

The “Welfare Standard” and Soviet Consumers

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...granting the predominance of money income and the opportunities to spend it, how nearly real corresponds with money income in the USSR is another matter. In order for household money income to be freely exchanged for consumers' goods at established prices, such prices must limit household demand at least to levels corresponding to available supplies. Prices of consumers' goods in the USSR apparently are again and again below such levels
...With prices below clearing levels, money income ceases to be the sole determinant of capacity to acquire goods.

Abram Bergson (1984)

Introduction

There is a path dependency to the work of scholars. One problem naturally leads to another and the research trajectory of any member of a scientific community can easily pass fertile fields in the hot pursuit of an elusive partial truth. Abram Bergson's modestly entitled “A Reformulation of Certain Aspects of Welfare Economics” (*QJE* 1938) demonstrated that he was theoretically equipped to have worked either or both sides of the street of national income and product accounting, i.e. using either the production potential standard or the welfare standard as the ideal behind his calculations. As an empirical researcher Abram Bergson's seminal work employed the production potential standard. However, just as cheerfulness can be a distraction for many a would-be philosopher, Bergson's theoretical interests in economic welfare could be seen to regularly break in to his commentary of Soviet economic realities. As the quotation at the top of this page clearly indicates, when writing about inequality in the Soviet income distribution, Bergson was fully aware of the precise

¹ Freie Universität Berlin. In the Spring of 1975 the author participated in Abram Bergson's graduate research seminar in socialist economics at Harvard University as a cross-registered M.I.T. graduate student. It was a legitimate way to obtain a Widener Library card too.

problem of using a money metric in an economic system based upon material balances where more than the budget constraint limited consumer choice.

I have often wondered why Abram Bergson's revealed preference seemed to have been for the production potential standard as opposed to the welfare standard. Perhaps others at the conference can confirm or reject my speculation on this matter. The most compelling reason behind the choice for the production potential standard appears to me simply data availability. It is the nature of a material balances system to collect a lot information about quantities. While consumer prices are by their nature public information and not subject to top-secret classifications, they do require on the ground observation which for embassy staff and the intelligence professionals must seem to be of relatively low priority compared to the determination of the order of battle.² Not quite as compelling but completely plausible from Bergson's own writings is the substitution of the notion of planners' preferences for consumer sovereignty in much of the literature about centrally planned economies. In certain respects this resembles the old economic history of slavery before Fogel and Engerman—slaves were regarded less as economic agents and more as means of production or labor saving household appliances.³ In addition the methods of applied demand analysis that were being developed and improved while Bergson was busy fitting the pieces of the real Soviet national income together exploited the tangency of indifference curves to budget constraints in market economies in order to piece together statistical maps of consumer preferences. This was not a trick available for an economic world where non-price rationing is endemic and indifference curves are almost never presumed to be tangent to budget constraints.⁴ My final speculation is that the Moorsteen-Bergson quantity index number theory requires no econometrics for its

² My own work on the cost of living in the GDR relied on the detailed consumer price comparisons conducted by members of the German Institute for Economic Research in West Berlin, and one presumes their friends and families in trips to East Berlin. For this paper a similar critical role is played by the Schroeder and Edwards (1981) purchasing power parity comparisons for the USSR and the USA.

³ One could argue that Gregory Grossman's success in getting us to think seriously about the second economy helped to provide an opening for the welfare standard.

⁴ The experience of war-time rationing in Great Britain and the U.S. led to a sophisticated theoretical understanding of the implications of rationing for the welfare standard that turns out to be of critical importance for the estimates presented in this paper. See Rothbarth (1941).

implementation⁵ whereas index numbers à la Konyus have been closely linked with the statistical art of demand systems estimation. Econometrics beyond the descriptive use of multiple regression was very specialized human capital for Abram Bergson's generation.

While it is an interesting question in scientific biography why Abram Bergson chose the path of the production potential standard, there is the bigger question of why others did not try or were not as successful in their attempts to apply the welfare standard. Clearly data constraints that might have affected Bergson's research choices would have mattered for others. But it is equally important to consider a different aspect, the role of fashion or to sound more profound, the sociology of knowledge. The early 1970s was an age of disequilibrium macroeconomics. Barro and Grossman's break from IS-LM general equilibrium framework to one of a general disequilibrium caught the fantasy of many able younger economists hungry for a scientific revolution. This was also the beginning of econometric software that was fairly user friendly (even by today's standards), conditional on one's understanding some econometrics! The point here is that the younger hounds like Richard Portes were off chasing macro-disequilibrium foxes. No one was really left minding the welfare standard.

