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Abstract The current paper empirically examines the determinants of household savings rates in the Soviet republics, by utilizing the panel data of an aggregated household budget survey in the period from 1965 to 1989. Earlier studies claimed that increases in household savings starting from the late 1950s were the direct result of worsening shortages of consumer goods; therefore, they considered Soviet households' savings to be involuntary ones and that households were "forced" to save under severe shortage conditions in the official consumer market. But they failed to fully investigate this problem mainly because of unavailability of data on household incomes and expenditures and of ignorance of a widespread informal economy ("second economy"). When the informal economy could at least partly provide households with opportunities to spend their money on lacking goods, households would be able to choose whether to save money and stand in line for scarce goods at the official retail shops, or move to the informal market. This understanding leads to the implication that there existed neither involuntary nor forced savings. In order to tackle this unsolved research problem, the Soviet households' savings rate function is estimated by taking into account shortages, the informal economy, and other factors, among them life-cycle factors, and then the "forced savings rate" is calculated. The main findings of this study are as follows: Firstly, even taking into account these factors, there existed Soviet-unique factors, namely the shortage factor, informal factor, and demand-spillover effect. Secondly, the magnitudes of these three factors varied among regions, so forced savings rates also varied. According to our estimation results, forced savings in the Slavic and Baltic regions accounted for more than 40% of the total savings just before the collapse of the Soviet Union, while those in the Caucasian and Central Asian regions accounted for less than 10%.

JEL Classification Codes: N34, P24, P32, P36, P51.

Keywords: forced savings, shortages, informal economy, centrally planned economies, Soviet Union

1. Introduction

In the late 1950s, the Soviet economy recovered from World War II and achieved remarkable economic growth. This improved the living standards of the Soviet population, accompanied by substantial increases in household savings. At the same time, the shortage phenomenon became tangible. Needless to say, consumer goods shortages were one of the main features of the Soviet economy, and were also typical of other Centrally Planned Economies (CPEs) in Central and Eastern Europe. The concurrent development of shortages and increases in savings invited an academic debate on the existence of “forced savings” of the population (Bronson and Severin, 1966; 1973; Keizer, 1971; Bush, 1973). Then, increases in household savings unaccompanied by corresponding increases in consumer goods supplies were interpreted as one of the symptoms of worsening shortages, because households do not have any rational reason to save non-usable assets and the concurrence of shortages and increases in household savings for the purpose of future consumption is not possible.

This debate continued during the 1970s and 1980s, when the constant and more tangible increasing tendency of household savings became stronger, which fueled further debate on “financial crisis” (Birman, 1980a; 1980b; Pickersgill, 1980b; Birman and Clarke, 1985). The more severe the shortage problems became, the stronger the inflation pressure of unsatisfied consumer demand, which would possibly affect the feasibility and stability of the economic system. Under Gorbachev’s Perestroika with worsening economic conditions, the feasibility of CPEs and market reform came to be widely discussed (Alexeev, 1988; 1991; 1992; Alexeev et al., 1991) because forced savings can easily cause hyperinflation after price liberalization.

In this way, what the relationship between shortages and household saving behavior was like is an essential aspect to be examined not only for retrospective evaluation of the Soviet and CPE system, but also for analyzing the transition economy (Asgary et al., 1997; Kim, 1999;

Denizer and Wolf, 2000; Denizer et al., 2002, Forely and Pyle, 2005).

Figure 1 is helpful for retrospectively understanding and sharing the common views of the then researchers on the situation of possible financial crisis at that time, although not in a direct but a suggestive way at the onset. In this figure, two financial indicators are compared in clustered regions¹: bank (sberkassa: savings bank) deposits of households relative to net material product (NMP) during the Soviet period on the one hand, and bank deposits relative to gross domestic product (GDP) during transition periods on the other.² Both of them are intended to capture the relative sizes of financial assets held by households in the economy. Although these two different series are not comparable with each other in the strict sense, they give an outlook sufficiently useful for perceiving a sharp drop in household financial assets before and after the collapse of the Soviet Union.

