**IMF WORKING PAPER**





WP/91/55

INTERNATIONAL MONETARY FUND

European Department

# Forced Savings and Repressed Inflation in the Soviet Union: Some Empirical Results 1/

Prepared by Carlo Cottarelli and Mario I. Blejer

June 1991

## Abstract

In countries such as the Soviet Union, where wealth is mainly stored in monetary assets, the behavior of the money to income ratio is a poor indicator of the growth of undesired monetary balances (monetary overhang). In those countries a monetary overhang is primarily a wealth overhang, which has to be analyzed by evaluating deviations of actual from desired wealth holdings; this requires an empirical analysis of consumption and saving decisions. In this paper, we present estimates of a consumption function for the Soviet Union, from which an evaluation of the monetary overhang existing at the end of 1990 is derived.

JEL Classification Numbers
D12, E21, E41, P22

---

1/ We thank Hugh Bredenkamp, Gregory Grossman, Piroska Nagy, Kent Osband, Teresa Ter-Minassian, Alan Whittome and Thomas Wolf for comments and suggestions on a previous version of the paper and Luigi Guiso for helpful discussions. We also thank the Bank of Italy for allowing the use of the ESTITEST Speakeasy routine used for the econometric results presented in Sections IV and V.

Table of Contents

## Summary

In countries such as the Soviet Union, where households' wealth is mainly stored in monetary assets, increases in the money to income ratio are not appropriate indicators of an undesired accumulation of monetary balances (i.e. of a growing monetary overhang). In those countries the monetary overhang is primarily a wealth overhang, and therefore it has to be analyzed by assessing deviations of actual wealth holdings with respect to desired wealth holdings.

This paper focuses on the evaluation of the monetary overhang of households developed in the Soviet Union in the last decade. Desired wealth holdings are derived from estimates of consumption and saving behavior between 1964 and 1990. Consumption is modelled as a function of human and nonhuman wealth and of factors (such as the age distribution of the population or the real interest rates) which are theoretically likely to influence the equilibrium consumption to wealth ratio. The estimates take also into account the possibility that throughout the sample period, and not only in the most recent years, actual consumption fell short of desired consumption.

The empirical results indicate that between 1964 and, approximately, the mid-1980s consumption behavior in the Soviet Union can be described by a parsimonious representation in which the long-run ratio between consumption and total (human and nonhuman) wealth is stable; and that short-run fluctuation in that ratio are mainly due to adjustment lags of consumption expenditure. We also conclude that, again until the mid-1980s, there is no direct evidence of macroeconomic rationing and that if forced saving existed at all, it had to consist of a "chronic" component, approximately constant in relation to actual consumption. However, the existence of this component cannot be ruled out and surveys of saving behavior of Soviet households are used to evaluate its relevance. It is also shown that, in the second half of the 1980s, rationing at the macroeconomic level became more and more relevant as the increase in disposable income of the population substantially outpaced the increase in the supply of consumer goods. Bringing all components of the overhang into the picture, it is concluded that at the end of 1990 the amount of wealth accumulated in monetary form by Soviet households as a result of forced saving was around 170-190 billion rubles, close to 20 percent of GDP and around one third of existing financial assets.

## I. Introduction

The recorded rate of inflation in the Soviet Union, as measured by official price indices, has been, traditionally, extremely low. In the period 1960-80, the retail price index (which is, largely, a measure of the prices prevailing in official markets) remained basically unchanged, while it increased by slightly more than one percent a year in the last decade. This, of course, reflects the pervasiveness of price controls, which, in all likelihood, prevented markets from reaching their equilibrium levels, resulting, particularly in recent years, in repressed inflation and constraints on the availability of consumption goods in the official market. 1/

Excess demand in official markets could cause price increases in the parallel markets that would tend to equalize demand and supply for each consumer good. However, if parallel markets are too narrow, incomplete or inaccessible, actual consumption would remain below its desired level resulting in the emergence of involuntary savings with the consequent accumulation of a higher-than-desired level of wealth. When a wide menu of financial and real assets is available, this "wealth overhang" could be allocated across various saving instruments of different maturities and terms, especially if rationing is expected to persist for a relatively long period, and may, in this way, be partially frozen. However, in countries where asset markets are underdeveloped and the variety of financial assets is limited, like in the case of the Soviet Union, forced saving is likely to be accumulated largely in the form of liquid assets (cash and saving deposits). This gives rise to a "monetary overhang" which, in the event of price liberalization, would most likely lead to substantial price increases.

In this paper we first make an attempt to clarify the concepts of involuntary savings, monetary overhang and repressed inflation, as well as to disentangle the issues involved in defining and identifying them within the Soviet context. Second, a quantitative measure of the monetary overhang accumulated until the end of 1990 is calculated, based on an econometric analysis of consumption behavior and of forced saving. A short discussion of the implications of the findings is also provided. 2/

---

1/ In addition, it is likely that official price indices underestimate the actual price increases in official markets. "Hidden" inflation may occur because official price lists lag behind actual prices or changes in the quality and characteristics of goods sold in official markets. See Nuti (1989).

2/ A similar econometric approach to the one adopted here, as well as a discussion on the monetary overhang of Soviet enterprises is presented in IMF et al. (1991).

## II. Analytical Considerations

The concept of repressed inflation, as defined among others by Barro and Grossman (1974) and Portes (1989), refers to a situation in which aggregate demand exceeds supply and, therefore, the elimination of price controls and rationing would lead to an increase in the average price level. If all excess demand is for consumer goods, rationing implies forced savings and an increase in nominal wealth above the desired or equilibrium level. 1/ The difference between the nominal stock of wealth actually held and the amount desired in the absence of current and past rationing could be defined as wealth overhang. When the constraints on the availability of financial instruments limit the portfolio choices of households to very liquid or monetary assets, as has been the case in the Soviet Union and in most CPEs, it is likely that practically all the involuntary increases in the stock of wealth would take the form of higher holdings of monetary balances, which are defined as excess liquidity or monetary overhang.

Although the concepts of wealth and monetary overhang have been frequently identified, they coincide only under certain particular circumstances, mainly when money is the only available store of wealth or when other assets are fixed in price and quantities. This may be the case when regulations and intervention in financial and asset markets severely limit the financial alternatives to monetary assets and restrict the flexibility of their returns. 2/

While in countries with an underdeveloped financial structure such as the Soviet Union wealth and monetary overhangs tend to coincide, their conceptual difference is important and its implications for an appropriate measurement of the overhang are not always fully appreciated. If we admit that in the Soviet Union the monetary overhang is primarily a wealth overhang arising from forced savings, then it is clear that its measurement will have to be based on the analysis of desired against actual wealth accumulation, i.e. looking at household consumption behavior (Pickersgill (1980a)). It also follows that indicators of monetary disequilibrium, like the deviation of the money to income ratio from its "normal" level, which are useful for countries with a developed financial system, may be misleading in the Soviet Union. In countries where money is held primarily for transaction purposes, a continuous and rapid increase in the money to income ratio (i.e. a decline in velocity) is likely to signal the emergence of a monetary overhang, unless it can be explained by changes in payment

---

1/ The higher level of nominal wealth implies also an increase in real wealth at current, controlled prices but not necessarily at equilibrium prices.

2/ Of course, a monetary overhang can exist also in the absence of a wealth overhang, like in a case in which total wealth is equal to desired wealth but the composition of wealth is sub-optimal (and biased towards money).

technology, interest rates, etc., and the measurement of the overhang could be based on the behavior of that ratio, as suggested, for example, in Dornbusch and Wolf (1990). However, if money is by far the main store of wealth, like in the Soviet Union, the money to income ratio should be interpreted as a wealth to income ratio. The extent to which an increase in this ratio signals a disequilibrium will have therefore to be assessed against the factors influencing the desired wealth to income ratio (see Section III.1).

There are two conceptual issues that require attention when analyzing the validity of disequilibrium notions such as wealth and monetary overhang: (i) the role played by unofficial or parallel markets in eliminating imbalances; and (ii) the observed co-existence, in the presence of price controls, of shortages and slacks in different markets.

(i) The presence of well-functioning parallel markets where prices are unregulated could be inconsistent with the concepts of involuntary savings and monetary overhang. If these markets, which could be legal (such as the kolkhoz market in the Soviet Union) or illegal, are very widespread and large, if they are accessible to everybody and supply most goods, they will tend to absorb most, if not all, of the excess demand spilling over from the official markets. Prices in these markets will be higher than in official markets, reflecting relative scarcities, transaction costs, risks of operation, and expectations about future evolution of price controls. The relevant price level for the economy would be a weighted average of official and parallel market prices and total expenditure would be equal to desired expenditure, involuntary accumulation of wealth would be zero, and no monetary overhang would be present since the real supply and demand for money would be equal when deflated by the relevant, weighted price level. A fully flexible and clearing commodity market contradicts, indeed, the notion of involuntary savings and undesired monetary holdings. 1/

Such a scenario, however, may not be realistic in many instances, including the Soviet Union. Parallel markets may not be wide enough to supply most of the relevant goods and they may tend to be largely concentrated geographically. Access to these markets and the variety of goods available may be highly discouraged by penal sanctions and by non-competitive practices typical of illegal markets where intimidation and preferential treatment are common. The goods exchanged in the parallel markets would, therefore, be seen only as imperfect substitutes of those exchanged in official markets; in these circumstances, it has been shown by Gardner and Straus (1981) that the presence of clearing, although limited, markets, does not prevent the emergence of involuntary savings. 2/ Moreover, if some form of price liberalization is expected in the near

---

1/ It has been claimed that this is the case in many CPEs where parallel markets are common. See Nuti (1989) and Grossman (1977).

2/ Relative to the level of savings that is expected to prevail in the absence of price controls in the official markets.

future, parallel markets, even if extended enough, may not absorb all of the excess demand from official markets. Households may restrict their buying in parallel markets because the expected relaxation of official price controls would usually lead to a fall in parallel prices. When a price reform is expected, therefore, parallel markets could easily co-exist with the continuous buildup of a monetary overhang. 1/ Similarly, refrain from resorting to the parallel markets (and the consequent buildup of monetary balances) would be observed when the supply of goods in the official market is expected to increase significantly in the near future and when the probability of buying these goods at lower prices in the official market increases with queuing. 2/

Although the size and importance of secondary markets in the Soviet Union is fairly large, 3/ it is unlikely that they have been able to prevent the emergence of significant monetary imbalances, particularly in recent years. Despite the lack of precise information, it is widely believed that there is a large variety of goods that are not available in these markets and that, for many specific commodities, household access is rather limited. Moreover, given the high level of uncertainty about the quality and timing of goods availability in official markets, purchases at much higher parallel prices are contained, and money is accumulated for "lucky" purchases in official outlets. Ultimately, the clearing function of secondary markets is an empirical question not easy to answer with the available information. From the policy point of view, however, price liberalization would presumably trigger increases in official prices not likely to be compensated by commensurate reduction in parallel prices such as to keep the relevant "weighted" index unchanged. 4/

---

1/ Such overhang is, however, "voluntary" in the sense that it arises from speculative reasons and not only from current commodity scarcities.

2/ If official allocations are not implemented through coupons but rather by queuing, and the probability to obtain the desired good is, for each individual, larger than zero, it is possible that households prefer to delay their purchases and queue longer (accumulating at the same time more undesired balances) rather than pay the higher parallel market prices.

3/ The kolkhoz market and the private supply of housing services (particularly housing construction) constitute the most important legal parallel markets in the Soviet Union (Grossman (1977)). Official data on expenditure and consumption take partially into account economic activity outside the state sector but exclude entirely incomes from illegal activities.

4/ In the following sections partial consideration of economic activity in parallel markets will be given by using adjusted data (instead of official data) on consumption and prices. To the extent that this is not sufficient to take into account the role of parallel markets, indications on the effect of unreported transactions on the estimate of the overhang will be provided.

(ii) The second issue of analytical interest is the effect of multiple markets on the conceptual validity of macroeconomic rationing. It has been argued 1/ that the simultaneous presence of slack and scarcities does not pose any conceptual problem. If, at the prevailing vector of official prices, aggregate demand across all markets exceeds aggregate supply, the economy suffers from repressed inflation in the sense that the absolute level of prices is too low to clear the overall market. At the same time, if excess supply in some markets coexists with excess demand in others, and the sum of excess supplies is equal to the sum of excess demands, this requires an adjustment in relative prices but not in the absolute price level. Note, however, that the simultaneous existence of shortages and slacks creates some problems for the measurement of forced saving. The observation of an "abnormally high" level of saving based, for example, on econometric estimates does not necessarily imply the existence of aggregate excess demand as it can be offset by increased accumulation of unsold products. Again, the problem might simply be one of relative prices, not of absolute prices. This implies that the potential effect on absolute and relative prices of the undesired accumulation of wealth will have to be evaluated against possible increases in stockbuildings. These comparisons raise complicated empirical issues, (the most serious being that the value of stocks will have to be evaluated at the equilibrium price vector, which is not known). Despite the difficulties, we will proceed under the hypothesis that, in principle, the existence of many markets, some of which are possibly characterized by excess supply, does not prevent the measurement of an aggregate disequilibrium. 2/ In addition, the estimates of the overhang provided in the following sections will be compared with some available data on the accumulation of unsold consumer goods in the Soviet Union.

---

1/ See, for example, Portes and Winter (1980).

2/ It has been argued, instead, that the concept of aggregate disequilibrium is not well defined in economies where chronic shortages are pervasive (Kornai (1980, 1982)). According to this view, in an economy in which shortages are chronic, forced substitution is widespread: households that cannot obtain the commodities that they seek will buy substitutes and will not, generally, increase involuntarily their savings. If this is, indeed, the case, it would be correct to say that there is no overhang because income is always spent anyway. There would be, of course, an involuntary component in consumption behavior since households utility is clearly affected by the distortions in their desired expenditure basket, but there would be no accumulation of undesired balances.

## III. Consumption Behavior and Monetary Developments in the USSR

It is a widely accepted notion that over the second half of the 1980s households' consumption in the Soviet Union has been below the desired level and, therefore, savings were being involuntarily accumulated, mostly in the form of monetary balances. There is much less agreement, however, on the nature of consumers behavior and the extent of suppressed inflation before the mid-1980s. As a background to the quantitative appraisal of the monetary overhang, a number of issues related to the debate about repressed consumption in the Soviet Union are reviewed in this section, and a summary account of the recent monetary and credit developments, which have been behind the growth of households' disposable income, is presented.

### 1. How long has consumption been repressed?

There is a large body of literature that sustains the view that forced savings and repressed inflation have been a permanent characteristic of all CPEs, including the Soviet economy. 1/ According to this view, the existence of some degree, possibly mild, but chronic, of macroeconomic rationing is an essential component of macroeconomic management in CPEs. In the first place, due to the "soft budget constraint" of enterprises, the wage bill would always tend to exceed targeted figures (Winiecki (1985), Kemme (1989)). Moreover, the wage targets themselves would tend to allow some degree of excess demand, because the distribution of purchasing power in excess of what is required to absorb the supply of consumer goods (at desired saving rates) would allow policy planners to avoid the risk of insufficient demand for consumer goods (Ofer (1990)). Second, the persistence of shortages would enhance social discipline: social tensions, for example, could be eased by allowing temporary increases of the supply of consumer goods at the most appropriate moment. Due to this deliberate policy of the authorities, saving would therefore tend to exceed its desired level giving rise to a wealth overhang. 2/

It is also frequently argued that, in an economy characterized by chronic shortages, not only forced savings are present but also voluntary savings tend to be higher because buyers maintain very high reserves of purchasing power in order to be able to acquire goods that appear in the market in a random and unpredictable fashion (Kornai (1980), pp. 457, 458; Schroeder and Severin (1976), Grossman (1990)). Such a precautionary increase in purchasing power tends to inflate the observed saving rate. This point is important because it implies that the desired level of wealth is not independent of both current and expected state of shortages affecting

---

1/ For and extensive discussion on the debate about the existence and extent of repressed inflation in the CPEs see the surveys by Davis and Charemza (1989a), Portes (1989), and Van Brabant (1990).