It turns out that there were enough parts for a welfare standard story available in the first half of the 1980s to have applied the welfare standard to the Soviet consumer. In what is to follow I will describe those parts and provide a table to illustrate how one can actually quantify the microeconomic reality that Bergson's words have described.

⁵ This is by no means a weakness. One of the strengths of Erwin Diewert's superlative index numbers is that budget shares and price or quantity relatives are all that are required for their calculation and there is no need for an econometric estimation of the underlying aggregator functions (i.e. utility or production functions).

Economic Intuition

Market prices and household income determine the purchasing power of consumers in a market economy. Within their budget constraints households are sovereign and may structure their consumption expenditure as they please. Even allowing for differences in levels of per capita national income between the advanced market economies and the centrally planned economies, consumers in centrally planned economies had significantly less freedom of choice. The budget constrained choice set of consumers in a centrally planned economy is also limited by a host of constraints on the availability of goods and services at official prices. The typical case was housing with the average household desiring to have more housing than it has been allocated. This excess demand for housing results in household demand spilling over into other kinds of spending, e.g., drink. The issue is how to quantify the extent of the mismatch between the supplies of consumer goods and services with the demands of consumers.

This paper will focus on the quantity constraints faced by consumers in centrally planned economies which prevented the established relative prices in those economies from reflecting the subjective trade-offs of consumers. This has important consequences for the methodology of intersystem comparisons of consumption levels as well as the meaning of relative purchasing power. When households are subject to quantity constraints, traditional measures of real consumption and purchasing power parity for cross-national comparisons are afflicted with quite a different index number problem than the choice of weights or inaccuracies from approximating curved isoquants or indifference curves with linear approximations.

Quantity constraints are understood here to include all forms of non-price rationing, e.g. formal rationing with coupons and allocation by waiting lists, queues, “elbows”, etc. Both quantity constraints and the conventional budget constraint determine the real income of consumers in a shortage economy.

Notional demand is the quantity of a good that consumers would be willing to buy at existing prices and incomes without the interference of quantity constraints (a.k.a. Marshallian demand). When actual purchases exceed notional demands, we observe spillover demand. When actual purchases are less than notional demands, there is excess demand.⁶

Effective demand for a particular commodity is defined in the sense of Clower as the relationship between its price and quantity demanded obtained from utility maximization subject to the budget constraint and the quantity constraints for all other commodities.

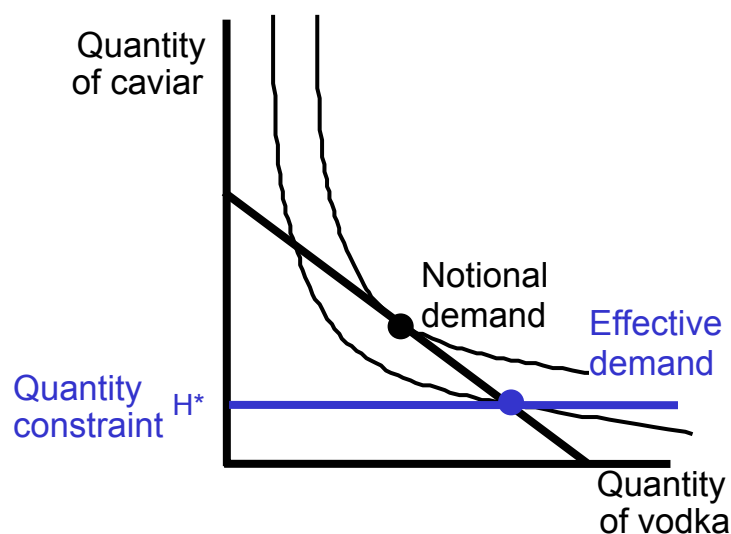


Figure 1. You can't always get what you want.