[Figure 1 here]

Bank deposits of households showed a continuous increasing tendency throughout the Soviet period, and then strikingly decreased and disappeared after the price liberalization

¹ Hereafter, each union republic in the Soviet Union is treated as one in a region clustered into four groups, namely Slavic, Baltic, Caucasian, and Central Asian. Russia, Ukraine, Belarus, and Moldova are republics in the Slavic region. Other regional grouping follows the usual classification rule: the Baltic region consists of Lithuania, Latvia, and Estonia; Caucasus—Georgia, Azerbaijan, and Armenia; and Central Asia—Uzbekistan, Kazakhstan, Kyrgyzstan, Tajikistan, and Turkmenistan.

² The compilation of statistical data on total household savings and GDP series for each republic within the framework of the System of National Accounts (SNA) is beyond the scope of the current paper. In Figure 1, we compare the relative sizes of the stocks of household financial assets as the first approximation of excess household savings in the Soviet Union. For this purpose, it is sufficient to look at the bank deposits relative to the sizes of the national economy expressed either in NMP or in GDP. Later sections will examine this issue in a more rigorous manner.

in the early 1990s. This change occurred simultaneously in the all regions. Because prices of consumer goods were fixed at almost the same level for the last three decades of the Soviet Union, household savings remained unspent in the hands of the consumers. But once prices were liberalized and market economic coordination was introduced to the economic system, excess demand resulted in sharp price rises, which in turn entirely absorbed household effective demand. This means that the Soviet economic system caused household savings to increase more than in a market economy.

Deposits/NMP ratios in 1990 just before the collapse of the system reached 52.4% in the Soviet Union as a whole, 53.6% in the Slavic region, 51.8% in the Baltic region, 62.0% in the Caucasus, and 38.6% in Central Asia on regional average. It is quite interesting to observe these ratios exceeding those in the transition period. Looking at the year when transition economies recovered their pre-transition level of nominal GDP and real per-capita GDP in 1990 prices, regional average deposits/GDP ratios are 19.0% (2004) and 25.5% (2007) in the Slavic region, 12.4% (1996) and 22.2% (2002) in the Baltic region, 9.0% (2005) and 10.2% (2007) in the Caucasus, and 13.4% (2003) and 17.1% (2004) in Central Asia. In fact, the ratios in the Soviet periods substantially exceed those in the transition period in all regions. Needless to say, levels of income and economic development are factors determining household savings. But the wide gap in the ratios of deposits to NMP or GDP can hardly be explained by these factors and differences in measurements. Figure shows the clear difference given the same level of income and development in the corresponding regions. Therefore, this is expected to be attributable to the structural change and certain features of the Soviet economic system affecting excess household savings. Our central research question is what explains this intuitive discrepancy and whether this can be interpreted as forced savings caused by shortages typical of the CPEs and the Soviet economy.

At the moment, it is difficult to judge the existence of forced savings as being a direct

result of shortages in the Soviet Union only by referring to these gaps between two economic systems although the hyperinflation after the transition reform indirectly suggests the existence of unsatisfied and unrealized consumer effective demand. The reason is that neither voluntary nor involuntary savings motives under a shortage economy have been empirically examined in an integrated manner. One of the main shortcomings in this research field is in the insufficient investigation into the role of the informal market. Some researchers objected to the idea of forced savings because the informal market could expect to provide the opportunity for households to obtain consumer goods with their savings. Due to the unavailability of a statistical dataset appropriate for empirical examination, this research issue remained unsolved. When the informal economy could at least partly provide households with opportunities to spend their money on lacking goods, households would be able to choose whether to save money and stand in line for scarce goods at the official retail shops, or move to the informal market. This understanding leads to the implication that there did not exist involuntary or forced savings.

Hence, in order to tackle this unsolved research problem, we quantitatively examine the relationship between households' savings rates and consumer goods shortages in the centrally planned economies (CPEs), by utilizing an original panel dataset for the Soviet republics in the period from 1965 to 1989. The main findings of this study are as follows: Firstly, even taking into account these factors, there existed Soviet-unique factors, namely the shortage factor, informal factor, and demand-spillover effect. Secondly, the magnitudes of these three factors varied among regions; therefore, forced savings rates also varied. According to our estimation results, forced savings in the Slavic and Baltic regions accounted for more than 40% of the total savings just before the collapse of the Soviet Union, while those in the Caucasian and Central Asian regions accounted for less than 10%.