2/ Note that, according to this view, households are not able to react to excess saving by reducing their labor supply, given the structural rigidities characterizing labor markets in CPEs.

the system. Should the shortages be relieved due, for example, to a price liberalization policy, the portion of wealth voluntarily maintained for precautionary purposes would become part of the overhang. Therefore, even if empirical evidence showed the absence of forced savings in a shortage economy, it still may be possible that a credible elimination of price controls could raise equilibrium consumption demand, putting pressure on the price level. 1/

Given its nature, chronic excess saving would be difficult to detect even by sophisticated analysis of macroeconomic consumption behavior because it would result in a permanent increase in the average observed saving rate. 2/ In order to prove the existence of chronic shortages in the Soviet Union, some authors (e.g. Birman (1980), Birman and Clark (1985), Pindak (1983), Winiecki (1985), Nove (1986)) have, therefore, relied mainly on an indicator of stock disequilibrium, namely the ratio between household financial holdings (most of which are in monetary form) and consumption or disposable income. 3/ These ratios have indeed exhibited very rapid growth throughout the last thirty years (Chart 1) which has been interpreted as indicating an increasing undesired accumulation of monetary balances. 4/

Many authors have, however, challenged this evidence as well as the view that repressed inflation and involuntary savings have always been characteristics of the Soviet economy. The main critique is that, in countries with limited capital markets, money to income ratios, such as those reported in Chart 1, have a different meaning than in economies with well developed financial markets. As mentioned in Section II, in the Soviet Union, money is primarily a store of wealth and therefore its behavior in relation to GDP should be interpreted as a wealth to income ratio. Viewed in this way, several factors could explain a voluntary increase in the

---

1/ It could be argued, however, that precautionary savings may actually rise in the wake of systemic reforms if these imply increasing uncertainty regarding employment, social services, etc.

2/ This point is similar to that raised by Kornai (1982), p. 35.

3/ Other indicators, not available for the Soviet Union, however, have been used for other CPEs. Kornai (1982), for example, suggests considering the number of people queuing for officially allocated housing, the time invested in search for goods and the physical length of queues.

4/ A second indicator of repressed inflation sometimes used for the Soviet Union is the ratio between secondary (kolkhoz) market and state prices; this ratio shows a continuous increase in the last 30 years, accelerating at the end of the 1980s (Chart 2, upper panel) which has been taken as indicator of chronic excess demand (Nove (1986); p. 255, for example). However, as indicated by Holzman (1960), repressed inflation should be measured by the secondary/official price ratio weighted by the share of kolkhoz market expenditure in total consumer expenditure. When this is done, there is no visible trend in the ratio over the period discussed here (Chart 2, lower panel).

aggregate wealth to income ratio. Ofer (1990) has explained the increase in the wealth to income ratio as arising from (1) the expansion of expenditure in durable goods, given the virtual absence of consumer credit, and (2) the deterioration in the quality and availability of public services and social security payments. Moreover, as the level of households' wealth in relation to income or consumption was extremely low at the beginning of the 1960s (compared, for example, with wealth to consumption ratios in Western countries) it should not be surprising to observe a steady rise in the desired wealth to income ratio (Asselain (1981), Portes (1989)). Finally, a well known implication of the life cycle approach to consumption behavior is that, due to aggregation, the equilibrium aggregate wealth to income ratio is a negative function of the growth rate of income (see Modigliani (1986), for example). Thus, the increase in the wealth to income ratio in the Soviet Union may be explained by the deceleration of disposable income growth between the 1960s and the 1980s (Chart 3, upper panel). 1/

These arguments are quite persuasive and it could be asserted that, before the second half of the 1980s, there seems to be no reasons to assume a priori the existence of wealth and monetary overhangs; this "agnostic" view is reflected in the empirical analysis of Section III. 2/

2. Monetary and credit developments during the 1980s 3/

Two important monetary developments characterized the 1980s. In the first place, the increasing deficits that emerged in the 1980s led to the progressive acceleration in the expansion of bank credit to the Government and, in the second half of the decade, to a sharp crowding out of enterprise credit. Second, during the last part of the decade, a strong increase in both household disposable income and savings rates occurred (Chart 3), the

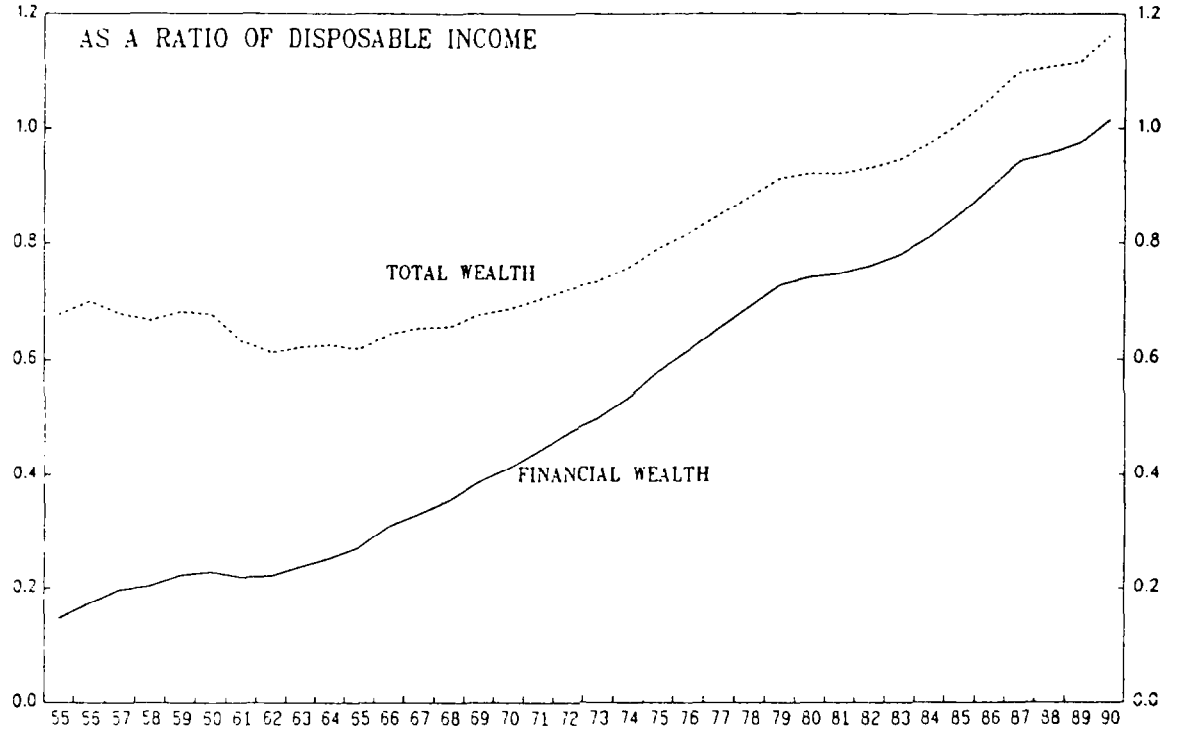
---

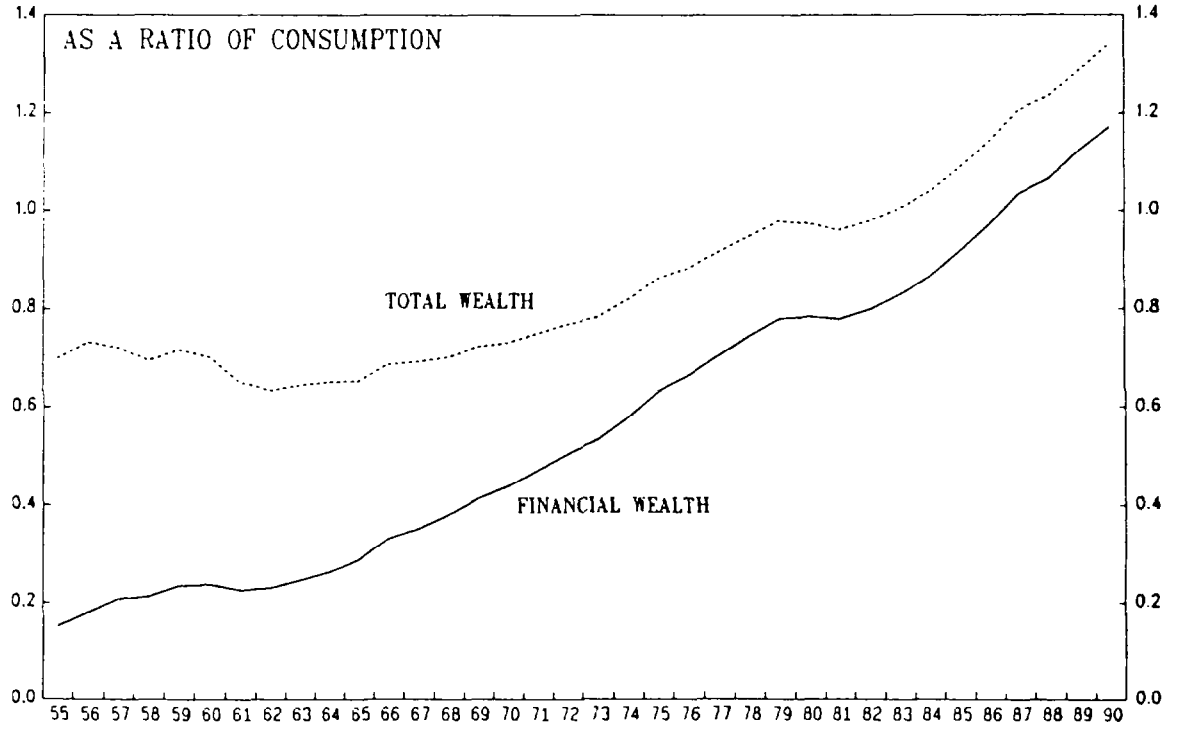
1/ Note also that if we took the money to income ratio as indicator of a monetary overhang we would have to conclude not only that the overhang accumulated throughout the last 30 years, but also that its rate of growth did not accelerate in the second half of the 1980s, which is hardly credible in light of well-reported phenomena of increased rationing characterizing the most recent years.

2/ Previous econometric analysis of consumption behavior in the Soviet Union also reached ambiguous conclusions on the state of the consumption goods market before the 1980s. Pickersgill (1976) finds that consumption behavior between 1955 and 1971 can be explained mainly by movements of disposable income without the use of proxies for rationing effects. However, Pickersgill (1980b and 1983) identifies the existence of a structural break in consumption occurred in the middle of the 1960s (reflected in the increase of the saving rate; see Chart 3); she suggests that this break is due to rationing effects.

3/ For a complete detail of recent developments and a discussion of the evolution of monetary institutions in the Soviet Union see IMF et al. (1991), Vol. I, Chapter III.2 (pp. 359-377) and Vol. II, Chapter IV.5 (pp. 107-137).

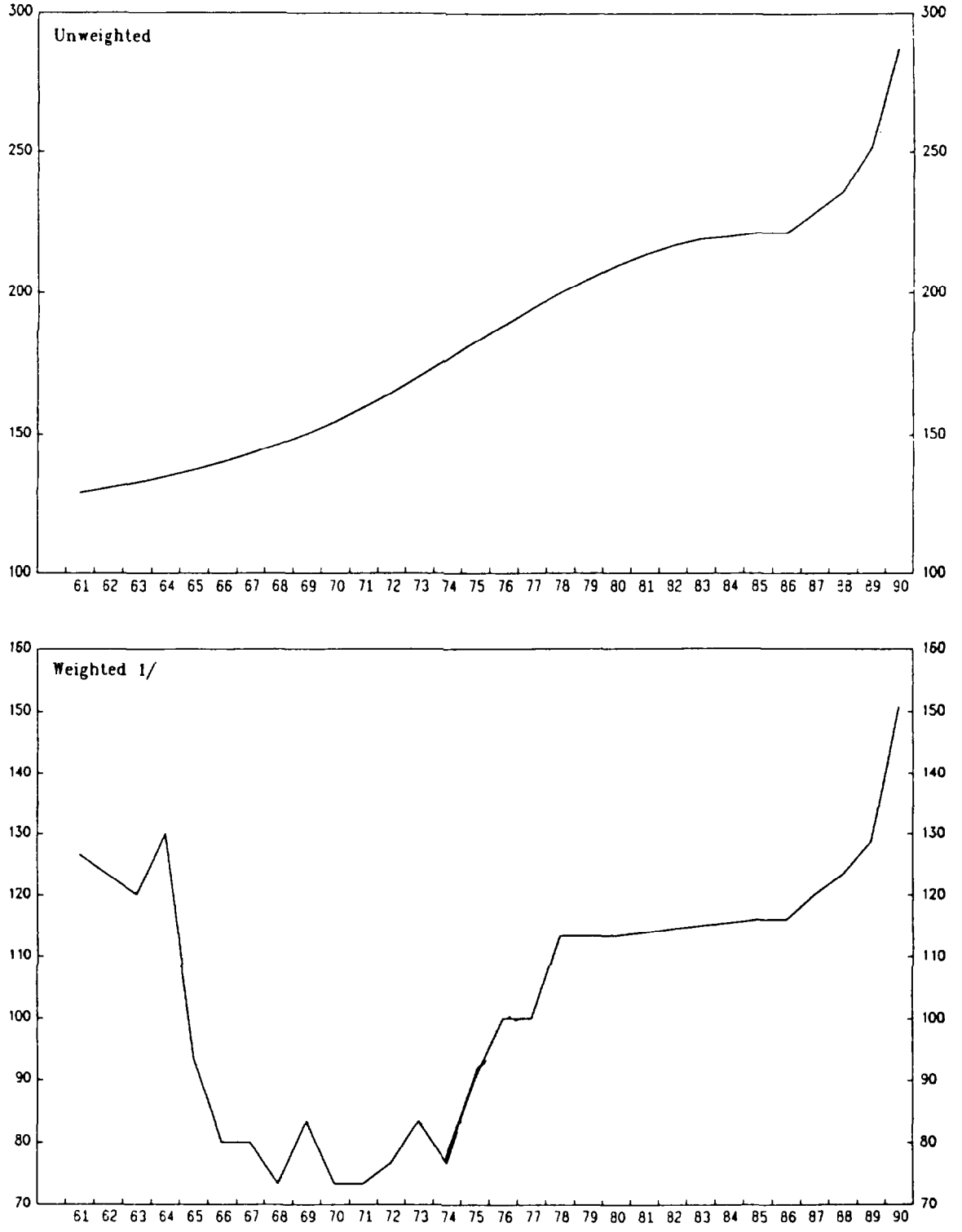
CHART 1
U.S.S.R
HOUSEHOLDS' WEALTH, 1955-90




Sources: See Appendix I.