An obvious way to gauge the disequilibrium is to consider the individual deviations between notional and effective demands. Conventional methods of demand analysis cannot be used to combine effective demand points and budget constraints to estimate the map of consumer preferences.

⁶ Leon Podkaminer (1982) used demand systems estimated for Irish and Italian consumers to interpret observed Polish consumer demands in this manner.

There is a dual way of regarding consumer market disequilibrium by calculating what the structure of relative prices would need to be in order for quantity constrained consumers to freely choose their observed effective demands. Such prices were designated as “virtual prices” by Erwin Rothbarth (1941) who was interested in the implications of war-time rationing in Britain for the measurement of real income, stricter rations could then be analyzed with Marshallian demand tools as if there had been an increase in the virtual price of a commodity.⁷

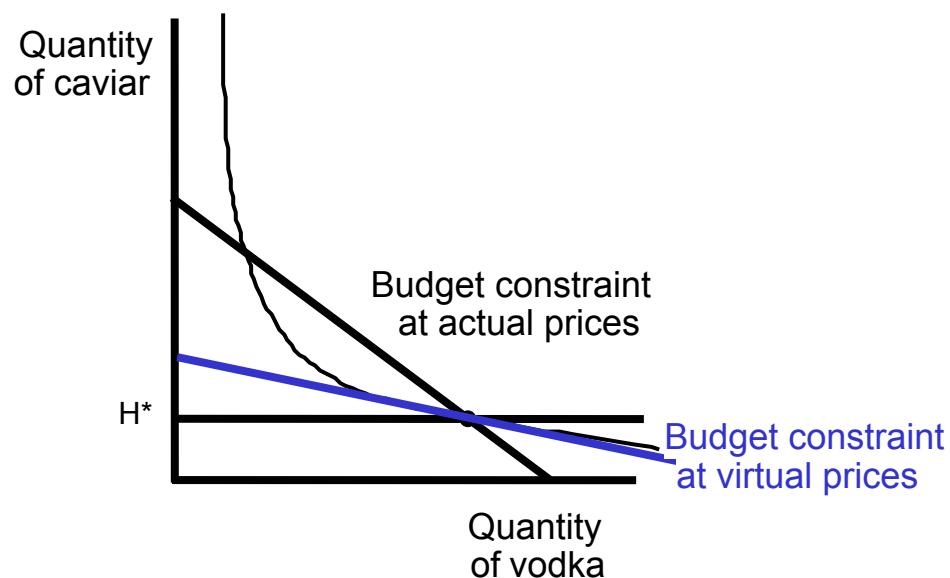


Figure 2. But You Can (Virtually) Like What You Get

An alternate way to characterize the degree of microeconomic disequilibrium is by determining the change in the prices that would be necessary for consumers to choose their effective demand freely. Here the relative price of caviar which is subject to a quantity constraint would need to rise relative to the price of vodka for the consumer to choose the point of effective demand at the original prices. Like notional demands, virtual prices require knowledge of consumer preferences before we calculate them.

⁷ Neary and Roberts (1980) rescued the original Rothbarth paper from relative obscurity that was due perhaps in part to Rothbarth's death in combat during the Second World War fighting for the British. Rothbarth wrote another paper regarding the measurement of household equivalence scales that has become a classic paper in that branch of the economic measurement literature as well. Two papers still cited sixty years after their publication is an impressive indicator of the scientific contributions probably lost due to Rothbarth's premature death.

Effective purchasing power (EPP) is an average measure of the extent of spillover and excess demands, much as the change in a price index may be regarded as an average measure of price changes. Effective purchasing power is defined as the answer to the following hypothetical question:

What is the most a quantity-constrained household would pay for the right of attaining its notional demands at existing prices?

