where e_M is the post-liberalization per-unit procurement transaction cost. Expanding the numerator as in the main text and using results from pre-liberalization utility maximization, it is easy to show that the difference between the actual percentage increase in utility and the measured increase in utility is

(5) $$\frac{\psi_{POST}-\psi_{PRE}}{\psi_{PRE}} - \left[\frac{p_F-1}{p_F}\right]\left[U_1\frac{x_T}{U}\right]\left[\frac{x_S}{x_T}\right] = -\frac{U_2 e_M x_T}{U}$$

Because this term is negative, welfare gain from price liberalization is overestimated.

Values of the ratio e/e_M such that net welfare gain is zero for each of the four empirical scenarios for Poland can be derived. If the true value of the ratio is higher, then net welfare gain is positive (and if lower, then negative).

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[32] I am indebted to Peter Murrell for pointing out the possibility of significant post-liberalization transaction costs.

	e/e_M, net welfare change = 0	
x_s/x_T	5%	12%
0.50	4.5	-
0.75	2.1	11.5

The nature of post-liberalization transaction costs requires careful consideration. Immediately after prices are liberalized, significant transaction costs may persist due to a high degree of market fragmentation and price dispersion that results in search for low prices[33]. However, this dispersion should disappear fairly quickly if restrictions on market entry and competition are eliminated. Aside from factors such as search driven by price dispersion, it is not clear that shopping should be considered as a true utility cost to the consumer. In a typical Western economy, sellers spend considerable resources in providing services to shoppers in order to maintain market share. Shopping in this case takes on aspects of leisure activity.

(c). Labor Supply[34]

The model can be extended to incorporate a labor-supply decision and thus endogenize the level of total output x_T. Assume that labor supply is L, and output depends only on labor supply and a vector of other variables such as capital stock and imported intermediate inputs: $x_T = x_T(L,\beta)$, $\delta x_T/\delta L > 0$, $\delta x_T/\delta \beta_i > 0$, $\delta^2 x_T/\delta L^2 < 0$, $\delta^2 x_T/\delta \beta_i^2 < 0$. Also assume that labor L and procurement costs ex_s are perfect substitutes in leisure, and that the consumer/worker

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[33] This has certainly been the case in Russia. I am indebted to Yevgeny Kuznetsov for making this point.

[34] I am indebted to Michael Marrese for emphasizing the importance of labor supply change over the course of reform.

earns an "untied" income I and a "tied" income wL, where the wage rate w is determined exogenously[35].

The consumer/worker's problem is

$$\begin{aligned} &\max\ \psi = U(x_S+x_F, T-ex_S-L) \\ &w.r.t.\ \{x_S, x_F, L\} \\ &s.t.\ x_S + p_F x_F = I + wL \end{aligned} \tag{6}$$

First-order conditions from this maximization together with the supplier's first-order condition give the following system of equations:

$$U_1 - U_2 e = \lambda \tag{7}$$

$$U_1 = \lambda p_F \tag{8}$$

$$U_2 = \lambda w \tag{9}$$

$$x_S + p_F x_F = I + wL \tag{10}$$

$$x_F = g(p_F) \tag{11}$$

These five equations determine the five unknowns x_F, p_F, e, λ, and L.

The important question is whether labor supply changes over the course of liberalization. The ratio of post- to pre-price liberalization utilities is

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[35] Endogenization of the wage rate requires explicit description of the decision calculus of the agent who produces x_T. If the agent is treated as a state firm, profit maximization would not be an appropriate decision calculus, and the wage rate is properly treated as being determined exogenously by planners.

However, a non-state production sector could also be incorporated which does maximize profits, and in this case the wage rate would be endogenous. As this paper's focus is not on comparative statics given a particular institutional regime, these complications are not relevant.

(12) $$\frac{\psi_{POST}}{\psi_{PRE}} = \frac{U(x_T(L_M,\beta_M),T-L_M)}{U(x_T(L,\beta),T-ex_S-L)}$$

where the subscript M corresponds to the post-liberalization regime.

Total utility changes over the course of liberalization and reform due to the elimination of procurement costs, changes in labor supply L, and changes in the input vector β. An increase in L will reduce utility due to falling leisure but increase utility due to rising output x_T. x_T will also change (most likely decrease) due to changes in variables not under the consumer/worker's direct control, which is captured by changes in the vector β.

If the representative agent chooses an optimal level of labor supply beform reform, then any change in labor supply over the course of liberalization should reflect the fact that this change increases the agent's welfare level, because otherwise it would not be made.

Distributional issues concerning change in labor supply are probably more important than effects on representative-agent utility levels. For example, employers can now use the threat of unemployment as a device to extract a higher labor supply without increasing the real wage thus increasing profits. In the single-agent model, the single agent enjoys the increase in real income represented by the increase in profits, and the effect on net welfare is ambiguous (see above). In a multi-agent model, however, some agents clearly gain and some lose.

The emergence of involuntary unemployment is also basically a distributional issue. In the representative-agent model, involuntary unemployment corresponds to a undesired contraction in the supply of labor and hence consumption x_T. This should be captured in the empirical estimates because the fall in consumption x_T is taken into account. Employment is only a means to obtain consumption. In a multi-agent model which takes into account distributional effects, some agents will enjoy a rise in labor supply and consumption, and others a fall.