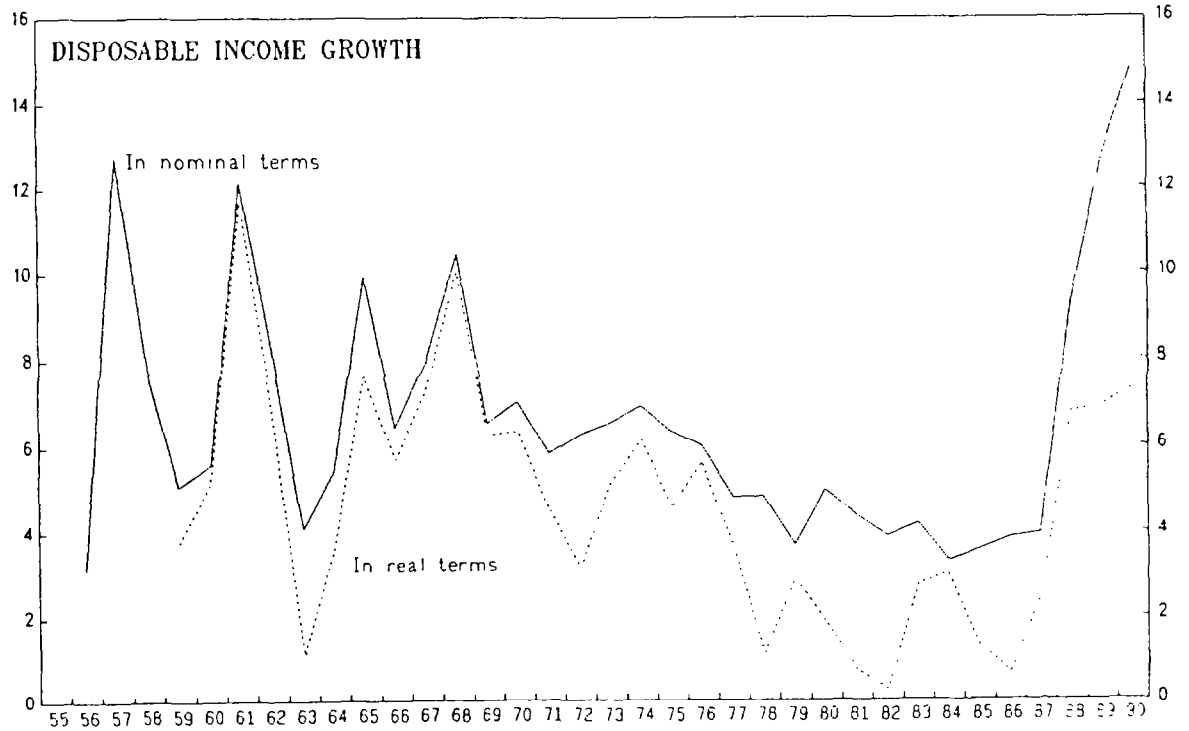
CHART 2
U.S.S.R
PRICES ON KOLKHOZIAN MARKETS, 1960-90
(Relative to state prices)

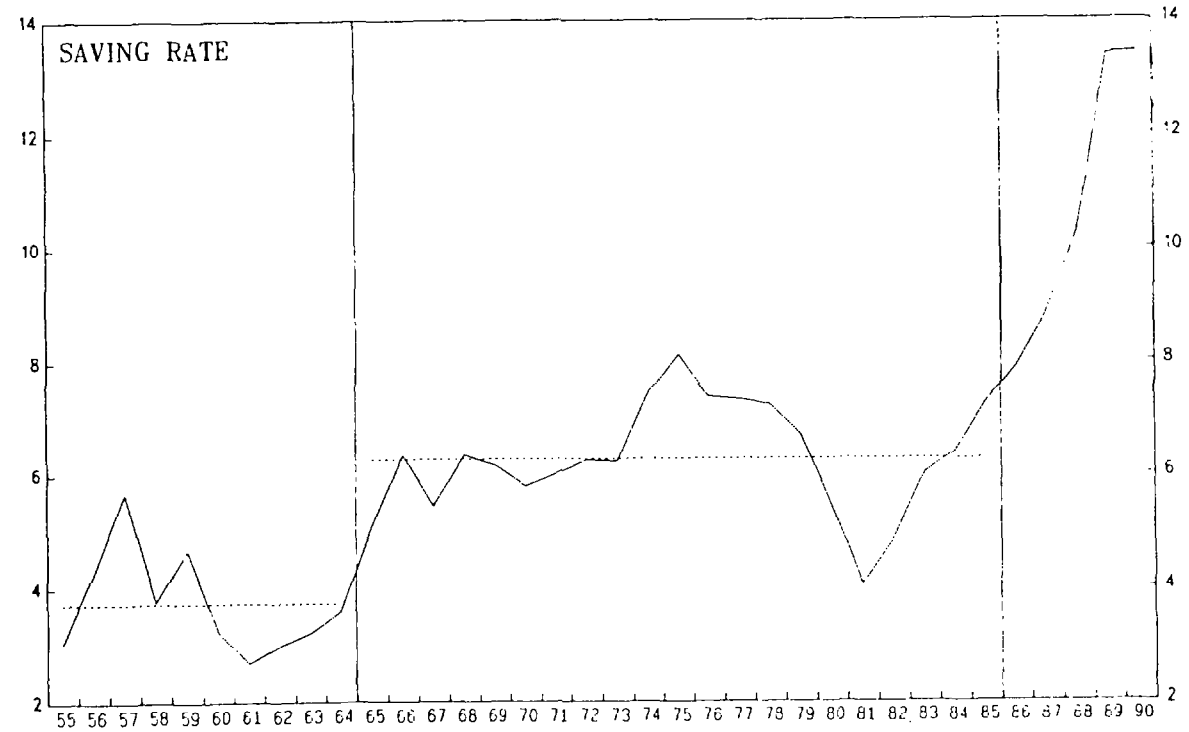



Sources: IMF et al. (1990).

1/ Unweighted ratio multiplied for the share of output sold in the free market (1960=100). (Holzman's rationing indicator).

CHART 3
U.S.S.R
DISPOSABLE INCOME AND HOUSEHOLDS' SAVINGS, 1955-90




Sources: See Appendix I.

latter reflecting, as is claimed here, increasingly strong constraints on consumption expenditure. As the decade neared the end, these two elements, together with the growing freedom granted to enterprises to keep a higher share of their internal resources, combined to produce a picture of overextended monetary credit conditions, which has continued to deteriorate in 1990.

The monetary developments over the decade can be broadly separated into three main phases (see Table 1):

a. 1981-85. The behavior of money and credit during this period reflects the traditional behavior of these variables in the pre-Perestroika Soviet Union: bank credit, both to the Government and to the enterprises, increased at a relatively fast rate as a consequence of the preeminence given in the Plan to investment over consumption. However, by restraining the expansion of nominal (and real) wages, the increase in households' monetary holdings was contained and the counterpart to credit growth was primarily represented by higher balances in the enterprise accounts, that could only be used for specific authorized expenditures. Given the limited liquidity and fungibility of these funds, credit expansion did not have strong expansionary consequences because its monetary impact was effectively blocked.

b. 1986-87. This is a short transitory phase that separates the pre-reform period from the fully blown monetary expansion of the late 1980s. The period is characterized by an attempt of the authorities to offset, by curtailing enterprise credit, the rapid acceleration in the bank financing of larger budget deficits (at an annual rate of more than 30 percent). As a result, total credit expansion decelerated, as the decline in enterprise credit largely offset the rise in government credit. However, already in this period the rate of growth of broad money (M2) of both household and enterprises accelerated.

c. 1988-89. As the government deficits started rising rapidly, the squeeze of enterprise credit became insufficient to prevent an overall acceleration of total credit and monetary creation. Credit to the Government rose by about 40 percent per year while credit to the economy (enterprises and households) declined by only 5 percent, with the result that the growth rate of total bank credit more than doubled with respect to the previous period, averaging more than 11 percent a year. Moreover, despite a tightening in their ability to borrow, enterprises became increasingly liquid since the reforms raised significantly the volume of profits that could be retained and used without major restrictions. This, together with the relaxation of wage constraints, led to an unprecedented growth in wages and a major acceleration on households' income growth, fueling, in the absence of adequate increases in consumer goods, the growth of households' monetary holdings at increasingly high rates. It is in this last period that the monetary overhang appears to have assumed sizable proportions. This rapid buildup of monetary balances is the culmination of a process of progressive acceleration in the rate of growth of households'

financial holdings, which rose from an average of 7 percent in 1981-85 to 9 percent in the following year, to 13 percent during 1988-89 (Table 1). 1/

Table 1. U.S.S.R.: Main Monetary and Credit Aggregates

(Average annual growth rates)

| | 1981-85 | 1986-87 | 1988-89 | 1990 |
|---|---|---|---|---|
| Total bank credit | 8.7 | 5.2 | 11.2 | 10.5 |
| Government credit | 8.6 | 30.4 | 39.4 | 16.6 |
| Credit to the economy | 8.7 | -2.3 | -4.7 | 4.3 |
| Money (M2) | 7.5 | 11.6 | 14.4 | 15.3 |
| Households | 7.2 | 9.6 | 13.1 | 13.5 |
| Enterprises | ... | 18.3 | 18.4 | 20.0 |

Source: IMF et al. (1991).

## IV. Actual and Desired Consumption in the Soviet Union

Our measurement of the overhang is based on the analysis of the behavior of actual and desired consumption. Consumption behavior is analyzed in terms of standard consumption theory.

### 1. The analytical framework

Standard consumption theory based on the Life Cycle Hypothesis stresses the existence of a relation of proportionality between (desired) households' consumption and households' human and nonhuman wealth (see Blanchard (1985), for example):

$$(1) \quad C^d = A\ (W + H)$$

1/ In addition, in the later period there was a marked shortening of maturities, as the most liquid components, namely demand deposit and currency, rose more rapidly than saving deposits and bonds. This represents a change in the trend observed during the previous two decades since until 1987 the composition of households' financial assets had shifted decisively towards the longer maturities. This "flight to liquidity" may be a symptom of increasing uncertainty (including the fear of administrative measures against bank deposits) or it may reflect a precautionary demand for cash in the context of an increasingly scarce and unpredictable supply of goods.

where $C^d$ is households' consumption 1/, W is nonhuman wealth 2/, and H is human wealth 3/; A is the equilibrium ratio between consumption and wealth, which will depend on a set of variables affecting the intertemporal distribution of present resources; we assume that A can be expressed as:

$$(2) \quad A = b_0 \exp(Xb)$$

where b is a vector of coefficients and X stands for a set of variables that affect consumption behavior and that will be detailed below. Equation (1) assumes a unitary wealth elasticity of consumption; moreover, it is based on the hypothesis of an equal effect of human and nonhuman wealth on

---

1/ In our definition, consumption will include also consumer durables. This is an approximation; in theory, one would like to include in consumption only the value of the "services" obtained from the current stock of consumer durables; in this case, wealth could be defined as inclusive of consumer durables. Lack of adequate data on consumer durables, difficulties in estimating the value of their services and uncertainty on the inclusion, especially in a country like the Soviet Union, of consumer durables as components of wealth, led to the specification reported in the text.

2/ As detailed in the Statistical Annex, wealth is defined as the sum of financial wealth (currency, bank deposits, government bonds and insurance policies net of households' borrowing), plus houses and other real wealth (mainly livestock and other property held by rural households). The value of wealth at the beginning of the period is considered for each time period.

3/ Human wealth is defined as the present discounted value of disposable labor income; this has been computed by adding to a three-period centered moving average of current disposable labor income the discounted expected stream of income in the next 27 years; in this respect, it has been assumed, for simplicity, that per capita real income was projected to grow at the constant annual rate of 2.5 percent (close to the average for the sample period 1965-85, considered in the estimates); the average interest rate on bank deposits was used as discount factor. The 27-year interval has been selected in the following way: the average expected life at birth of the population in the Soviet Union has been close to 69 years throughout the sample period (Kingkade (1987), p.11). Assuming an average expected life of 72 years for the population of age 18 (taken as average starting year of working life), 27 (= (72-18)/2) is the average number of years for which a middle-aged worker expects to receive labor income (including pension payments) in the rest of his/her life.

consumption (i.e. that the composition of total wealth is irrelevant and only the total matters 1/).

In order to allow for more flexibility in the empirical specification of consumption behavior we assume, instead, that:

$$(3) \quad C^d = A(W+H)^{a1}W^{a2}$$

where $a_1$ and $a_2$ are parameters. Of course, if $a_1=1$ and $a_2=0$, equation (2) collapses to equation (1). In addition, in order to reduce the collinearity between regressors, it is convenient to write (3) as:

$$(4) \quad C^d = A(1+H/W)^{a1}W^{a1+a2}$$

Consider now the possibility that, even in the absence of a limited supply of consumer goods and of sticky prices, observed consumption differs from desired consumption; without loss of generality, the relation between actual and desired consumption can be written as:

$$(5) \quad C = C^dR \qquad 0 \leq R \leq 1$$

where C is actual consumption and R is one minus the amount for which consumption demand is rationed (as a percentage of desired consumption). Note that R is, of course, equal to one in the absence of disequilibrium and, as long as C is measured exactly, that it reflects all possible forms of forced substitution, including purchases in the black market. 2/ For sake of generality, we express R in the following way:

$$(6) \quad R = c_0\exp(c_1IR)$$

---

1/ The most obvious reason why this may not be the case is that, in the absence of (efficient) capital markets, households cannot borrow against future labor income and that, as a consequence, an increase in human wealth has an effect on consumption more contained than an increase in nonhuman wealth. It must be recalled, however, that this aspect becomes relevant only in the presence of liquidity constraints, i.e. when desired consumption (based on human and nonhuman wealth) exceeds the amount of resources available in the current period. Therefore, we cannot a priori rule out the possibility that, even in the absence of efficient capital markets (such as in the Soviet Union), desired consumption is equally influenced by both wealth components. It can also be argued that uncertainty on future incomes implies that the discounted income flow may have a lower "weight" that nonhuman wealth; this aspect may, however, not be very relevant in the Soviet Union, given the high degree of "certainty" attached to future labor incomes (see, on this point, Ofer and Pickersgill (1980)).

2/ Thus, if forced substitution (between different goods on the official market or between goods on the Government and on the black market) is large, so that actual expenditure (albeit not its composition) approaches desired expenditure, R is close to 1.

where $c_0$ and $c_1$ are, respectively, positive and negative constants, and IR is an observable variable which is an increasing function of the degree of rationing. Equation (6) allows for the presence of macroeconomic rationing embodied in an unobservable component (i.e. $c_0 \neq 1$ ) that remains approximately constant in relation to consumption. 1/ We assume that $c_0$ incorporates possible voluntary shifts of consumption due to the existence of rationing at the micro level (due, for example, to increasing precautionary saving as argued by the chronic rationing school). 2/ IR, (the rationing indicator) is, in our case, the ratio between level of prices in the nonofficial market (specifically in the kolkhoz market) and in the official market (weighted or unweighted for the size of the kolkhoz market with respect to official markets) which is assumed to increase with the level of rationing. It is, therefore, implicitly assumed that the kolkhoz market is extended enough to provide a reliable indicator of excess demand, but is not sufficient (especially because of the limited number of products supplied) to eliminate excess demand at the macro level. 3/

By substitution of (2), (4) and (6) into (5) we finally obtain (in log form):

$$(7) \quad \log C = (\log b_0 + \log c_0) + a_1 \log(1+H/W) + (a_1+a_2)\log W + Xb + c_1 IR$$

It remains to specify the variables, included in X, assumed to affect consumption behavior. The following four variables have been considered to be relevant in the present context:

---

1/ This corresponds to the existence of a "normal" degree of rationing, as suggested by the "chronic rationing" school.

2/ Note that, strictly speaking, this component does not reflect actual rationing as consumption is voluntarily reduced to allow a buildup of precautionary reserves; this is the reason why this component may not be related to observable demand pressure indicators. However, in case of price liberalization, this component plays the same role of forced saving; as the reason for the accumulation of precautionary reserves disappears with price liberalization, the accumulated balances become part of the "overhang" that people desire to spend.

3/ The use of rationing proxies for the estimation of demand curves under rationing, based on Fair and Jaffee (1972), is simpler than the one based explicitly on disequilibrium econometrics (see, with reference to CPEs, Portes and Winter (1980), Portes, Quandt and Yeo (1988) and Burkett (1988), for example). First, estimates can be performed with OLS; second, there is no need to specify a supply function, whose form would be arbitrary in the absence of appropriate models of enterprise behavior in CPEs. Finally, the use of disequilibrium econometrics would have implied the separation of the sample between points on the supply and points on the demand function; this procedure seems inappropriate given the very limited number of observations available. Proxies for rationing in the estimation of consumption functions for the Soviet Union have also been used to Green and Higgins (1977) and by Pickersgill (1980).

a. the real interest rate on deposits 1/; given the low level of private wealth in the Soviet Union, the expected sign of this variable is negative as the substitution effect prevails on the income effect;

b. the "dependency ratio", defined as the ratio between the nonworking population (children below 16 years of age and pensioners) and the remaining population. This is expected to have a positive sign, as a large number of children and old people imply a high share of people with relatively low saving rates;

c. the "benefit ratio" defined as the ratio between the Social Consumption Fund benefits (mainly pensions and other grants 2/) received by each nonworking member of the population and the wage rate. This has an expected positive sign, as high nonlabor incomes reduce the need to accumulate savings.

d. the inflation rate, with an expected negative sign, as high inflation reduces the real value of accumulated wealth, which has to be restored by increased saving. 3/

A dynamic specification is postulated, assuming a slow adjustment of consumption to changes in wealth; in particular, the following "quasi-error-correction mechanism" was adopted:

$$(8)\quad Dlog(C) = d_0 + d_1 log(W/C)_{-1} + d_2 log(1+H/W)_{-1} + Xd + d_3 IR + d_4 Dlog(Y)$$

---

1/ The real interest rate has been computed by deflating the nominal interest rate on bank deposits with an estimate of actual (as opposed to official) inflation (see Appendix I).