The *effective purchasing power gap* is defined as the reply to this question expressed as a percent of total consumption expenditure in the quantity-constrained economy.⁸

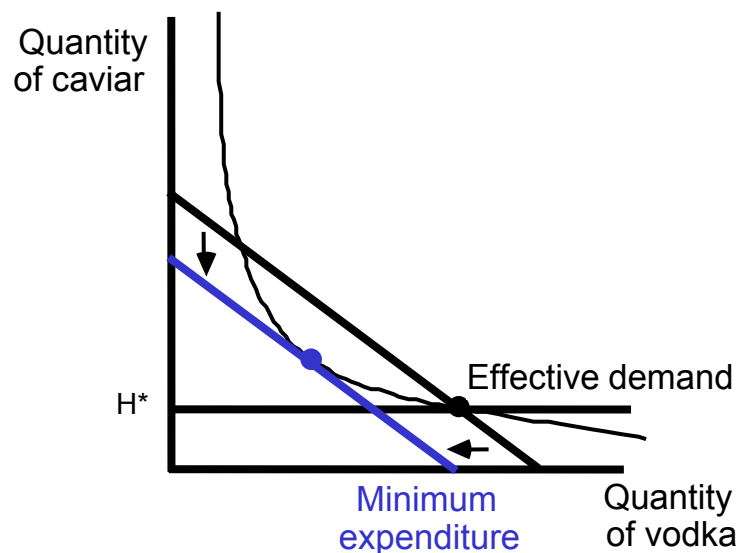


Figure 3. “Willingness to Pay” to be “Free to Choose”

A simple summary measure of the deviations between actual and virtual prices is found in the reduction of the nominal budget a consumer could still accept after being freed from quantity constraints yet be no worse off than he or she was with the higher budget and quantity constraints.

⁸ This summary measure was proposed and implemented by Collier (1986, 1989, 2001) to interpret the GDR family budget data using demand systems estimated from budgets of West German households.

The Statistical “Raw” Material

Actually the raw material for the calculations used to compute the numbers in Table 1 are really “intermediate products” in the global scheme of data generation. The trick of applied demand analysis in market economies to piece together tangency points (literally connecting the dots!) is lost when one enters a quantity constrained world. The nihilist response is to deny the possibility of extracting economic meaning from such data, the pragmatic response taken by Podkaminer and myself has been to bring-your-own-demand-system before entering that quantity constrained world.

As one can easily imagine, demand systems need to be tailored to the data and are not readily available off-the-rack. For such purposes it is extremely important to have highly disaggregated and comparable data (an oxymoron?) for the inevitable process of reaggregation into categories useful for the analysis. The International Comparisons Project Phase III report, *World Product and Income* (1982), by Kravis, Heston and Summers is the mother lode of such detailed expenditure and purchasing power parity (PPP) data.

The sample of market economies used are: Austria, Belgium, Denmark, France, Germany, Italy, Ireland, Luxembourg, Netherlands, Spain, U.K. and U.S. Data on per capita expenditure and PPPs for 107 categories of consumer expenditure in 1975 have been aggregated into fifteen categories to correspond to categories for the U.S.S.R.-U.S. comparison available in Schroeder and Edwards (1981).

It is hardly a coincidence that the biggest international comparison project that has evolved from the European comparisons first carried out in Gilbert and Kravis (1954) would serve as the methodological frame of reference for much of the Schroeder and Edwards consumption comparisons. The actual per capita consumption figures for column 3 of this paper are taken directly from Table 8 in Schroeder and Edwards (1981). Their Appendix *F*, describes the alterations they required to get the ICP classifications to fit their Soviet data.

The bridge between the ICP Phase 3 (1975) and the U.S.S.R./U.S. comparison (1976) are the consumption expenditures data from OECD national income accounts for the U.S. in 1975 and 1976 with consumer price indexes from the BLS used to link the ICP purchasing power parities to the ruble/dollar parities estimated by Schroeder and Edwards.

The PPPs reported in column 1 of Table 1 of this paper are expressed in terms of Austrian shillings, i.e. the “price” for each category of goods in Austria has been normalized to 1.0.

Specification of preferences

The specification used to calculate notional demands, virtual prices, effective purchasing power and an aggregate measure of purchasing power parity is a generalization of the Cobb-Douglas demand system⁹ that permits budget shares to vary systematically with real income. As in the simple Cobb-Douglas specification, the compensated price elasticity of each good is minus unity. The point of this generalization is that income elasticities are *not* constrained to be equal to unity which is most desirable because ICP data are clearly consistent with Engel’s Law, i.e. budget shares do indeed vary systematically with increasing real budgets.