The remainder of this paper is organized as follows: The next section gives an

overview of earlier studies regarding household saving motives and the forced savings phenomenon in the CPEs, and then develops the hypothesis examined in the following section by introducing some related information from archival materials. Section 3 sets up the statistical database we use and explains the empirical strategy for estimating the determinants of the savings rate at the republic level. Then, Section 4 conducts empirical investigations and reports the estimation results. We also attempt to compute “forced savings” rates. In the last section, our major findings and conclusions are summarized based on the results.

2. Saving Motives in the Centrally Planned Economies

2.1 Literature Review

So-called forced savings of households and the consequent accumulated “monetary overhang” is one of the peculiar aspects of a shortage economy, and a widely argued research issue when the feasibility and stability of Soviet-type or centrally planned economic (CPEs) systems are discussed. The term “forced savings” is generally defined as excess household savings over the desired level stemming directly from repressed inflation (Nutti, 1986, p. 46). Due to the rigidity of centrally fixed consumer prices in the official sector, excess consumer demand does not result in explicit inflation and price coordination, but in quantity constraints faced by households. Accordingly appear such shortage phenomena as longer queues and waiting lists, while unspent money is accumulated in the form of undesired increases in savings. Therefore, the existence of forced savings means the situation where households want to but cannot spend their saved money to buy goods because of shortages (Birman and Clarke, 1985, p. 497).

This argument transpires against a background of rapid increases in household savings starting since around the late 1950s and the early 1960s. Researchers asserted that rapid increases in household savings were one of the symptoms indicating the disfunctioning

of the CPEs. At that time, various shortage-related phenomena, such as long queues, price gaps between official and farmers' markets, and others were reported in the Soviet media. Referring to these casual observations, researchers regarded the more rapid growth in savings than that of household incomes and retail turnovers to be "excess" savings and forced ones. Under persistent shortage conditions, consumers do not have the opportunity to use their saved money to buy goods (Howard, 1976; Birman, 1980). However, some researchers objected to this view and insisted that there is no clear evidence indicating the persistent existence of shortages (Pickersgill, 1976; Ofer and Pickersgill, 1980).

Most researchers shared a common view regarding the saving motives of Soviet households, which were different from those in the market economies. Soviet-specific features of savings are summarized in the following three points (see Ofer and Pickersgill, 1980, pp. 123-127):

(1) As lifetime fluctuations in household incomes are smaller in CPEs than in market economies, income transfers from the current to the future period are also limited. While wage payments with much smaller short-run fluctuations occupy the largest part of household income, income differentials according to profession, age, and skill of workers are small and are decreasing after the 1950s. In addition, retirees receive sufficient pension benefits (needless to say, these are quite a lot smaller than their wages during their working years) and medical care without charge and other in-kind payments such as low-priced/subsidized housing and transportation. These supplements to money income served as a buffer against lifetime income fluctuations. The above-described features of CPEs were expected to weaken the saving motives of households aimed at income smoothing between periods. Mikhalev (1996) and Guariglia and Kim (2003) also pointed out that the existence of a social security system and de facto absence of unemployment in the CPEs reduced the motive for precautionary saving in the CPEs.

(2) On the expenditure side, households in CPEs, with quite limited occasions for almost all kinds of financial investment in equities, were constrained to save either in the form of monetary savings of bank deposits, state bonds, and cash holdings under the mattress, or real investments in consumer durables, valuable goods like jewelry, and others. These limitations on the choice of how to save were considered to reduce the saving motives of households. In other words, households would have weaker incentive to save in the absence of profitable financial instruments and under persistent shortage/repressed inflation conditions.

Contrary to these arguments, features of the Soviet financial and economic system might as well increase household savings in some way. Households, facing the difficulty of getting consumer credit and loans when purchasing expensive goods (consumer durables, cars, dachas, etc.), were required to pay all expenses for such purchases in advance. It is also pointed out that the limited access to consumer credit also constrained younger families from transferring expenditure from the future with higher income to the present. Another factor enlarging savings was shortage. As availability of scarce goods was uncertain in this shortage economy, households had to be ready to pay cash money whenever an opportunity unexpectedly arose;

(3) Lastly, households' experiences under Soviet social and political conditions were also considered to influence their saving behaviors. One such experience is related to the monetary reform in 1947, when most private financial assets held in old currencies were converted into new ones at unfavorable rates. This experience implanted the fear of possible asset confiscation in households' minds. It is also argued that households refrained from conspicuous consumption because the political authorities monitored households accumulating wealth with suspicion.