2/ The Social Consumption Fund provides education and health services, grants, pensions and scholarships to the Soviet population. The benefit ratio was also computed considering the per capita benefits (i.e. the benefits for each member of the population) without altering substantially the econometric results.

3/ Lack of adequate information on the stock of consumer durables prevented its use as an additional explanatory variable, despite its potential relevance in explaining saving movements in the Soviet Union (as argued in Section III.1). Note that the variables indicated in (b), (c) and (d) are included only because of the imperfect way in which the current real value of human and nonhuman wealth is computed. If wealth were computed by aggregating all individual discounted income streams of the population (plus the current real value of nonhuman wealth) it would be necessary to include only the real interest rate.

where Y is disposable income and D is the first difference operator. 1/

In the above framework the difference $C^d - C = S - S^d$ represents forced saving, which, short of the unobservable chronic component of rationing ($c_0$), can be measured from the estimates of (8). 2/ To move from the definition of flow disequilibrium (forced saving) to that of stock disequilibrium (the wealth overhang), note, first, that the choice on desired consumption involves a choice of (end-of-period) desired wealth; calling $W^d$ desired end-of-period wealth, we have, in the absence of capital gains:

$$(9) \quad W^d = W_{-1} + S^d(W^d_{-1}, H, \ldots)$$

where $S^d \equiv Y - C^d$. 3/ Thus, if desired saving is smaller than actual saving, actual wealth will be higher than desired wealth, i.e. there will be a wealth overhang at the end of the period. 4/ We now define the overhang at time t as the difference between actual wealth holdings and the amount of wealth that would have been held in the absence of current and past forced saving. This is given by:

$$(10) \quad OV_t = W_t - W^d_t = W_t - W_0 - \sum_{j=1}^{t} S^d_j = \sum_{j=1}^{t} S_j - S^d_j$$

---

1/ Note that this specification does not correspond completely to an error correction applied on equation 2 as the change in disposable income, instead of the change in total wealth, appears as "impact variable" in (8). Equation (8) implies that changes in disposable income (and hence in human wealth), possibly in connection to liquidity effects, affect consumption faster than changes in nonhuman wealth. Note also that if $d_1 = d_2$ then the long-run elasticity of C with respect to H + W is one and there are no composition effects, which corresponds to the case in which, in equation (7), $a_2 = 0$ and $a_1 = 1$.

2/ Clearly, $c_0$ as part of the constant in (7), will have to be evaluated judgmentally.

3/ Note that desired saving has to be evaluated, for all periods, along the equilibrium path, i.e. it has to be derived by using in the consumption function desired wealth and not actual wealth.

4/ Note that even if households desire to spend this "wealth overhang", they may not necessarily want to spend it entirely in one period. The share of the overhang that households want to spend in the current period will depend on several factors, including the type of consumer goods and services that was rationed in the past and all factors affecting the intertemporal distribution of households' resources. In the extreme case in which forsaken consumption has not created an overhang of "unsatisfied needs", the overhang has the same effect on expenditure of a "windfall gain" which, in a life cycle perspective, will be spent only gradually throughout life.

where $W_0$ is the initial value of wealth (i.e. the value of wealth before the first period of rationing). Note that if in any of the periods between time 0 and t actual saving is lower than $S^d$ 1/ the overhang will be reduced.

Assume now we had an estimate of all parameters of equations (7) and (8), including a judgmental estimate of the breakdown of the constant allowing for an identification of $c_0$ (the "chronic overhang"); desired saving could be obtained through a dynamic simulation of the equation over the complete period, starting at a point in which the overhang is considered to be zero or small 2/, and the parameters reflecting the amount of rationing $c_0$ and $c_1$ are set to zero. The cumulative sum of desired saving (plus the initial value of wealth) represents the desired level of wealth. Comparing this level with actual wealth, as in equation (10), it is possible to evaluate the stock of the wealth overhang at any given date. 3/

In order to evaluate the monetary overhang, the first step is, therefore, to estimate equation (8). As that equation takes explicitly into account the possibility of rationing, in principle, there is no need to exclude from the estimation period years in which rationing was considered to be strong (such as the late 1980s). It was found, however, that estimating equation (8) over the entire data range available, including the second half of the 1980s, yielded poor results. More specifically, it was clear that the parameter reflecting the degree of observable rationing ($d_3$) was not stable. This was indication of the existence of a structural break, probably due to increasing degree of rationing. 4/ The above procedure for the measurement of the overhang was therefore modified as follows: first, equation (8) was estimated in a period in which behavioral parameters appeared to be stable. As a first approximation, the sample period included 1964-85, but, as reported in Section V, statistical tests were then used to identify more precisely the year of break. The estimated equation was then used to simulate over the entire data sample (including the late 1980s) the behavior of desired consumption (after setting to zero the rationing

---

1/ This can occur because, after a period of rationing, supply may again increase allowing for a gradual absorption of the initial overhang.

2/ As we are considering a growing economy, it is always possible to start the simulation in a period (e.g. the early 1960s) in which the overhang was "small" with respect to the value of the overhang at the end of the period.

3/ Note that it is also necessary to include as part of desired saving the error term of the equation.

4/ In theory, if the included proxy for rationing were very good, an increased degree of rationing would not necessarily induce instability in the equation. But, in practice, it is possible that the proxies used are inadequate to describe fully the extent of the increase in rationing occurred during the late 1980s.

coefficients, if significant, in the estimates); forced saving was finally measured as the difference between actual and desired saving. 1/

2. Estimates of the consumption function

Tables 2.a-2.c report the OLS estimates 2/ of equation (8) (on annual data for the period 1964-85). 3/ Three sets of results are presented: Table 2.a refers to equations in which nonhuman wealth is included in its broader definition (net financial assets plus houses and rural properties); Table 2.b reports estimates for which only net financial wealth was used; finally, Table 2.c reports results referring to a simpler specification based only on disposable income. Together with coefficient estimates, t statistics and the usual goodness of fit indicators, the tables show a number of statistics relative to "diagnostic tests" on the normality of

---

1/ Note that, as the simulation includes periods outside the range used in the estimation, it is not possible to include in the estimate of desired saving the error term; the measurement of the overhang will therefore be affected by a disturbance, equal to the error term outside the estimation period.

2/ The use of OLS in the estimation of consumption functions has well known drawbacks. The main problem is the endogeneity of income with respect to consumption demand; in the context of CPEs, however, this endogeneity should not be taken for granted as total income may be entirely supply determined (so that random shocks in consumption demand would affect mainly stockbuilding rather than total output). More serious may be the consequences of measurement errors affecting disposable income, especially if related to the existence of black markets; however, as argued in Appendix II, the effect of measurement errors in the sample period are probably limited.

3/ Limiting the estimation period to the post Khrushchev era, may help identifying a stable behavior in the absence of regime shifts. On the other hand, we are forsaking the possibility of explaining the "jump" in the propensity to save occurred between the first and second half of the 1960s. It must be added, however, that the reliability of the data declines rapidly as we go back in time; more specifically, official data on financial savings (particularly cash holdings) are available only as of 1964, the first year of our sample period; in this respect, it cannot be ruled out that the jump in the saving ratio observed in the middle of the 1960s was influenced by lack of adequate information on cash holdings (see Appendix I).

Table 2a. U.S.S.R.: Estimates of Households' Consumption

(OLS; annual data: 1964-85; dependent variable DlogC)

| Variables | Equation A | Equation B | Equation C | Equation D | Equation E | Equation F |
|---|---|---|---|---|---|---|
| Constant | -1.25<br>(-1.24) | -1.5<br>(-2.88) | -1.39<br>(-2.83) | -0.02<br>(-0.03) | -0.94<br>(-1.26) | -1.54<br>(-2.90) |
| log $(W/C)_{-1}$ | 0.51<br>(2.11) | 0.43<br>(2.89) | 0.41<br>(2.84) | 0.52<br>(3.12) | 0.53<br>(2.66) | 0.55<br>(2.74) |
| log $(1+H/W)_{-1}$ | 0.43<br>(2.00) | 0.44<br>(2.88) | 0.41<br>(2.84) | 0.06<br>(0.34) | 0.34<br>(1.72) | 0.48<br>(3.01) |
| Dependency ratio | -0.0021<br>(-1.12) | -- | -- | -0.0035<br>(-2.90) | -- | -- |
| Benefit ratio | -0.40<br>(-1.06) | -- | -- | 1.10<br>(2.67) | 0.47<br>(1.13) | -- |
| Real interest rate | 0.074<br>(0.41) | -- | -- | 0.37<br>(2.32) | -- | -- |
| Inflation | 0.071<br>(0.39) | -- | -- | 0.36<br>(2.30) | -- | -- |
| IR1 | -0.054<br>(-0.56) | -- | -- | -- | -- | -- |
| IR2 | -- | -- | -- | -0.62<br>(-3.47) | -0.22<br>(-1.36) | -0.05<br>(-0.91) |
| DlogY | 0.66<br>(2.78) | 0.78<br>(6.20) | 0.85<br>(11.50) | 0.84<br>(5.68) | 0.86<br>(6.12) | 0.79<br>(6.22) |
| Adjusted $R^2$<br>Standard error | 0.87<br>0.0084 | 0.89<br>0.0076 | 0.90<br>0.0075 | 0.93<br>0.0061 | 0.89<br>0.0076 | 0.89<br>0.076 |
| Normality | 55.9% | 61.3% | 67.7% | 68.0% | 88.4% | 86.5% |
| DW | 1.63 | 1.58 | 1.56 | 1.93 | 1.77 | 1.60 |
| MLM | 43.3% | 45.1% | 46.7% | 95.8% | 94.1% | 58.3% |
| Ljung-Box | 43.2% | 42.0% | 44.6% | 95.3% | 93.6% | 55.4% |
| Heteroskedasticity 1 | 60.9% | 75.7% | 58.4% | 43.6% | 17.5% | 35.5% |
| Heteroskedasticity 2 | 3.0% | 42.2% | 46.9% | 2.2% | 21.0% | 18.8% |
| Chow test | 3.6% | 53.5% | 92.2% | 20.3% | 88.8% | 74.9% |
| Variance ratio test | 25.1% | 8.4% | 26.6% | 42.0% | 14.4% | 10.2% |
| Generalized Chow test | 0.2% | 36.6% | 94.1% | 76.9% | 89.5% | 66.4% |
| Harvey's PS1 (forward) | -1.67 | -0.14 | -1.22 | -1.24 | -0.45 | -0.59 |
| Harvey's PS1 (forward) | -0.79 | -0.82 | 0.99 | 0.52 | -0.27 | -1.76 |
| Harvey's PS1 (forward) | -1.67 | -0.14 | -1.22 | -1.24 | -0.45 | -0.59 |
| Harvey's PS1 (backward) | -0.79 | -0.82 | 0.99 | 0.52 | -0.27 | -1.76 |
| F test on $d_1 = d_2$ | -- | -- | 48.2% | | | |

Table 2b. U.S.S.R.: Estimates of Households' Consumption

(OLS; annual data; 1964-85; dependent variable DlogC)

| Variables | Equation A | Equation B | Equation C | Equation D | Equation E |
|---|---|---|---|---|---|
| Constant | -1.49 | -1.60 | -1.23 | -1.52 | -1.45 |
| | (-1.40) | (-2.86) | (-2.66) | (-1.49) | (-1.83) |
| log $(WFIN/C)_{-1}$ | 0.43 | 0.46 | 0.36 | 0.37 | 0.43 |
| | (2.00) | (2.88) | (2.66) | (1.70) | (2.37) |
| log $(1+H/WFIN)_{-1}$ | 0.43 | 0.47 | 0.36 | 0.37 | 0.43 |
| | (1.84) | (2.86) | (2.66) | (1.56) | (2.10) |
| Dependency ratio | -0.0014 | -- | -- | -0.0014 | -- |
| | (-0.91) | | | (-0.97) | |
| Benefit ratio | -0.21 | -- | -- | 0.09 | -- |
| | (-0.50) | | | (0.44) | |
| Real interest rate | 0.10 | -- | -- | 0.22 | -- |
| | (0.59) | | | (1.05) | |
| Inflation | 0.10 | -- | -- | 0.21 | -- |
| | (0.55) | | | (1.04) | |
| IR1 | -0.01 | -- | -- | -- | -- |
| | (-0.09) | | | | |
| IR2 | -- | -- | -- | -0.09 | -0.02 |
| | | | | (-0.84) | (-0.29) |
| DlogY | 0.71 | 0.77 | 0.88 | 0.70 | 0.77 |
| | (3.04) | (6.27) | (12.19) | (3.61) | (6.10) |
| Adjusted $R^2$ | 0.87 | 0.89 | 0.89 | 0.87 | 0.89 |
| Standard error | 0.0085 | 0.0076 | 0.0076 | 0.0083 | 0.0078 |
| Normality | 53.9% | 69.8% | 64.7% | 66.1% | 66.8% |
| DW | 1.51 | 1.58 | 1.57 | 1.63 | 1.60 |
| MLM | 9.0% | 44.2% | 48.4% | 18.5% | 45.7% |
| Ljung-Box | 25.8% | 41.6% | 45.8% | 38.3% | 45.0% |
| Heteroskedasticity 1 | 93.3% | 69.8% | 60.1% | 75.0% | 75.8% |
| Heteroskedasticity 2 | 0.4% | 41.3% | 58.4% | 0.1% | 37.4% |
| Chow test | 4.7% | 74.6% | 90.0% | 5.6% | 33.0% |
| Variance ratio test | 16.1% | 14.5% | 30.1% | 47.8% | 14.5% |
| Generalized Chow test | 0.9% | 71.6% | 93.0% | 48.7% | 36.5% |
| Harvey's Psi (forward) | -1.73 | -0.86 | -1.50 | -1.05 | 0.77 |
| Harvey's Psi (backward) | -0.15 | -1.03 | 1.23 | 0.97 | -1.15 |
| F test on $d_1 = d_2$ | -- | -- | 26.7% | -- | -- |

Table 2c. U.S.S.R.: Estimates of Households' Consumption

(OLS; annual data: 1964-85; dependent variable DlogC)

| Variables | Equation A | Equation B | Equation C | Equation D | Equation E |
|---|---|---|---|---|---|
| Constant | 0.01 | 0.06 | -0.01 | -0.48 | 0.02 |
| | (0.04) | (0.34) | (-0.80) | (-1.18) | (0.88) |
| log $(Y/C)_{-1}$ | 0.27 | 0.19 | 0.18 | 0.28 | 0.27 |
| | (1.64) | (1.70) | (1.66) | (1.99) | (1.94) |
| Dependency ratio | -0.0025 | -- | -- | -0.0018 | -- |
| | (-1.73) | | | (-1.42) | |
| Benefit ratio | -0.30 | -- | -- | 0.46 | -- |
| | (-1.52) | | | (1.30) | |
| Real interest rate | 0.15 | -- | -- | 0.34 | -- |
| | (0.79) | | | (1.69) | |
| Inflation | 0.15 | -- | -- | 0.34 | -- |
| | (0.78) | | | (1.68) | |
| IR1 | (-0.07) | (-0.03) | -- | -- | -- |
| | (-0.93) | (-0.52) | | | |
| IR2 | -- | -- | -- | -0.20 | -0.01 |
| | | | | (-2.00) | (-1.03) |
| DlogY | 0.79 | 0.97 | 1.01 | 0.82 | 0.94 |
| | (3.54) | (7.72) | (10.6) | (5.07) | (7.88) |
| Adjusted $R^2$ | 0.86 | 0.87 | 0.87 | 0.89 | 0.87 |
| Standard error | 0.0086 | 0.0085 | 0.0084 | 0.0085 | 0.0083 |
| Normality | 55.5% | 65.8% | 68.5% | 59.6% | 61.6% |
| DW | 1.64 | 1.49 | 1.44 | 1.53 | 1.36 |
| MLM | 48.0% | 38.1% | 30.0% | 25.8% | 24.3% |
| Ljung-Box | 39.1% | 32.9% | 25.7% | 24.8% | 19.7% |
| Heteroskedasticity 1 | 74.8% | 71.4% | 71.4% | 68.2% | 60.1% |
| Heteroskedasticity 2 | 7.3% | 74.2% | 71.7% | 0.1% | 54.6% |
| Chow test | 9.0% | 99.9% | 98.4% | 33.2% | 97.0% |
| Variance ratio test | 30.8% | 29.1% | 28.0% | 20.5% | 33.0% |
| Generalized Chow test | 10.9% | 99.9% | 98.7% | 60.0% | 98.7% |
| Harvey's Psi (forward) | -2.32 | -1.31 | -0.83 | -0.96 | -1.82 |
| Harvey's Psi (backward) | -0.55 | -1.03 | 1.51 | 1.67 | -2.23 |