The geometric intuition behind the generalization of Cobb-Douglas preferences used here comes from the fact that in *log-quantity space*, simple (i.e. *constant* expenditure share) Cobb-Douglas preferences would be represented as a family of parallel indifference planes, the slopes of which being a function of the budget shares. The point of the generalization is to allow the indifference planes in log quantity space to “fan out” with increasing income so that budget shares can vary systematically with changing real income.

⁹ For an earlier application of the generalized Cobb Douglas demand system used here, see Collier (1986, 1989).

We begin with the indirect utility function that expresses the maximum level of utility achievable by a household in a market economy, i.e. subject solely to a budget constraint (y), conditional on that budget constraint and conditional on the prices of goods it faces (expressed as a vector \mathbf{p}):

$$(1) \quad v(\mathbf{p}_i, y_i) = \prod_{k=1}^K (y_i / p_{ki})^{\beta_{ki}} = y_i / \prod_{k=1}^K (p_{ki})^{\beta_{ki}}$$

where i ($=1, \dots, N$) denotes the country and k ($=1, \dots, K$) denotes the category of expenditure.¹⁰

The second equality in equation (1) is due to the fact that the budget shares (β_k) sum to unity in any period. We transform equation (1) into log-form and obtain

$$(2) \quad \ln v_i = \ln y_i - \sum_k \beta_{ik} \ln p_{ik} .$$

In order for these preferences to indeed be consistent with Engel's law, we explicitly let the budget shares vary systematically with real income (indirect utility) itself.

$$(3) \quad \beta_{ki} = \frac{\alpha_k v_i^{\gamma_k}}{\sum_{m=1}^K \alpha_m v_i^{\gamma_m}} ,$$

where the α_k would in fact be proportional to the budget shares β_k were these not to differ in their response γ_k with respect to real income (which itself is hidden in the indirect utility v) from the responses γ_m of other goods. To eliminate the denominator we choose a reference category n (here food) and drop the country subscript (i) for convenience

$$(4) \quad \frac{\beta_k}{\beta_n} = \frac{\alpha_k v^{\gamma_k}}{\alpha_n v^{\gamma_n}} = \left(\frac{\alpha_k}{\alpha_n} \right) v^{(\gamma_k - \gamma_n)} .$$

The log-form of equation (4) provides us an estimation equation:

$$(5) \quad \ln(\beta_k / \beta_n) = \ln(\alpha_k / \alpha_n) + (\gamma_k - \gamma_n) \ln v = \tilde{\alpha}_k + \tilde{\gamma}_k \ln v ,$$

¹⁰ By force of habit some readers might mistakenly regard the budget shares as constants which would only be true for a traditional Cobb-Douglas world which is of course just one particular case of the Generalized Cobb-Douglas specification.

where the log indirect utility on the right hand side of equation (5) can be calculated with observed prices, total budget and budget shares using equation (2).¹¹ Weighted two-stage least squares coefficient estimates are reported in Appendix Table 1.

Weighted two-stage least squares coefficient estimates are reported in Appendix Table 1.

Results

Given the parameter estimates for the Generalized Cobb-Douglas preferences of twelve market economies in 1975 and the Schroeder and Edwards data for the Soviet Union in 1976, it is possible to compute values that correspond to the points, slopes and shifts seen in Figures 1-3 above. Table 1 gives the disaggregated measures of the impact of quantity constraints for the individual categories of expenditure. The first three columns are essentially what Schroeder and Edwards “saw”. Columns (4) and (5) are what Alfred Marshall would have expected to see, given the Soviet budget constraint and Soviet prices. The last two columns are what Erwin Rothbarth would have imagined.

The effective purchasing power gap (Figure 3) is calculated to be approximately 12% of total per capita ruble expenditure, which turns out to be larger than EPP values are calculated with the ICP data set using the same method for Hungary, Poland, Romania and Yugoslavia in 1975.

¹¹ Statistically sensitive readers will be offended by the fact that the “independent” variable on the right hand side of (5) is in fact dependent in a nonlinear way on the budget shares found on the left hand side. Fortunately, an obvious instrument to use for two-stage least squares estimation is an alternate measure of log real total consumption derived by deflating total per capita consumption with an *unweighted* geometric average of the underlying PPP’s.