These considerations led researchers to expect that savings of Soviet households were,

on the whole, weaker than those in market economies. As the above arguments on both the income and the expenditure sides imply, one of the remarkable features of saving behaviors in CPEs is the weaker role of lifetime income smoothing. Keeping such understanding in mind, increases in savings accompanied by worsening shortage conditions were accordingly interpreted as a symptom of excess savings. Hence, it is believed that increases in savings should be explained by Soviet-/CPEs-inherent factors different from those of market economies, that is, the shortage factor.

Meanwhile, some objected to this argument and emphasized the role of the informal economy. If an informal economy exists, households can obtain consumer goods that are in shortage in the official market. Given the possibility of purchasing goods even at higher prices than at the state and cooperative retail shops, all money savings can be used in the informal sector. Whether to stand in line at state and cooperative shops and save money or to pay higher prices in the informal market is dependent only on household preference. If a household values time over money, they move to the informal economy to save queuing time. Otherwise, they stand in line and keep their money in their hands until they can spend it in the official sector. The decision is made by households as a voluntary choice; therefore, increases in savings even under the situation of longer queuing are considered to be non-forced savings.

In the context of the above-described debates as a research background, empirical investigations were conducted by Western researchers, although in limited numbers. As the main focus of this paper is on the influencing role of shortages and the informal economy on saving behaviors, here, we also focus our overview on how these factors were treated in previous studies. The main previous studies are neatly summarized in Table 1 from the following viewpoints: region and period covered, hypothesis to be employed, estimation methodology, and estimation results based on the two main variables of shortages and informal economy. They can be also classified into three groups according to the dataset they

used: namely, official statistics and so-called CIA estimates of household money incomes and expenditures,³ interview survey data from Soviet emigrants, and lastly, archival materials on the household budget survey. We review them accordingly.

[Table 1 here]

Investigation into Soviet household saving behavior in an econometric way as a first attempt was conducted by Pickersgill (1976). She estimated the savings function of Soviet households in the period from 1955-1971 relying on the absolute income hypothesis, and concluded that the marginal propensity to save in the Soviet Union was 6.6% and within the range of those of market economies. Adding to this, she also confirmed that the proxy of shortage defined as Holzman-type repressed inflation,⁴ that is, the price gap between officially set prices and those of collective farmers' markets, was not statistically significant in her estimation results. Based on these findings, she insisted that there was no influence of shortages on household saving behavior. This argument is supported by Pickersgill (1980a), which extended the period examined to 1977. Cottarelli and Blejer (1992) also estimated the

³ Shida (2015, Appendix 1) critically overviewed official Soviet statistics and CIA estimates of household money incomes and expenditures, and then reconstructed an original database of household money incomes and expenditures at the republic level for the period from 1960 to 1989, based on archival materials of "monetary balances of money incomes and expenditures of the population" (*denezhnye balansy dokhodov i raskhodov naseleniya*).

⁴ Holzman (1960, p. 170)'s repressed inflation rate indicates widening of prices gaps between the official retail sector and the collective farm (kolkhoz) markets. Prices in official retail shops were centrally planned by the authorities and did not fluctuate very much. Excess demand for consumer goods in the official market could not be reduced by raising prices, and then they as unsatisfied demand could move to the informal sector including kolkhoz markets and stimulate price coordination there. Therefore, widening of the price gaps between the two sectors can be interpreted as a symptom of worsening shortage conditions in the official sector.

savings function of Soviet households in the period from 1964-1985 in the framework of the life-cycle hypothesis, and contended that household savings were not influenced by the shortage indicator of Holzman's repressed inflation rate and can be explained in the context of Western standard economic theory, at least before the mid-1980s.

These studies employed conventional methodology for investigating saving behavior, taking shortage factors into account. Meanwhile, they suffered from shortcomings in the datasets they utilized. The dataset used in Pickersgill (1976; 1980a) is from CIA estimates of households' money incomes and expenditures, which is as a whole based on Soviet official statistics. Because the latter provided a limited number and range of statistical items of household activities, the CIA estimates based on them also inevitably underestimated household incomes and savings, especially those in the form of cash holdings besides bank deposits. Kim (1997) also objected to them from the viewpoint of the instationarity of time-series data. In addition, given the unavailability of information on informal economic activities, their analyses are limited to shortage problems.