Table 2d. U.S.S.R.: Estimates of Households' Consumption

Definitions

Variables

Y = households' disposable income (per capita in real terms)
W = total nonhuman wealth (per capita in real terms)
C = households' consumption (per capita in real terms)
H = human wealth (per capita in real terms)
WFIN = net financial wealth (per capita in real terms)
IR1 = Holzman's disequilibrium indicator (Chart 2, lower panel)
IR2 = relative kolkhoz prices (Chart 1, top panel)

Tests

Normality = Lagrange multiplier test of normality of residuals (Jarque-Bera (1980))
DW - Durbin-Watson test
MLM = Lagrange multiplier test of autocorrelation of residuals modified for small samples (Harvey (1981))
Ljung-Box = portmanteau test of autocorrelation of residuals (Ljung and Box (1978))
Heteroskedasticity1 = test of autoregressive conditional heteroskedasticity (Engle (1982))
Heteroskedasticity2 = test of linear dependence between residuals and regressors (Breusch and Pagan (1979))
Chow test = test of stability of equation parameters against the hypothesis of structural break in 1975
Variance ratio test = test of stability of residual variance against the hypothesis of structural break in 1975 (Phillips and McCabe (1983))
Generalized Chow test = Wald test of stability of equation parameters against the hypothesis of structural break in 1975 in the presence of instability of residual variance (Honda and Ohtani (1986))
Harvey's PSI (forward) = stability test based on recursive estimates (starting from the beginning of the sample period) (Harvey (1981))
Harvey's PSI (backward) = stability test based on recursive estimates (starting from the end of the sample period) (Harvey (1981))

Note: t statistics are reported in parentheses (below the coefficient estimates). For all the above tests, with the exception of the DW and of Harvey's PSI test, the table reports the percentage of the appropriate test distribution lying on the right of the computed test statistic under the null hypothesis of absence of misspecification. The lower bound of the DW statistic (at the 5 percent level) is 0.637 in the equation with eight regressors and 1.026 in the equations with four regressors (including the constant). Harvey's PSI test has a t distribution with T-K-1 degrees of freedom.

residuals, on the absence of autocorrelation and of heteroskedasticity and on the within sample stability of the equation. 1/

The specification search process begins, for each of the three formulations, by estimating an equation containing all available regressors. Starting from Table 2.a, the more general specification (equation A, which includes as indicator of rationing the relative kolkhoz prices weighted by the share of expenditures on the kolkhoz market, as suggested by Holzman (1960)) shows a remarkably good fit, with an adjusted $R^2 = 0.87$ (which is high since the estimations are on percentage changes) and a standard error of 0.84 percent. The normality and residual autocorrelation tests are easily passed, but one of the two heteroskedasticity tests shows unsatisfactory results; traces of instability are also shown by the Chow tests which fall well beyond the 5-percent critical value. As to the coefficient estimates, the human and nonhuman wealth effects and the impact effect of disposable income have the correct sign and the corresponding t statistics are close or higher than 2. 2/ All other variables are statistically nonsignificant and, with the exception of the proxy for rationing (IR1), have also "wrong" sign. In summary, while the overall performance of the equation appears to be adequate, there are signs of mispecification. More satisfactory results are obtained in equation B by removing all variables that were not significant at the 10-percent level in equation A: all test statistics remain approximately stable or improve (with the only exception of the variance ratio test) and the standard error drops to 0.76 percent. Note also that all t statistics increase substantially. Finally, the coefficients on human and nonhuman wealth, even if unrestricted, are extremely close. The equality restriction is imposed in specification C and is easily accepted (see last row of the table), which implies, in terms of the parameters of equation (7), that $a_1 = 1$ and $a_2 = 0$. The equation's standard error is further lowered and the variance ratio test improves. In summary, specification C seems to be entirely adequate in

---

1/ As detailed in the legend, Table 2 reports for all tests (with the exclusion of the DW test and of Harvey's PSI tests) the percentage of the appropriate test distribution laying on the right of the computed test statistic, under the null hypothesis of absence of mispecification. The null hypothesis cannot be rejected at the conventional 5-percent level if the value reported in the table is higher than 5 percent. Note that for some of the tests reported in the table (specifically for the Normality test, the Liung-Box tests and the two Heteroskedasticity tests) only the asymptotic distribution is known. For those tests, in light of the limited number of observations available, it seems to be safe to accept the null hypothesis only when the value reported in the table is "substantially" higher than 5 percent. It must also be recalled that in dynamic regressions with only 22 observations the results may be to some extent affected by bias of the Hurwicz type.

2/ Note that with 13 degrees of freedom the critical value of the t distribution is 1.77 at the 10-percent level and 2.16 at the 5-percent level.

terms of goodness of fit, diagnostic tests and consistency of parameter values with what could be expected from economic theory. Actual and fitted values for this equation are shown in Chart 4. 1/

In equation D, the unweighted ratio between kolkhoz and state prices replaces Holzman's index as indicator of rationing (IR2 in the table). Specification D has a slightly better fit, but shows signs of instability; and, while the rationing index and the benefit ratio have the expected sign and are significant, the interest rate and the inflation variables, together with the dependency ratio, still have wrong sign. What is worst, the term including human wealth is not significant, implying, in principle, the absence of an effect of labor income on consumption in the long run. On account of this surprising feature, the equation has been re-estimated dropping all variables with wrong sign. In this case (equation E), the significance of both the benefit ratio and the rationing proxy drops below the 10-percent level, while the coefficient on human wealth increases in value and significance. When also the (now insignificant) benefit ratio is removed, the t statistics of the rationing proxy falls to -0.91, while that on human wealth rises above 3. Thus, regardless of the rationing proxy used in the general specification, the specification search leads to the simple representation of consumption behavior reflected in equation C.

The estimates using net financial wealth, rather than total nonhuman wealth, as regressor (Table 2.b) do not substantially alter the empirical results just described. The properties of the equation remain approximately unchanged and the specification search leads again to a parsimonious representation (equation C) in which, in the long run, the ratio between consumption and (human and nonhuman) wealth appears to be stable. Note, however, that, contrary to Table 2.a, the relative kolkhoz price (IR2) has a low t statistic even in the most general specification D, thus confirming the spurious nature of the correlation found in equation D of Table 2.a.

Finally, Table 2.c presents estimates of a simpler specification in which only disposable income influences consumption expenditure. Note that the performance of the equation remains satisfactory in terms of fit and diagnostic tests, but that the results appear inferior to those presented in Tables 2.a and 2.b. The most disturbing problem is that in specification C, in which all nonsignificant variables have been dropped, the t statistics of the coefficient referring to the error correction variable is not significant at the 10-percent level, implying the indeterminacy of the long-run relation between the level of consumption and the level of disposable income. Again, similar results are obtained, if the specification search makes use of the second rationing proxy (equations D and E): this proxy looses significance as the variables with low t statistics and/or wrong sign are dropped, leading back to specification C.

---

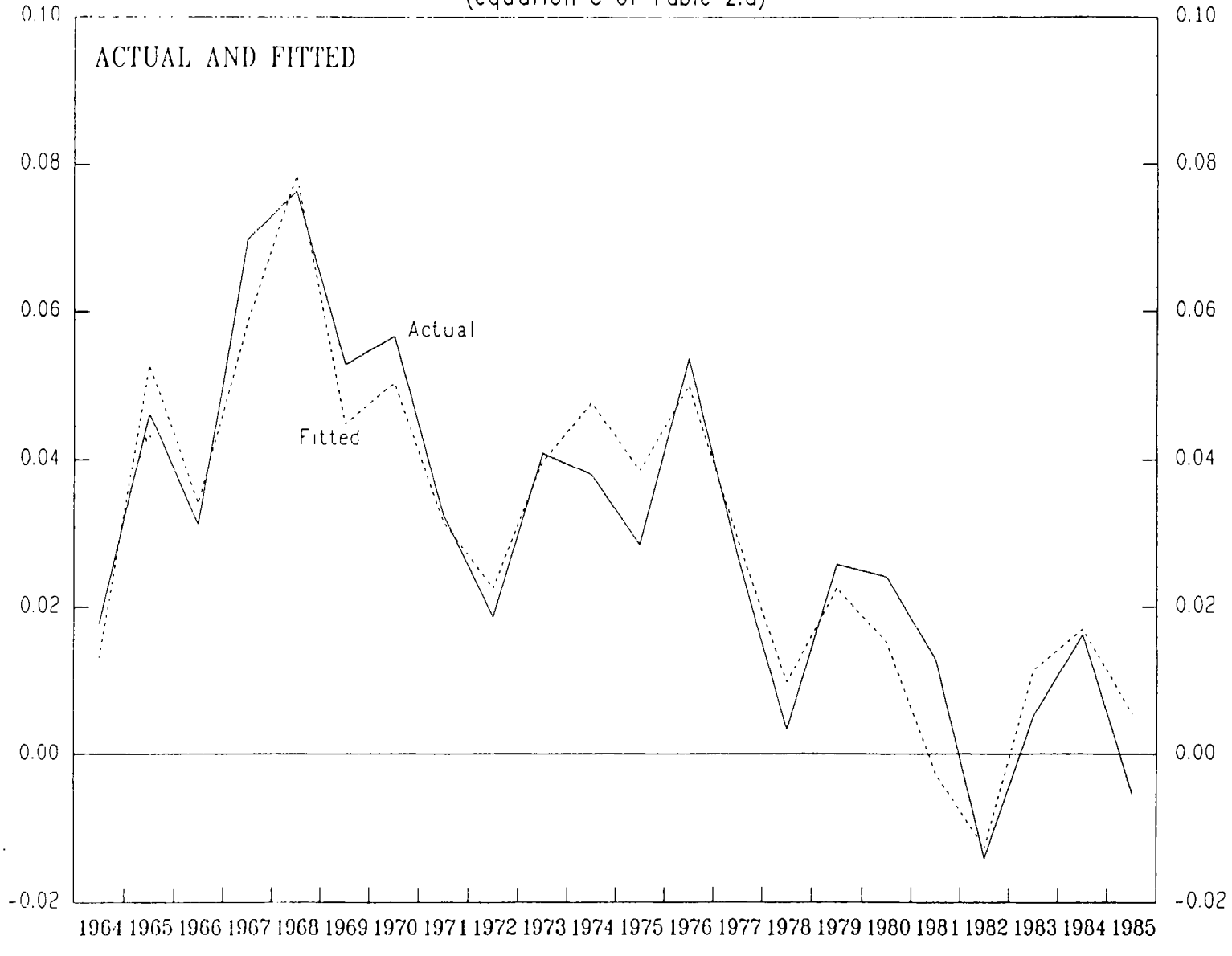
1/ Further attempts to reintroduce in this equation, individually or in combination, the variables previously excluded failed, as these variables remained insignificant.

In conclusion, consumption behavior between 1964 and 1985 appears to be adequately represented, on the basis of both fit and diagnostic tests, by a simple representation such as the one reported in equation C of Table 2.a. Some of the properties of this equation deserve some comments. First, the specification implies a stable long-run relation between consumption behavior and total (i.e. human and nonhuman) wealth of the households' sector. As the elasticity of consumption with respect to wealth is one, the long-run marginal and average propensities to consume are equal. Moreover, it has been shown that (as $d_1 = d_2$) changes in human and nonhuman wealth have the same effect on consumption. As to the dynamic properties of the equation, the fact that the coefficient on the change of disposable income is 0.85 (i.e. it is less than one) implies that the short-run effect of income changes, possibly because they are not perceived as permanent, is lower than the long-run effect, which can explain why in years of strong decline in real disposable income (such as 1981-82) the saving propensity tended to be low (Chart 3). Moreover, as the nonhuman wealth variables enters only in lagged form, changes in human wealth tend to affect consumption faster than changes in nonhuman wealth. Second, while for empirical purposes the behavior of consumption can be considered as dominated by disposable labor income movements 1/, the specifications in which consumption is related to human and nonhuman wealth appear to dominate those in which only disposable income is included. Third, the preferred specification (equation C of Table 2a) is relatively parsimonious as it explains the movements in consumption simply in terms of wealth and disposable income movements, without making use of additional variables. The failure to identify additional effects may be of course due to the absence of sufficient variability of some of the other included regressors or to measurement problems. However, the fact that the estimated model produces a remarkable fit and generates small i.i.d. residuals indicates that in the sample period, the main movements of consumption expenditure in the Soviet Union can be explained without the use of additional variables. Note, however, that the failure to identify any rationing effect does not rule out the possibility that rationing, while present, was equivalent to a constant proportion of actual consumption and, being part of the constant of the equation (i.e. $c_0 \neq 0$), could not be identified. Indeed, as already mentioned, the possible existence of some "chronic" rationing will have to be taken into account judgmentally in the measurement of the overhang.

---

1/ This is because nonhuman wealth, which is derived from (permanent) disposable labor income, is in the Soviet Union much larger than nonhuman wealth. Even in the United States human wealth is estimated to be around 12 times nonhuman wealth (Jorgenson and Fraumeni (1989)); it is not surprising that in the Soviet Union this ratio is around twice as high.

Chart 4
USSR
# CONSUMPTION EQUATION
(equation C of Table 2.a)



## V. Estimates of Households' Wealth and Monetary Overhang

As discussed in Section II.1, the wealth overhang can be derived by cumulating excess saving which in turn can be obtained as a difference between desired and actual consumption. As the "preferred equation" does not include any rationing proxy, we can conclude that desired and actual consumption were equal during the sample period, i.e. that there was no overhang (save, possibly, for the chronic overhang component). We also showed that the estimated consumption function presents a high degree of parameter stability during the sample period. However, as we move towards the second half of the 1980s, it becomes clear that the relation between observed consumption and the regressors included in the preferred equation progressively breaks down.

In this respect, Chart 5 reports the one-step-ahead prediction errors of equation C of Table 2.a 1/: these errors are consistently negative (actual consumption is lower-than-projected consumption) outside the sample period (and exceed the two-standard errors band as of 1987). To test formally for the existence of instability, the equation was re-estimated over 1964-90 and the hypothesis of parameter stability (against that of a structural break in 1985) was evaluated by a Chow test. The value of the test statistics (7.64) falls beyond the critical value even at the 0.5-percent level. This instability may be due to three reasons. First, the structural relation determining desired saving may have changed; more specifically, Soviet households increased substantially their propensity to save. Second, as unrecorded consumption transactions in parallel markets increased, measurement errors may account for the apparent increase in saving rates. 2/ Third, actual consumption differed from desired consumption because of rationing. Clearly, there is no statistical basis to attribute the behavior of projection errors in the second half of the 1980 to one of the above specific reasons. However, we find the third reason more plausible. Consumption behavior had remained particularly stable in the Soviet Union over two decades and it is hard to explain why, in the absence of rationing, it should have changed in such a drastic manner. As to the second reason, the expansion of consumption on secondary markets may have been relevant, but is, at least partially, taken into consideration by the use of adjusted figures for income (see Appendix I). Moreover, as

---

1/ Until 1985, these errors are equal to the residuals of the equation estimates.