Table 1. Consumer purchasing power parities (PPP), implicit per capita quantities (Q) and per capita expenditures (X)

U.S.S.R. 1976

	Actual PPP (1)	Actual Q (2)	Actual X (3)	Notional Q (4)	Notional X (5)	Virtual P (6)	Virtual X (7)
Food	0.0614	6227.24	382.29	8015.01	492.04	0.0848	527.77
Beverages	0.0455	3271.41	148.98	1476.99	67.26	0.0208	68.03
Tobacco	0.0571	259.86	14.83	803.13	45.83	0.1917	49.80
Clothing	0.0815	1945.18	158.61	1079.26	88.00	0.0447	87.03
Footwear	0.0549	736.11	40.42	474.98	26.08	0.0370	27.24
Furniture, appliances	0.0852	464.10	39.56	435.99	37.16	0.0733	34.04
Household supplies, operations	0.0605	363.41	21.99	741.23	44.85	0.1237	44.95
Transport	0.0450	1305.64	58.78	1560.20	70.24	0.0477	62.30
Communications	0.0083	747.29	6.21	402.30	3.34	0.0035	2.61
Gross rent	0.0411	1054.04	43.30	1494.34	61.39	0.0500	52.66
Fuel, power	0.0186	1020.92	19.03	1595.80	29.75	0.0267	27.28
Medical care	0.0356	1278.68	45.47	1019.40	36.25	0.0231	29.60
Recreation	0.0396	1563.35	61.94	2320.23	91.93	0.0572	89.48
Education	0.0223	3137.47	69.84	1636.26	36.42	0.0101	31.58
Other expenditures	0.0319	1256.81	40.13	652.23	20.83	0.0135	17.00
Total monthly expenditure			1151.38		1151.38	0.0601*	1151.38

Cols. (1),(6): Prices expressed relative to Austrian prices in each category, 1975=1.00

Cols. (2),(4): Implicit quantities. (2) = (3)/(1) and (4) = (5)/(1). Dimension is austrian shillings of expenditure at 1975 prices for

Col. (7): Actual quantities valued at virtual prices. (7) = (2)x(6)

*Exact deflator to convert 1976 per capita ruble expenditure into 1975 austrian shillings

Sources:

(1) Smith (1994), revised in 1995. Linking Schroeder and Edwards PPPs in Table 8 to ICP phase 3 binary comparison US and Austria.

(3) Schroeder and Edwards (1981), Table 8

(4)-(7) author's calculations

Anticipation of Criticism.

The Schroeder and Edwards data are too frail to survive such calculations.

In an earlier age Laspeyres and Paasche were able to approach their respective formulas with a naivete of the data describer looking for a measure of central tendency of individual price ratios. But the temptation to take such a measure of central tendency to deflate a nominal variable is too strong for most people to resist. Following the division of a spending or income magnitude by a price index, the user has (knowingly or not) bought in to an underlying economic theory, i.e. specific assumptions of specification. I am reminded of Evsey Domar's comment on Abram Bergson's productivity paper in the Eckstein volume: "... everyone who constructs index numbers transgresses against honesty, and ... every user thereof is an accomplice in the act."

From the point of view of theoretical depth, all that the method sketched here does is to allow a generalization of income elasticities. No Cobb-Douglas indifference curve was hurt in the making of these estimates. The fact that these are calculations cannot be done on a first generation Hewlett-Packard or Texas Instruments pocket calculator nor on the mechanical desk-top monsters of calculating machines that were still to be found in the bowels of the economics departments in the early 1970s is not important. Spreadsheets can do all the calculations presented here.¹² The family resemblance between the simplest arithmetic or geometric average and what has been calculated here is strong. They are only one generation removed from each other. Thus if one loves a blended Fisher index of relative consumption in Schroeder and Edwards, Table 8, it would be fickle not to at least like the right half of Table 1 here.

¹² I confess, it more convenient to do weighted two stage least squares with econometrics software, as I have done here.

Preferences are not identical

I want to sidestep the issue of the actual specification of the generalized Cobb-Douglas used in this paper. It is only one of many possible specifications to model demand. Tinkering is always needed just as is crash-testing for robustness.