The second wave of research on household savings came in the 1980s, triggered by the active use of information from Soviet emigrants. Ofer and Pickersgill (1980), as one such example, estimated the savings function within the framework of the absolute and the permanent income hypotheses, by utilizing microsurvey data derived from interviews with Soviet emigrants to Israel. They found that household incomes from private sources functioned as transitory incomes, and concluded that Soviet households' saving behavior can be explained in the same way as in the market economies. Contrary to this argument, Mokhtari (1996) and Asgary et al. (1997) investigated the influence of quantity constraints on household money demand, based on the dataset from the Soviet Interview Project (SIP) with immigrants to the U.S. The latter study measured conditions of availability and shortage of consumer goods and participation in the informal economy by families by subjective evaluation based

on samples of those interviewed, and found that these two factors statistically significantly affected household money demand. These cross-sectional analyses advanced research on saving behavior in the Soviet Union. But such analyses suffered from several methodological problems besides whether those interviewed were representative samples. Firstly, they are limited to one time in the 1970s. Secondly they do not consider the time-series trend; therefore, the dynamic process of household behavior is not taken into account. Thirdly, regional variations are not considered, because of ignorance of uncontrollable region-inherent factors.

The most recent research was conducted by Kim (1997; 1999), which collected and reconstructed previously closed archival materials on the household budget survey. He estimated short-run and long-run solutions of household savings for 1965-1989 using cointegration and vector autoregressive (VAR) models. Kim presented the shortage indicator as the ratio of household money income to retail inventory, and found it statistically significant with a positive sign. Kim (1999) also estimated the savings function using the vector error correction (VEC) model. At this time, he used the informal-economy-adjusted shortage indicator, where demand spillovers from the official to the informal sector on the one hand and shortage conditions in the formal sector on the other hand are examined simultaneously in an integrated manner. And he then estimated the ratio of forced savings to total household savings relying on estimation results as follows: 16% in 1970, 27% in 1975, 14% in 1985, and 58% in 1990 (Kim, 1999, p. 662). Although shortage factors are confirmed to increase household savings, the influence of transaction motives was not made clear because shortages and the informal economy were not examined separately, but as a single variable. Deficiencies in his research also accrue from the limited scope of the region examined. Investigations only into the Soviet Union as a whole may cause regional aggregation problems.

Now, we can summarize the outcomes and remaining problems of previous studies from the following four perspectives. Firstly, although Mokhtari (1996), Asgary et al. (1997),

and Kim (1997; 1999) found a positive effect of the shortage factor on household savings, it is not made clear whether these arguments are applicable to each region over the Soviet Union and to each period examined. While the former two studies did not examine the time trend, the latter did not consider regional differences. Also, because the former two studies are based on one-time survey data on subjective evaluation regarding shortage conditions, this kind of index does not serve as an effective proxy when we revisit this issue at the region level for a longer period.

Secondly, none but Asgary et al. (1997) examined the role of the informal economy in a separate manner. As mentioned before, it is difficult to conclude that there is a positive effect of the informal economy and to extend this understanding based on one-time cross-sectional analysis to all regions and republics. The role of the informal economy should be treated particularly carefully, because not only the size but also the relationship between the informal economy and the official economy may differ at the republic/region level (Shida, 2015, Ch. 3, 4).

Thirdly, previous studies based on either official statistics or CIA estimates, such as Pickersgill (1976; 1980) and Cottarelli and Blejer (1992), underestimated the amount of household savings and the effect of shortages. They drew different conclusions from later studies, but this can be explained at least partly by data shortcomings of their dataset. If they had used different data, they might have drawn opposite conclusions.

The last remaining research problems are related to the hypothesis to be employed. All but Cottarelli and Blejer (1992) examined saving behavior in the Soviet Union in the framework of the absolute income or permanent income hypothesis, and they did not take life-cycle factors into consideration. Researchers expected weaker saving motives of households for smoothing incomes between periods, but this should also be examined.