2/ Also, it is possible that actual inflation (i.e. inflation taking into account price behavior on parallel markets) exceeded measured inflation. While, possibly due to insufficient inflation variability before 1985, inflation did not appear to have influences on consumption in the Soviet Union, it stands to reason that, in the presence of strong inflationary pressures, desired saving may have increased in the late 1980s to restore the value of financial wealth eroded by the higher-price level.

consumption is derived residually from income, 1/ any underestimate of consumption must be due to an underestimate of disposable income. But in this case not only actual consumption was underestimated, but also desired consumption (albeit to a lower extent); which moderates the effect of possible under-reporting of consumption in parallel markets (see Appendix II). In conclusion, the strengthening of rationing appears the most likely reason for the "oversaving" that characterized the late 1980s. We will, therefore, assume, as a first approximation, that all the projection errors observed outside the sample period are due to forced saving. 2/

It should be added that the stability tests performed do not tell us very precisely the point in which the break between actual and desired consumption took place. Table 3 shows the results of Chow tests on the parameter stability against that of structural break between 1975 and 1986; the table shows that the hypothesis of stability can be rejected at the 1-percent level for all break years after 1980 (and at the 5-percent level for all breaks after 1978). 3/ On the other hand, a recursive Chow test based on one-step-ahead predictions allows the rejection of parameter stability at the 5-percent level only after 1987; loosely speaking, this means that, while the break may have occurred before, only after that date the behavior of the residuals is such that the hypothesis of stability can be rejected. This leaves a rather large interval (1981-87 or, possibly, even 1979-87) in which the break may have occurred. Some additional indications can be derived by applying the maximum likelihood procedure suggested in Quandt (1958) for the identification of points of structural break. Chart 6 reports the value of the loglikelihood function for breaks occurring in each year between 1976 and 1987; the function reaches an absolute maximum for the event of a break in 1985, but it has also a high local maximum in 1982; in general, all values of the likelihood function between 1982 and 1986 are rather close. In light of the limited number of observations on which the likelihood function was computed, it would be unwise to draw precise conclusions from relatively small differences in the value of the likelihood function.

In the absence of precise indications on the moment in which the break occurred, it seems reasonable to consider different possible starting points for the beginning of rationing. Column (b) of Table 4 reports the cumulated value of forced saving at the end of 1990, derived as a difference between consumption as projected by equation C of Table 2.a and actual consumption;

---

1/ Remember that saving is measured reasonably well by financial statistics. Therefore, errors in the measurement of consumption must be due to errors in income measurement.

2/ This is, of course, a simplification as we are implicitly assuming that the error term of the equation is always close to zero outside the sample period.

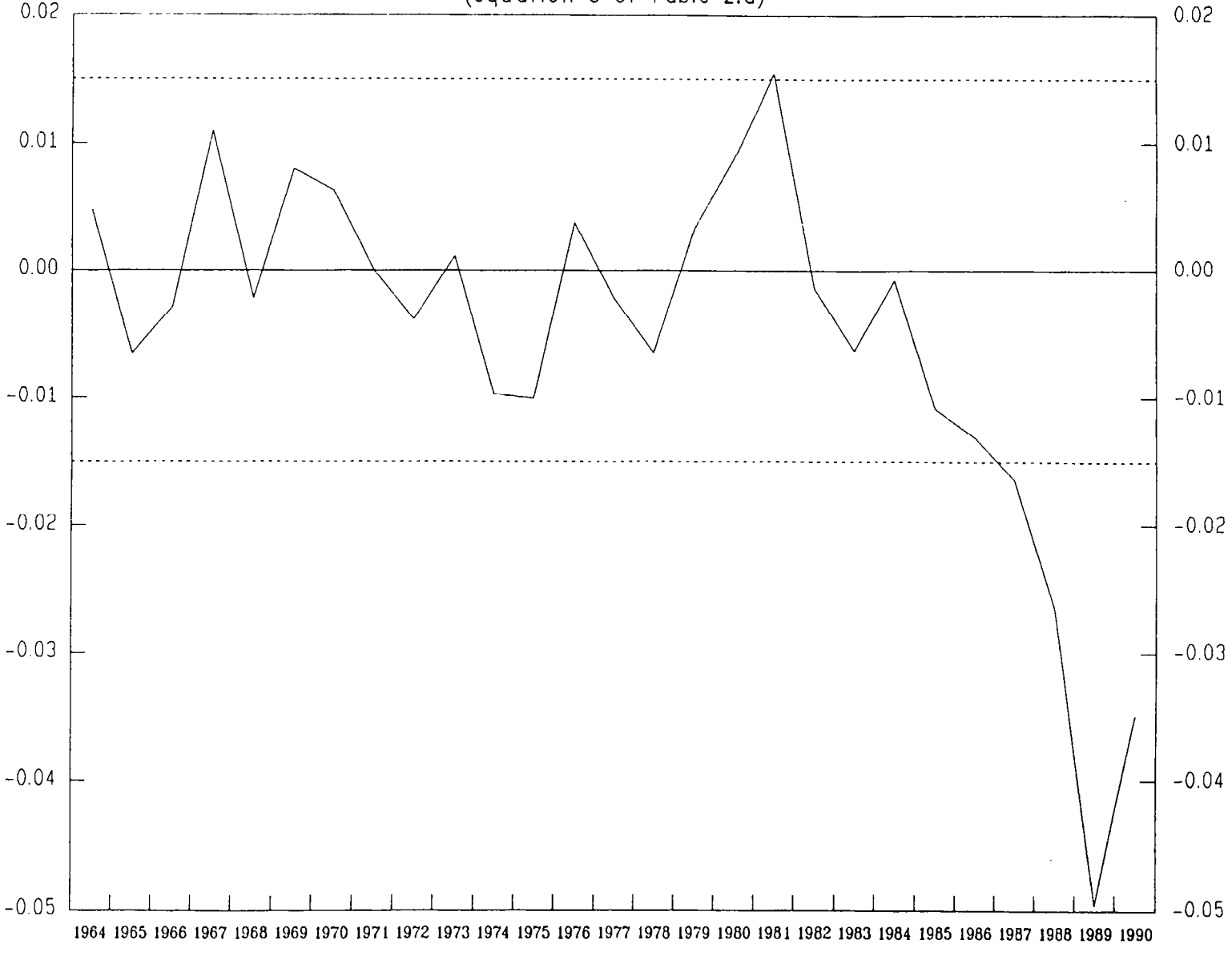
3/ Similar results are obtained with the generalized Chow test of Honda and Otani (1984), also reported in the table.

Chart 5

USSR

# ONE STEP AHEAD PREDICTION ERRORS 1/

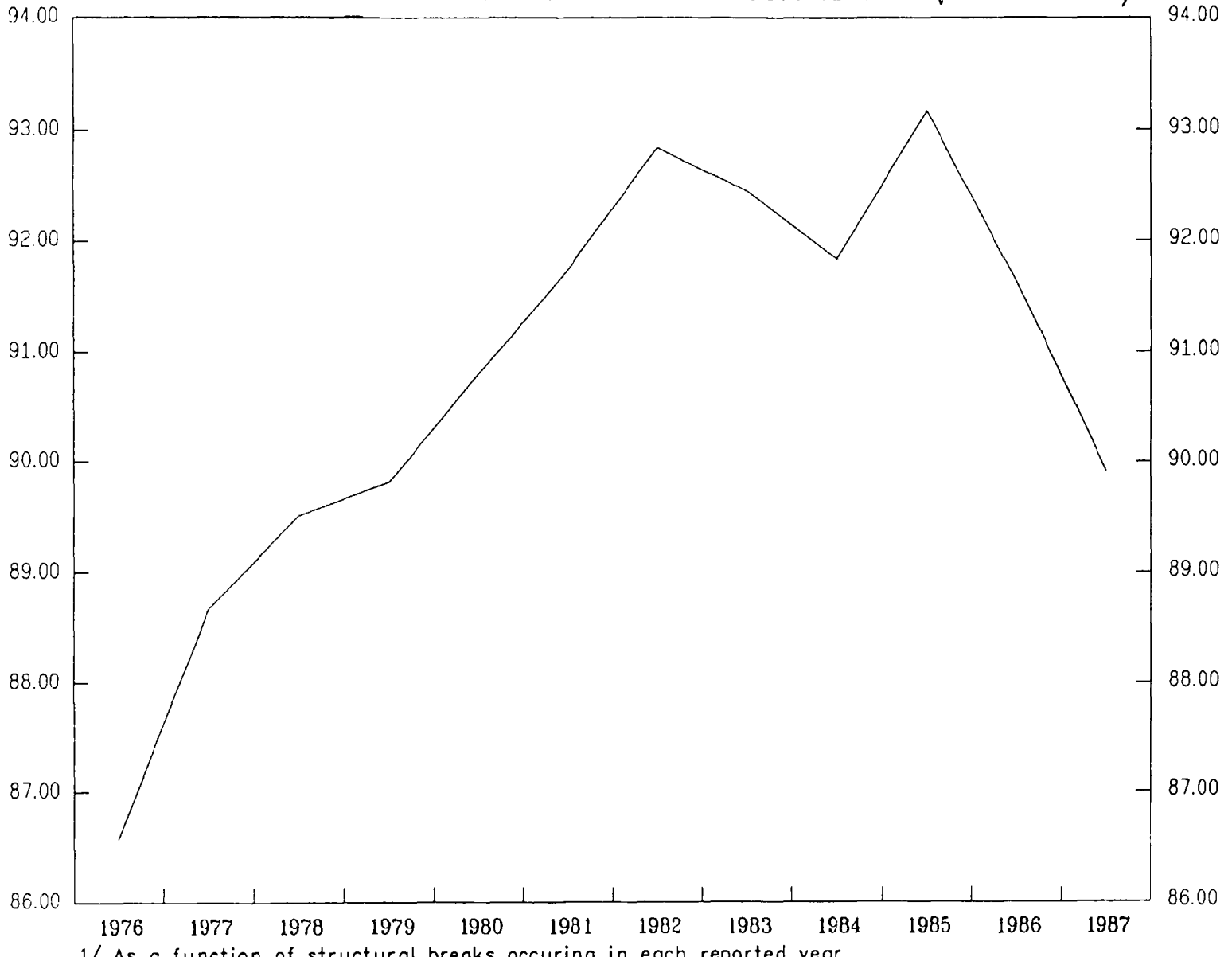
(equation C of Table 2.a)




1/ The dashed lines mark the two-sided standard error band.

Chart 6
USSR

LOGLIKELIHOOD FUNCTION OF THE CONSUMPTION EQUATIONS 1/




1/ As a function of structural breaks occuring in each reported year.

Table 3. U.S.S.R.: Chow Tests on the Existence of a Structural Break in Consumption Behavior

| | Chow Test | | Generalized Chow Test | |
|---|---|---|---|---|
| Year of Break | F Value | F Probability 1/ | F Value | F Probability 1/ |
| 1975 | 1.21 | 33.0 | 5.17 | 16.0 |
| 1976 | 0.82 | 49.8 | 3.24 | 35.6 |
| 1977 | 2.37 | 9.9 | 7.64 | 5.41 |
| 1978 | 2.79 | 6.6 | 8.67 | 3.40 |
| 1979 | 2.71 | 7.1 | 8.37 | 3.90 |
| 1980 | 3.53 | 3.2 | 9.78 | 2.05 |
| 1981 | 5.16 | 0.8 | 13.09 | 0.45 |
| 1982 | 7.05 | 0.2 | 17.08 | 0.1 |
| 1983 | 6.67 | 0.2 | 15.51 | 0.1 |
| 1984 | 6.05 | 0.4 | 14.03 | 0.3 |
| 1985 | 7.64 | 0.1 | 15.34 | 0.2 |
| 1986 | 6.25 | 0.3 | 9.84 | 2.0 |

1/ Area of the F distribution on the right of the reported F value.

Table 4. U.S.S.R.: Estimates of the Monetary Overhang

(Billions of rubles)

| First Year of Break | Cumulative Sum of Forced Savings 1/ | | Chronic Overhang | | Estimate of $c_0$ (in percent) | Total Overhang (end-1990) | |
|---|---|---|---|---|---|---|---|
| | end-1985 (a) | end-1990 (b) | end-1985 (c) | end-1985 (d) | (e) | (f) 2/ | (g) 3/ |
| 1982 | 21 | 143 | 38 | 54 | 0.8 | 197 | 181 |
| 1983 | 12 | 127 | 47 | 67 | 1.0 | 193 | 174 |
| 1984 | 5 | 117 | 54 | 76 | 1.1 | 193 | 171 |
| 1985 | 4 | 115 | 55 | 78 | 1.1 | 193 | 170 |
| 1986 | -- | 103 | 59 | 83 | 1.2 | 187 | 162 |
| 1987 | -- | 89 | 59 | 83 | 1.2 | 173 | 148 |
| Average | 7 | 116 | 52 | 74 | -- | 189 | 168 |
| In percent of financial wealth | 2.2 | 21.0 | 16.3 | 13.4 | | 34.2 | 30.4 |
| In percent of desired financial wealth | -- | -- | -- | -- | | 52.0 | 43.7 |

1/ Excluding the "chronic component".
2/ Under the assumption that the "chronic overhang" component increases after 1985.
3/ Under the assumption that the "chronic overhang" component remains constant after 1985.

each row refers to a simulation starting in the reported year and ending in 1990. 1/ The value of the cumulated sum at the end of 1985 is also reported in column (a). The reported figures are interpreted as estimates of the overhang at the end of 1990 and of 1985, respectively, with the exclusion of the possible "chronic overhang" (i.e. for $c_0 = 1$ ), not revealed by the econometric estimates and to be evaluated judgmentally (see below). The cumulative sum of forced saving ranges from 89 billion rubles for simulations starting in 1987 to 143 billion rubles for the simulation starting in 1982, with an average of 116 billion rubles. Chart 7 (top panel) shows the evolution of the estimated overhang for each of the possible starting years of rationing. It is clear that, regardless of the starting year, the overhang accumulated faster as we approach the end of the decade.

Consideration of a possible "chronic overhang" (implying $c_0 \neq 1$ ) has to be entirely judgmental. The only indication on the possible existence of a "chronic overhang" is derived from the results of surveys of households' saving and wealth conducted by the Soviet authorities: according to these surveys, the stock of involuntary monetary savings at the end of 1985 was equal to 59 billion rubles. This figure exceeds all estimates of the 1985 overhang derived from the equations (Table 4, first column); the difference between the survey estimate (59 billion rubles) and the estimates reported in column (a) would give estimates of the "chronic overhang" existing at the end of 1985; these estimates, reported in column (c) of the table range from 38 to 59 billion rubles. Note that from these estimates, and with the additional assumption that the total overhang (including its chronic component) was zero until the mid-1960s, it is also possible to derive estimates of $c_0$. 2/ These estimates, reported in column (e) of the table, are close to 1 percent; the interpretation is that during the 1960s and 1970s consumption fell short of what it would have been in the absence of price controls by around 1 percent; as the size of total consumption is close to that of disposable income this component of the overhang is also close to around 1 percent of disposable income. Thus the increase in the saving rate observed around the mid-1960s could be explained, at least partially, by the beginning of the accumulation of a "chronic overhang".

If we accept the hypothesis that $c_0 \neq 1$, then the estimates of forced saving reported in column (b) of the table should be adjusted as they

---

1/ In each case, equation C has been re-estimated ending the sample period in the last year of equilibrium. Note that for all simulations forced saving is positive in all years, as should be expected, regardless of the starting year. Note, instead, that a simulation starting in 1981 would produce negative estimates of forced saving in the first two years confirming that rationing was certainly not relevant until, at least, 1982.