Appendix B : The Polish Free-Market/State Price Ratio

A variety of data are available on the state and free-market prices of various Polish consumer goods for the period 1981-1987[36]:

(a). The household budget survey, which monitors some 28000 household budgets annually, recorded data on purchases in state and free markets separately. The statistical authorities estimated and reported state and free market prices for a wide variety of goods on the basis of this data. All categories of food and alcohol consumption were covered, as were most categories of clothing and many consumer durables. However, most services were not covered.

(b). Farmers' market prices for a variety of foodstuffs were collected and reported.

(c). Black market prices were reported quarterly since 1981 for a variety of foodstuffs and consumer durables. The basket of goods covered grew over time (initially, consumer durables excluded). The methodological notes of the volume in which these prices were published give no details of how these prices were obtained.

(d). Official state list prices and many state transaction prices are available. List prices were set by official price-setting state agencies. Transaction prices were calculated by dividing the value of retail sales by quantities sold; the value of retail sales was calculated according to actual transaction price as opposed to list price.

The price ratios used in this study are calculated from the household budget data. To check the accuracy of these ratios, they can be compared to ratios calculated from farmers' market, black market, and official state price data (see table 8).

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[36] See reference notes for the statistical publications containing all price data used in this paper.

The correlation of household budget and farmers' market price ratios is quite good. The correlation of household budget and black market price ratios is good in the case of meats, sugar, coffee, and tea. However, in the case of alcoholic beverages and consumer durables, the correlation is poor. The household budget ratios for consumer durables are clearly inaccurate, as they are all less than 1. This is due to the fact that few families purchased a given consumer durable in any given year, even fewer purchased it on the free market, and, most importantly, many (perhaps most) of the durables sold on the free market were used. The black market price ratios for consumer durables are therefore used as a substitute in the calculation of the aggregate price ratio. All other ratios are derived from household budget survey data.

Individual good price ratios were aggregated using weights derived from household budget survey data on consumer expenditures. In some cases, the household budget survey data was not disaggregated enough, and more detailed information on the structure of retail trade sales was used to obtain weights. Household budget weights are from 1987 data, and retail trade weights are from 1985 data.

One possibility that could not be corrected for is that goods of higher quality were generally sold on free markets. This problem, if important, would lead to an overstatement of the true value of the price ratio. It is not known to what extent goods sold in state and free markets differed according to quality parameters.

No price ratios are available for most services and a small number of consumer durables and clothing[37]. In these cases, the price ratio is assumed to be 1. It is clearly counterfactual to assume that these ratios equalled 1. For example, the aggregate ratio for those few services which are available is 2.04. This is much higher than for the other broad consumption

[37] 59% of all consumer goods and services are covered. 35% should be covered but are not due to lack of data. For the remaining 6%, free markets probably did not exist.

categories (see table 1). Omission of services means that the calculated price ratio understates its true value.

Given that the calculated magnitude of the ratio in 1987, 1.22, is rather low, implying that correction for state-free market quality differences would probably lower its value only to a small degree, and that omission of services clearly has a major impact in the other direction, the ratio value empirically estimated in this paper should be treated as a lower bound to the true value. Correction for quality mix and services omission would probably increase the estimate and thus the magnitude of welfare gain due to procurement cost elimination.

TABLE 8

PRICE RATIO COMPARISON

Good	Household Budget Ratio	Farmers' Market Ratio	Black Market Ratio	State price type (*)	Notes
Potatoes	0.95	1.11	-	CTP	
Cabbage	1.12	1.27	-	CTP	
Cheese	1.36	1.49	-	CTP	
Sour cream	1.83	2.01	-	LP	
Eggs	0.97	1.08	-	CTP	
Honey	1.09	1.12	-	CTP	
Beef	1.39	-	1.31	LP	
Veal	1.12	-	1.58	LP	
Pork	0.89	-	1.07	LP	(^)
Sugar	2.36	-	2.60	LP	
Chocolate	1.87	-	4.18	CTP	
Cocoa	1.41	-	5.82	LP	
Coffee	1.48	-	1.54	CTP	
Tea	1.42	-	1.60	CTP	($)
Clear vodka	1.14	-	1.35	LP	
Flavored vodka	1.16	-	1.42	LP	
Wine	1.35	-	1.51	LP	
Beer	1.19	-	1.88	LP	
Auto	0.91	-	2.08	LP	(#)
Washing machine	0.80	-	1.19	CTP	
Black and white TV	0.52	-	1.36	CTP	
Sewing machine	0.65	-	1.27	CTP	

(See next page for notes).

(*) : LP = State list price.
CTP = Calculated transactions price.
(^) : For 1983-1984.
($) : For 1985-1986.
(#) : The black-market and state prices are for the Polski Fiat 126P model.

Sources : see discussion in appendix B.

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1985-87 : Glowny Urzad Statystyczny, Materialy Statystyczne, Ceny Detaliczne 1985-1987

(b). Household budget data are obtained from:

Glowny Urzad Statystyczny, Materialy Statystyczne, Budzety Gospodarstw Domowych, various years

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