The deeper issue that strikes at the heart of international comparisons is that Koreans are not Pakistani are not Hungarians are not... While there is no obvious moral law that prohibits the transplantation of demand systems across different species of economics systems, one does have to be careful about predicting out of sample. For my inter-German comparisons I felt no uneasiness about taking Wessi preferences to the Ossi constraints. Here I consider the calculations tentative and interesting rather than conclusive.

The fact that the International Comparisons Project is alive and well at the World Bank leads me to think that this criticism is less important than the prediction out of sample issue.

The lists of goods in the market economies and centrally planned economies differ too much

This is indeed an Achilles heel. In fact it constitutes one of the fundamental criticisms of the Consumer Price Index coming out of the Boskin Commission's review of the CPI computed by the U.S. Bureau of Labor Statistics. As Hausman (2003) has shown, there are data intensive ways of dealing with introduction of new products and the phasing out of old products. One is not surprised that estimation of Rothbarthian virtual prices is part of the method used by Hausman to measure the impact of the introduction of cellular telephones on the cost of living. Such methods are the stuff of rocket-science compared to the relatively humble generalized Cobb-Douglas specification employed here.

Conclusion

The Soviet Union will continue to occupy a special wing in the virtual museum of comparative economics. Contemporary observation and analysis of that economy have been filed with the historical record. The problems of economic transition tend to overshadow the fact that there remained so much unknown and so much substantive work still to do at the time of the demise of the USSR. The Bergsonian legion was never large in proportion to the enormity of the task. Still we can be sure that future scholars, having had the benefit of the present and subsequent generations of Soviet archive miners, will confirm that Bergson (as well as those assembled here in his honor) knew the right economic questions to ask. Pioneers earn the glory that comes with establishing early claims. Because the stakes are so high when answers are hazarded to important difficult questions, early claims are bound to be challenged by later research. Many exhibits in the virtual museum of comparative economics will require serious restoration work and some will be replaced with new discoveries of the generations of post-Bergsons that post-Hardts will chronicle.

The estimates in Table 1 are presented here as an illustration of the principle that old data and new angles are complements in the production of knowledge. The Schröder and Edwards consumer price comparisons together with their estimates of consumption spending are among the most precious artifacts¹³ from the Soviet era for applying the welfare standard to Soviet economic reality.

Abram Bergson's Chapter 3 of his *National Income of Soviet Russia* exposed many of us to the geometric beauty of the distance function for the first time and we learned that not

¹³ Neither word play nor irony is intended here. The Schröder and Edwards data are certainly not "statistical artifacts" in the (pejorative) technical sense.

all averages of quantity relatives are endowed with equal meaning. That is part of an intellectual heritage we can be proud of. It prepares us to bring new and different tools of applied economic analysis to bear on familiar evidence gathered in the days when the proxy statistical office of the USSR had its branches in Massachusetts, Virginia and Illinois.

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AppendixTable 1 Estimates of Generalized Cobb Douglas Coefficients.
ICP Phase 3 Western European Countries and US, 1975

	$\ln(\alpha_i - \alpha_n)$	$(\gamma_i - \gamma_n)$	Adj R^2
Beverages	-6.12 (3.72)	0.413 (0.337)	0.112
Tobacco	-1.46 (5.87)	-0.909 (0.533)	-0.105
Clothing	-7.43 (2.28)	0.571 (0.207)	0.393
Footwear	-4.82 (2.19)	0.188 (0.199)	0.001
Furniture, appliances	-13.69 (3.24)	1.110 (0.294)	0.562
Household supplies and operations	-7.17 (4.08)	0.477 (0.371)	0.128
Transport	-15.31 (1.86)	1.34 (0.168)	0.841
Communications	-27.25 (5.87)	2.225 (.533)	0.579
Gross rent	-17.79 (2.61)	1.570 (0.237)	0.778
Heating fuel, power	-13.81 (3.12)	1.100 (0.283)	0.579
Medical care	-21.78 (2.64)	1.917 (0.239)	0.837
Recreation	-8.50 (3.03)	.682 (.275)	0.336
Education	-17.57 (3.26)	1.496 (0.296)	0.671
Other expenditures	-22.38 (2.27)	1.921 (0.206)	0.875

Note: Instruments are the constant and the log of total consumption expenditure deflated by an unweighted geometric index of PPPs. 12 market economies were in the sample. Observations were weighted by the country population.