2/ Although the choice of an initial year when the overhang was zero is necessary, the results are not very sensitive to the specific year considered; choosing 1970, instead of 1965, as the initial year would alter the results only marginally.

underestimate the involuntary wealth by the chronic overhang already existing in 1985 (column (c)), and by the increase, after 1985, in this component. Based on the estimate of $c_0$, it is possible to assess the value of the "chronic overhang" component at the end of 1990; these estimates, reported in column (d), range from 54 to 83 billion rubles. Finally, by adding column (b) to column (d), we find estimates of the total overhang at the end of 1990 ranging from 173 and 197 billion rubles, with an average of 189 billion rubles (column (f)). 1/

Note that the average estimates (i.e., the estimates obtained by averaging simulation results starting in different years) are also very close to the results obtained from the simulation starting in 1985, the year in which the break is "most likely", according to the behavior of the likelihood function discussed above. Thus, whether we follow the maximum likelihood criterion or we take the "average" of all possible cases we anyway reach estimates of the overhang close to 170 rubles or to 190 rubles, according to the hypothesis made on the growth of the "chronic overhang" component. These estimates would be equivalent, respectively, to 30 and 34 percent of the actual stock of financial wealth of households at the end of 1990, and to 44 and 52 percent of the desired stock (Table 4). Note that it is convenient to compare the wealth overhang with the financial component of wealth (rather than with total wealth), because this is the component subject to erosion in case of price liberalization. In particular, the ratio between the overhang and desired financial wealth represents the increase in the price level necessary to wipe out the monetary overhang (under the hypothesis that the desired amount of wealth in real terms is independent from the price level 2/).

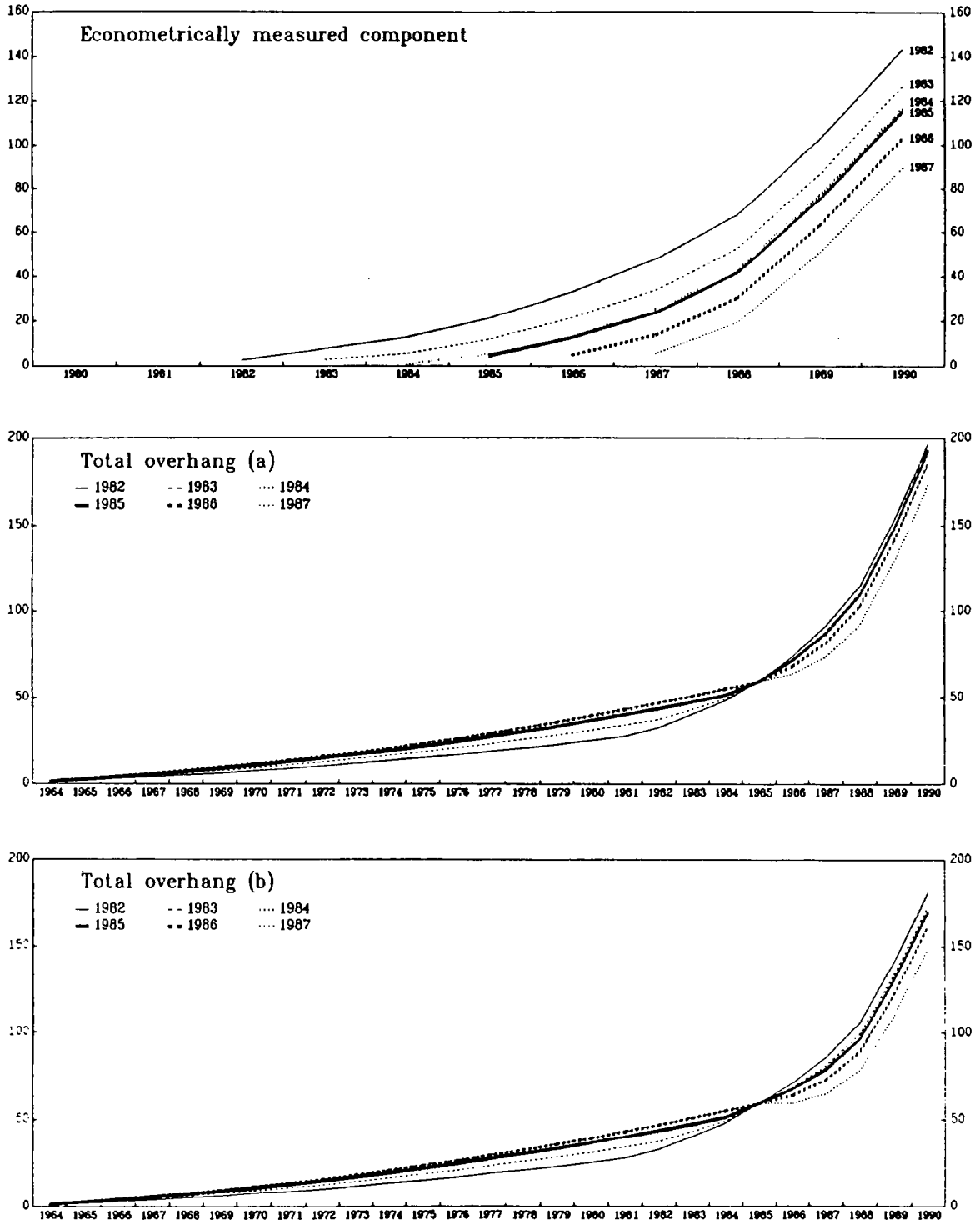
Three observations must be made with reference to these results. First, lack of consideration of the effect of past inflation on the value of

---

1/ It could, however, be argued that making chronic overhang increase in the second half of the 1980s is unrealistic; indeed, if we interpret deviations of $c_0$ from unity not as "chronic forced saving" but as increases in the precautionary reserves due to the existence of micro shortages, then it appears that the need to accumulate additional balances disappears when, due to macroeconomic shortages, wealth was already increasing at rates much higher than desired. If we maintain the value of the "chronic overhang" constant at its 1985 level, we obtain a range for the total overhang from 148 to 181 billion rubles, with an average of 168 billion rubles (column g).

2/ This assumption is appropriate as long as households perceive that the price increase will not erode permanently their real labor income (i.e. as long as wages are moved in line with prices). Note, however, that an equal increase of prices and nominal incomes, while it can eliminate the initial stock of the overhang, would not eliminate the source of the overhang accumulation, i.e. the "excessive" real income of the population. Thus, equilibrium of both stock and flows may require some decline in real distributed income (albeit not a decline in consumption standards).

CHART 7
USSR
# ESTIMATES OF THE MONETARY OVERHANG




(a) Under the hypothesis that the "chronic" component of the overhang increases after 1985.
(b) Under the hypothesis that the "chronic" component of the overhang does not increase after 1985.

real wealth may imply that the above figures overestimate the size of the overhang. On the other hand, the overhang may be underestimated if expectations of future price increases actually led to an increase in the current propensity to consume, an effect not measured by the estimated equation. Second, as recalled in Section II, the amount of the overhang should be compared to the stock of unsold consumer goods. Data on this amount show a very rapid trend decline in the last twenty years; the estimated stock was 62 billion rubles in 1970, 31 billion rubles in 1985, and 15 billion rubles at the end of 1989, a very modest proportion of the overhang. This finding confirms that, in the presence of price liberalization, the overhang would not lead simply to a change in relative prices (e.g., a decline in the price of the unsold inventories of consumer goods and an increase in the price of the goods for which shortages are observed) but it would bring about an increase in the average price level. Third, it must be recalled that the reported estimate of the overhang refers to the cumulative sum of involuntary saving incurred in past years. Under normal circumstances (i.e., under the assumption of stability of past behavior, as summarized by the estimated equations), Soviet households are unlikely to try and spend all the undesired accumulation of wealth in a single period (say one year). According to the life cycle behavioral hypothesis, they should allocate the expenditure of the undesired stock of wealth over time. Of course, a quantitative estimate of "how rapidly" the overhang would be released in the presence of price liberalization is extremely difficult to make; it will depend on the type of consumption forsaken in the past, on price expectations and on the extent by which price liberalization is seen as a temporary or permanent situation.

Having defined and measured the wealth overhang of households, let us consider the issue of evaluating their monetary overhang. This is equivalent to ask whether the composition of wealth (specifically its distribution between monetary and nonmonetary assets) resulted mainly in the accumulation of money or of other stores of value. Indications in this respect come from Table 5, describing the evolution in the composition of households' wealth and savings. The table shows the trend increase in the financial component of total wealth, almost entirely matched by a decline in the share of housing. While this decline may be influenced to some extent by miscalculations in the valuation of houses at current prices, 1/ the increased role played by financial wealth is confirmed by the data on the allocation of saving flows. While between the mid-1950s and the mid-1960s investment in real assets represented around one third of total saving, in

---

1/ As detailed in Appendix I, the value of houses included in the definition of wealth reflects in principle an evaluation at current prices; however, the series, provided by Goskomstat, reflects the official house prices which may underestimate, in both level and growth rate, the actual value of houses. The series matches anyway the figures reported in the so-called Abalkin Plan.

Table 5. U.S.S.R.: Composition of Households' Wealth and Saving

(Percentage shares)

| | 1955-59 | 1960-64 | 1965-69 | 1970-74 | 1975-79 | 1980-84 | 1985-89 |
|---|---|---|---|---|---|---|---|
| Wealth 1/ | | | | | | | |
| Net financial wealth | 32.7 | 40.4 | 57.1 | 70.7 | 79.9 | 83.3 | 87.2 |
| Houses | 62.4 | 53.5 | 34.3 | 22.9 | 15.1 | 11.7 | 9.0 |
| Other real assets | 4.9 | 6.1 | 8.6 | 6.5 | 5.0 | 5.0 | 3.9 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Saving 2/ | | | | | | | |
| Net financial wealth | 66.7 | 65.8 | 84.9 | 89.8 | 93.0 | 90.4 | 91.9 |
| Houses | 28.8 | 29.8 | 9.4 | 5.9 | 3.7 | 4.9 | 6.1 |
| Other real assets | 4.5 | 4.4 | 5.7 | 4.3 | 3.3 | 4.7 | 2.0 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Sources: See Appendix I.

1/ Composition of wealth at the end of the period.
2/ Average composition of saving during the period.

the following period this percentage fell below 10 percent, mainly as a consequence of the decline in the share of private housing investment. 1/

Clearly, at the beginning of the 1990s, the composition of households wealth is biased towards financial assets, accounting for a share of around 90 percent in both total wealth and saving. 2/ In addition, financial wealth is almost entirely represented by monetary assets; throughout the period under consideration M1 components (cash and demand deposits) always represented around two thirds of total financial assets; and M2 components (including M1, time deposits and lottery bonds 3/) covered a share slightly above 90 percent.

The main conclusion that can be drawn from these data is that, given the limited share taken by the real component of saving in the last 20-25 years, the involuntary accumulation of saving has almost certainly been in the form of financial, and specifically, monetary assets. In addition, in light of the size of the imbalance between monetary and nonmonetary wealth, it is likely that, even in the absence of involuntary saving (wealth overhang), the monetary overhang would be substantial: the amount of monetary assets held by the Soviet population appears to exceed the amount that would likely be demanded if other assets (both real and financial) were freely available. This has two implications: first, the demand for nonmonetary components of wealth may be high in the Soviet Union and may be exploited to bring about a noninflationary, voluntary reduction in monetary holdings. Second, the absence of adequate forms of investment may have discouraged households' savings in the past: thus, the availability of new forms of investments may stabilize the saving rate and transform an involuntary accumulation of wealth into voluntary holdings.

## VI. Summary and Concluding Remarks

After discussing a number of analytical issues related to the concept of "monetary overhang" some empirical estimates of the undesired accumulation of monetary balances in the Soviet Union were presented. It was argued that, as monetary balances in that country are the main form in

---

1/ As reported by Smith (1973) "although the downturn in individual home building may possibly be a reflection of deliberate restrictive policies, it is more likely the outcome of an increasingly stringent problem in providing building materials" (p. 413). Only recently the Soviet Government has enacted new legislation to favor "a reversal of the long-term decline of this 'private sector' over a 30-year period" (Andrusz (1990), p. 563).

2/ As reference, financial wealth in G7 countries ranges from 30 to 50 percent of households' total wealth.

3/ Lottery bonds are government bonds whose 3-percent interest rate is paid in the form of lottery winnings; although their maturity is formally rather long, their can be converted into cash upon presentation at the State Saving Bank.

which private agents can accumulate wealth, the evaluation of excess money holdings (i.e. of a monetary overhang) requires, in the first place, a comparison between desired and actual wealth, or, in terms of flows, between desired and actual saving. For this purpose, a consumption function was estimated on annual data between the mid-1960s and the mid-1980s. It was shown that a dynamic error correction model, involving long-run stability between consumption and total (human and nonhuman) wealth of Soviet households, produced reasonable results in terms of fit and of diagnostic checks.

It was also shown that, approximately at the middle of the 1980s, the stable relation between consumption and wealth breaks down as actual consumption consistently fell short of projected consumption. This development is attributed primarily to macroeconomic rationing in the consumers' goods market. The amount of undesired wealth holdings at the end of 1990 was then estimated by cumulating the difference between desired and actual consumption. It was concluded that, including also an estimate of the "chronic" overhang accumulated before the mid-1980s, the undesired holdings of monetary balances in the Soviet Union amounted at the end of 1990 to around 170-190 billion rubles, close to 20 percent of GDP and about one third of existing financial assets.

In assessing the macroeconomic consequences of these estimates, it is important to bear in mind that they refer exclusively to the involuntary savings of households. Estimates of excess liquidity in the hands of increasingly decentralized enterprises are in the range of 80-90 billion rubles. 1/ The combined magnitude of this imbalance represents a volume of pent-up demand that is certainly an element of concern in the design of any stabilization package. Even if flow balance could be reached, i.e. the expansion of monetary income is kept in line with the developments in production, and fiscal policies are adjusted accordingly, the problem of the current overhang stock remains to be dealt with.

Although a comprehensive discussion of the possible strategies available in dealing with the problem goes beyond the scope of this paper, 2/ it could be mentioned that our estimates show that solutions based on monetary reforms and other confiscatory measures would imply the wiping out of a significant portion of households wealth and that could be extremely difficult to accomplish from the political point of view. 3/

---

1/ See, for example, IMF et al. (1991).

2/ For a discussion on the issue in the context of reforming socialist economies see Blanchard et al. (1991); see also IMF et al. (1991).

3/ At the beginning of 1991, the Soviet Government tried to partially deal with the problem by retiring from circulation large denomination bills. After significant pressure, many exceptions to the measure were allowed and the net result is estimated to have been the reduction of liquidity of no more than 8 billion rubles, or approximately 5 percent of our estimated overhang.

Another obvious way of dealing with the overhang is to let excess demand free by price liberalization. Our estimates indicate that the first round price effects of such measure could be in the range of 40-50 percent (see Section V). However, under current circumstances, it could be justified to assume that the initial price increase may not be limited and could degenerate into an inflationary spiral. Noninflationary solutions that have been suggested include the sale of government assets, the increase of goods supply through higher imports, and the provision of incentives that could raise the demand for alternative, longer-run, financial assets. All these instruments have their advantages and drawbacks. It is, therefore, unrealistic to assume that the problem could be solved by relying solely on one type of instruments. The recourse to a broad spectrum of measures appears to be the most appropriate course of action.

## Statistical Sources

### 1. Financial assets and saving

All data on financial assets between 1964 and 1989 have been provided by the Gosbank; data on bank deposits for the previous period can be found in Hutchings (1983), who collected them from Soviet official publications; data on currency and other financial assets of households have been estimated by imposing a constant ratio with respect to bank deposits (at the 1964 level). This may underestimate the actual amount of cash before 1964 if the declining trend in the ratio between cash and deposits observable after 1964 started before that date. In the absence of capital gains on financial assets, net financial saving has been equated to the change in the nominal stock of financial assets net of the change in households' credit, also available from the above sources.

### 2. Households' disposable income

Data on disposable income for the 1980s have been provided by Goskomstat; the data have however been adjusted by adding to the official series the income from the private sale of agricultural products as estimated in CIA (1990); the value of those sales after 1987 (not available from the above source) was computed by using the growth rate of the sale of agricultural products to the socialized sector incremented by 3 percent in 1988, 6 percent in 1989 and 9 percent in 1990; the growth rates of the CIA series was also used to compute disposable income between 1965 and 1979; information on the previous period has been derived from Pickersgill (1983).

### 3. Real households' investment

This is made of two components: houses and other real investment (both considered net of amortization). As to the first component, Goskomstat provided data from 1970 to 1989; data for the previous period have been derived from Smith (1973). The second component (including mainly livestock and other property of the rural population) has also been provided by Goskomstat from 1970 to 1989; for the previous period this series, which is rather small, has been kept constant with respect to financial saving.

### 4. Households' wealth

Total wealth as been derived as the sum of three components: net financial wealth, houses and the stock of other real wealth. For financial wealth see 1); the value of houses owned by the population, net of depreciation and at current (official) prices, has been provided by Goskomstat from 1965 to 1989; the housing investment series has been used to derived the stock of houses for the previous period. The value of the third component has been also provided by Goskomstat but only for 1970-1989 and not at current prices, but as a cumulative sum of previous investments. For

the pre-1970 period the corresponding investment series has also been used to derive the stock of this wealth component. A "discrepancy", or "capital gain" series has also been derived by subtracting total (real and financial) investment to the change in wealth. Given the procedure followed above, this residual series represented entirely net capital gains on houses and was fairly small.

5. Households' saving and consumption

Households' saving was derived as the sum of the three saving components (net financial saving, investment in houses, investment in other real assets). Consumption was derived residually as a difference between disposable income and net saving.

6. Other series

The inflation series was derived from CIA(1990) and from Pickersgill (1983); inflation in 1988, 1989 and 1990 has been assumed to be, respectively, 2.4, 5.4 and 6 percent; data on population are derived from the Statistical Yearbook published in the Soviet Union (Narodnoye khozyaystvo SSSR); most recent estimates of the composition of the population by age have been published by Kingkade (1987); data from Howard (1983) have been used for the period before 1979. Nominal interest rates have been provided by the Gosbank; real interest rates have been derived by using the above mentioned inflation series. Data on monthly wages and the expenditure of the social consumption fund are published regularly by The USSR in figures (Finansy i Statistika Publishers, Moscow). Data on the ratio between kolkhoz prices and official prices for the same products have been collected in Nove (1986); data published in the 1988 issue of the Statistical Yearbook (p. 133) and in Alexeev, Gaddy and Leitzel (1990) have been used for the most recent period. Data on the stock of unsold consumer goods have been provided by the Ministry of Finance.

Al data for 1990 have been estimated based on preliminary information on 1990 developments.

## Parallel Markets and the Measurement of the Overhang

As argued in Section II, the existence of nonofficial markets in which prices are not regulated does not rule out the possibility of a monetary overhang if the size of the nonofficial market is limited. However, the procedure suggested in the text for the measurement of the overhang can be affected by underreporting of transactions on parallel markets. This occurs for two reasons; first, because the parameters of the consumption function may be affected by measurement errors; second, because, even if the true parameters were known, the difference between desired and actual consumption may be overestimated if actual consumption and inflation are underestimated. To appreciate the extent of these problems, consider the following linear version of the model presented in the text. Total disposable income $\tilde{Y}$ is given by:

$$\tilde{Y} = Y^S + Y^N \qquad (A.1)$$

where $Y^S$ is disposable income in the socialized sector plus all measured income generated on parallel markets and $Y^N$ is unreported income. Actual consumption is given by:

$$\tilde{C} = \tilde{Y} - \tilde{S} \qquad (A.2)$$

where $\tilde{S}$ is actual saving. As $\tilde{S}$ is measured with accuracy from financial statistics, we can assume that S (measured saving) is equal to $\tilde{S}$. Therefore:

$$\tilde{C} = \tilde{Y} - S \qquad (A.3)$$

Measured consumption C is given by:

$$C = Y^S - S = \tilde{Y} - Y^N - S = \tilde{C} - Y^N \qquad (A.4)$$

So, actual consumption will be underestimated by an amount qual to $Y^N$ and the actual saving rate $(S/\tilde{Y})$ will be overestimated by an amount equal to $s\,(Y^N/\tilde{Y})$ where s is the average propensity to save.

A second variable affected by inadequate measurements of activity in parallel markets is the inflation rate; we express the relation between true

and measured inflation rate (respectively $\tilde{p}$ and p) as: $\tilde{p} = p + \phi$ where $\phi$ is the measurement error.

Assume now that the true consumption function is:

$$\tilde{C} = b_1 (W + f \tilde{Y}) + b_2 \tilde{p} + u \qquad (A.5)$$

where W is nonhuman wealth, u is an i.i.d. error term and $b_1$, $b_2$ and f are parameters the latter summarizing the relation between income and human wealth. By substitution of (A.1) and (A.4) and of the definition of $\tilde{p}$ into (A.5) we get:

$$C = b_1 (W + f Y^S) + b_2 p + \eta \qquad (A.6)$$

where $\eta = (b_1 f - 1) Y^N + b_2 \phi + u$ which means that in a regression of measured consumption on measured income the error term of the equation will include terms which are functions of $Y^N$ and of $\phi$. Of course, the properties of the OLS estimates of (A.6) will depend on the size of the measurement errors, on the magnitude of the coefficients $b_1$, f and $b_2$ and on the stochastic properties of the measurement errors $Y^N$ and $\phi$. We argue that, during the estimation period 1964-85, the effect of the measurement errors is moderate.

Consider first the inflation rate. As described in Appendix I, CIA inflation estimates are used in the regressions, rather than official Soviet figures. We believe that this reduced substantially the systematic component of the measurement error (e.g. the systematic underestimation of inflation), possibly reducing the measurement error $\phi$ to i.i.d. with no effect on the estimates. As to the measurement error of disposable income, three points can be raised. First, again, official figures have been partially adjusted to account for activity on parallel markets. Second, the relevance of the error is inversely related to the propensity to consume out of disposable income: as $b_1$ f approaches unity the effect of the underestimation of $Y^N$ becomes less important. 1/ As we know that the saving rate is quite low in the Soviet Union (and the data used even overestimate it), the effect of the omission of $Y^N$ is reduced. Finally, the fact that in the estimates the error appears to be i.i.d. indicates, again, that, if present, $Y^N$ was rather small.

---

1/ This occurs because the implication of having $b_1$ f close to 1 is that most increases in income are consumed. But the effect of the underestimation of Y is precisely that of making the correlation of Y and C closer to one (because C is obtained as a residual given S). So the problem is less relevant when the correlation between Y and C is actually high.

Consider now the effect of the omission of $Y^N$ on the estimates of forced saving. The omission of $Y^N$ involves an underestimation of actual consumption equal to $Y^N$ (again, under the assumption that S is measured exactly); desired consumption is, however, also underestimated, for an amount equal to $b_1 f Y^N$. So the error on the computation of $\bar{C} - C^d$ (i.e. of forced saving) is only $(1-b_1 f)Y^N$. Again, the error is smaller if $b_1 f$ is close to one. Assume that, despite the corrections made to official figures, disposable income is unreported by 2.5 percent in 1988, by 5 percent in 1989 and by 10 percent in 1990 1/; by simulating equation C of Table 2.a with these revised data the estimate of the overhang at the end of 1990 would by smaller by around 10 billion rubles, still a relatively contained percentage of the overhang estimates reported in the text. However, this amount should be incremented by the increase in desired saving possibly connected to higher inflation in the second half of the 1980s, as part of the increase in savings observed in that period may have been due to the attempt to restore the real value of the stock of wealth eroded by price increases (in both official and parallel markets). On the other hand, desired saving may have been depressed by the increasingly negative yield of financial wealth, equally due to higher inflation. Consideration of those effects is, unfortunately, impossible given the failure to identify in the estimation period the elasticity of consumption with respect to inflation and the interest rate.

---

1/ These percentages correspond to an underestimate of disposable income respectively by 11, 25 and 57 billion rubles for the three years. These values are fairly large with respect to the estimated size of parallel markets. For example, according to CIA(1990), the net income of households from the sales of agricultural products (including the sales on official markets) totaled 19 billion rubles in 1987.

## References

Alexeev, Michael, Clifford Gaddy and Jim Leitzel, The Economics of the Ruble Overhang, George Mason University, mimeo, 1990.

Andrusz, Gregory D., "A Note on the Financing of Housing in the Soviet Union", Soviet Studies, July 1990.

Asselain, Jean-Charles, "Mythe ou Realité de l'Epargne Forcée dans les Pays Socialistes", in M. Lavigne (ed.), Travail et Monnaie en Système Socialiste, Economica, Paris, 1981.

Barro, Robert and Herschel Grossman, "Suppressed Inflation and the Supply Multiplier", American Economic Review, 61, pp. 62-83, 1974.

Birman, Igor, "The Financial Crisis in the USSR", Soviet Studies, January 1980.

Birman, Igor and Roger A. Clarke, "Inflation and the Money Supply in the Soviet Economy", Soviet Studies, October 1985.

Blanchard, Olivier, "Debt, Deficits, and Finite Horizons", Journal of Political Economy, April 1985.

Blanchard, O., R. Dornbusch, P. Krugman, R. Layard, and L. Summers, Reforms in Eastern Europe and the Soviet Union, U.N.-Wider Project, 1991.

Breusch. T.S. and A.R.Pagan, "A Simple Test for Heteroschedasticity and Random Coefficient Variation", Econometrica, No. 47, pp. 1287-1294, 1979.

Burkett, John., "Slack, Shortage and Discouraged Consumer in Eastern Europe", Review of Economic Studies, 1988, pp. 493-506.

CIA, USSR: Estimates of Personal Incomes and Savings, SOV 89-10035, April 1990.

Davis Christopher, and Wojciech Charemza, Models of Disequilibrium and Shortage in Centrally Planned Economies, London-New York, Chapman and Hall, 1989a.

Davies Christopher, and Wojciech Charemza, "Introduction to Models of Disequilibrium and Shortage in Centrally Planned Economies", in Davis C. and W. Charemza (eds.), Models of Disequilibrium and Shortage in Centrally Planned Economies, London-New York, Chapman and Hall, 1989b.

Dornbusch Rudiger, and Holger Wolf, Monetary Overhang and Reforms in the 1940s, NBER Working Paper Series No. 3456, October 1990.

Engle, Robert F., "Autoregressive Conditional Heteroschedasticity with Estimates of the Variance of the U.K. Inflation", Econometrica, No. 50, pp. 987-1007, 1982.

Fair, Ray C. and Dwight M. Jaffee, "Methods of Estimation for Markets in Disequilibrium", Econometrica, May 1972.

Gardner, Roy and Jonathan Strauss, "Repressed Inflation in the Soviet Union", European Economic Review, pp. 387-404, 1981.

Green, Donald W. and Christopher I. Higgins, Sovmod I: A Macroeconomic Model of the Soviet Union, Academic Press, New York, 1977.

Grossman, Gregory, "The Second Economy in the USSR", Problems of Communism, September-October, 1977.

Grossman, Gregory, "Monetary and Financial Aspects of Gorbachev's Reform", in Christine Kessides et al. (eds), Financial Reform in Socialist Economies, EDI Seminar Series, The World Bank, Washington, 1990.

Harvey, Andrew C., Econometric Analysis of Time Series, Philip Allan, Southampton, 1981.

Holzman, Franklyn D., "Soviet Inflationary Pressures, 1928-1957: Causes and Cures", The Quarterly Journal of Economics, May 1960.

Honda, Yuzo and Kazujiro Ohtani, "Modified Wald Tests in Tests of Equality between Sets of Coefficients in Two Linear Regressions under Heteroschedasticity", The Manchester School, June 1986.

Howard, David H., "The Disequilibrium Model in a Controlled Economy: An Empirical Test of the Barro-Grossman Model", American Economic Review, December 1976.

Hutchings, Raymond, The Soviet Budget, State University of New York Press, Albany, 1983.

IMF, The World Bank, OECD and EBRD, A Study of the Soviet Economy, Paris, 1991.

Jarque, Carlos M. and Anil K. Bera, "Efficient Tests for Normality, Homoschedasticity and Serial Independence of Regression Residuals", Economics Letters, No. 6, pp. 255-259, 1980.

Jorgenson, Dale W. and Barbara M. Fraumeni, "The Accumulation of Human and Nonhuman Capital, 1948-84", in Robert E. Lipsey and Helen Stone Tice (eds.), The Measurement of Saving, Investment and Wealth, University of Chicago Press, Chicago, 1989.

Kemme, David M., "The Chronic Excess Demand Hypothesis", in Davis C. and W. Charemza (eds.), Models of Disequilibrium and Shortage in Centrally Planned Economies, London-New York, Chapman and Hall, 1989.

Kingkade, W.W., Estimates and Projections of the Population of the USSR: 1979 to 2025, CIR Staff Paper No. 33, U.S. Bureau of Census, December 1987.

Kornai, Janos, Economics of Shortage, North-Holland, Amsterdam, 1980.

Kornai, Janos, Growth, Shortage and Efficiency, North Holland, Amsterdam, 1982.

Ljung, Greta M. and G.E.P. Box, "On a Measure of Lack of Fit in Time Series Models", Biometrika, No. 66, pp. 297-303, 1978.

Modigliani, Franco, "Life Cycle, Individual Thrift, and the Wealth of Nations," American Economic Review, June 1986.

Nove, Alec, The Soviet Economic System, Allen & Unwin, Boston, 1986.

Nuti, Mario D., "Hidden and Repressed Inflation in Soviet-type Economies: Definitions, Measurements and Stabilization", in Davis C. and W. Charemza (eds.), Models of Disequilibrium and Shortage in Centrally Planned Economies, London-New York, Chapman and Hall, 1989.

Ofer, Gur, Macroeconomic Issues of Soviet Reforms, Hebrew University of Jerusalem, Working Paper 222, April 1990.

Ofer, Gur and Joice Pickersgill, "Soviet Household Saving: A Cross-Section Study of Soviet Emigrant Families", Quarterly Journal of Economics, August 1980.

Phillips, G.D.A., and B.P.M. McCabe, "The Independence of Tests for Structural Change in Regression Models", Economics Letters, No. 12, pp. 283-287, 1983.

Pickersgill, Joice, "Soviet Household Saving Behavior", Review of Economics and Statistics, May, 1976.

Pickersgill, Joice, "The Financial Crisis in the USSR: A Comment", Soviet Studies, October, 1980(a).

Pickersgill, Joice, "Recent Evidence on Soviet Households Saving Behavior", Review of Economics and Statistics, November, 1980(b).

Pickersgill, Joice, "Household Saving in the USSR", in F. Modigliani and R.H. Hemmings (eds.), The Determinants of National Savings and Wealth, St. Martin's Press, New York, 1983.

Pindak, Frantisek, "Inflation under Central Planning", Jahrbuch fur Wirtschaft Osteuropas, 10/2, 1983, reprinted in SUERF Reprint Series, No. 29, Tilburg, 1984.

Portes, Richard, "The Theory and Measurement of Macroeconomic Disequilibrium in Centrally Planned Economies", in Davis. C. and W. Charemza, Models of Disequilibrium and Shortage in Centrally Planned Economies, London, Chapman and Hall, 1989.

Portes, Richard and David Winter: "Disequilibrium Estimates for Consumption Goods Markets in Centrally Planned Economies", Review of Economic Studies, pp. 137-149, 1980.

Portes, Richard, Richard E. Quandt and Stephen Yeo, "Tests of the Chronic Shortage Hypothesis: the Case of Poland", Review of Economics and Statistics, pp. 288-295, 1988.

Quandt, Richard E., "The Estimation of the Parameters of a Linear Regression System Obeying Two Separate Regimes", American Statistical Association Journal, December 1958.

Schroeder Gertrude E. and Barbara S. Severin, "Soviet Consumption and Income Policies in Perspective", in Soviet Economy in a New Perspective, Joint Economic Committee, Congress of the United States, October 1976.

Smith, Williard S., "Housing in the Soviet Union - Big Plans, Little Action", in Soviet Economic Prospects for the Seventies, Joint Economic Committee, Congress of the United States, June 1973.

Van Brabant Jozef M., "Socialist Economics: The Disequilibrium School and the Shortage Economy", Journal of Economic Perspectives, Spring 1990.

Winiecki, Jan, "Portes ante Portas: A Critique of the Revisionist Interpretation of Inflation under Central Planning", Comparative Economic Studies, Summer 1985.