2.2 Archival Evidence on Household Motives to Save in the Soviet Union

We briefly look at archival materials of the household survey as the first approach to these problems, prior to empirical investigation. Two documents on “Opinion survey on household savings” are collected at the Russian State Archive of the Economy (RGAE). They report the aggregated results of the survey conducted on April 1st in 1982 and 1984, respectively (fond 1562, opisi 65, delo 2733; fond 1562, opisi 67, delo 2423).⁵ The subjective evaluations made by households in fifteen union republics are summarized by family category (family of workers and employees, and family of collective farmers). Table 2 shows the share of households who answered positively to the respective questions. On average for the Soviet Union, 85.5% of all households held savings either in the form of bank deposits or other forms for multiple purposes: for spending on valuable goods in the future; for childbirth and childcare; for preparing for retirement; for precautionary reasons such as unexpected expenditure; and others. One of the important motives is future consumption of expensive goods. A total of 27.1% of households out of those who had savings (87.1%) cited this motive. This can be explained by the limited accessibility to financial services including consumer credit. Together with this, 35.6% of households on average in the whole Soviet Union referred to preparation for childbirth and childraising, and also for retirement (19.2%). Thus, household savings served in the Soviet Union as an income smoothing buffer even under a well-equipped social security system such as free education and day-care facilities and services for children, and a public pension system with some complementary payments both in cash and in kind. These

⁵ The archival materials to which we refer provide data aggregated at the republic level for each household category. We searched for this kind of material for the period after 1960 at the RGAE, but only the two above-mentioned materials were found. Because the survey data as of 1984 provide more detailed information on household saving motives than the 1982 data, we mainly refer to the 1984 data.

findings require us to consider the influences of lifetime events, which are not sufficiently examined in the previous studies on Soviet household savings. In addition, unexpected expenditure (47.7%) accounts for the largest share. In the context of the Soviet shortage economy, where uncertainty of consumer goods supply was high, it is assumed that households were required to prepare to pay whenever goods became unexpectedly available.

[Table 2 here]

As the first approximation, we further check the correlation between duration of holding saved money, perception of goods unavailability, and reasons. Here, we assume that shortages/unavailability of consumer goods prolonged duration of saving and holding money. The correlation matrix is shown in Table 3. The main findings here are as follows: the more severe the unavailability of consumer goods, the longer the duration of holding saved money for households who were fully ready to pay. The coefficient of correlation is 0.41 and is statistically significant at the 5% level. The correlation is much stronger depending on the relationship between duration in years of unspent savings and the reason for this. For example, the correlation between total years of holding saved money and unavailability of consumer goods is statistically significant at the 1% level with a coefficient of 0.76.

[Table 3 here]

[Figure 2 here]

Figure 2 shows this relationship focusing on two aspects. The first aspect is duration of money holding, which consists of the period accruing sufficient amounts of rubles for purchase of goods and the period of holding the money after accrual. The second aspect is

subjective evaluation of unavailability of consumer goods for which the household had saved money. Table 3 shows that households, even with the full amount of money for purchase, held savings longer because of unavailability of desired goods. The figures also confirm this positive relationship between shortages and saving behavior.

3. Data and Estimation Strategy

Households' saving behavior issues have been widely investigated. In recent years, the panel data approach has been actively employed. The most recent researches using cross-region or cross-country panel data are Hondroyannis (2006), Li et al. (2007), Horioka and Wan (2007), Hufner and Koske (2010), Horioka and Terada-Hagiwara (2012), Simleit et al. (2013), Mongale et al. (2013), Curtis et al. (2013), Bande and Riveiro (2013), and so on. We derive the estimation strategy and variables included in the models following these earlier studies. Our estimation model is described as below:

$$\begin{aligned}
 \text{saving_rate}_{i,t} &= \alpha + \mathbf{A}\mathbf{X}_{i,t} + \mathbf{B}\mathbf{Z}_{i,t} + \beta \text{shortage}_{i,t} + \gamma \text{informal}_{i,t} + \varepsilon_{i,t} \\
 \mathbf{X} &= (\text{income}_{i,t}, \text{liquid}_{i,t}, \text{inflation}_{i,t}, \text{graduates}_{i,t}) \\
 \mathbf{Z} &= (\text{fertility}_{i,t}, \text{expectancy}_{i,t}, \text{young}_{i,t}, \text{old}_{i,t}, \text{dependency}_{i,t}). \quad (1)
 \end{aligned}$$

We estimate the determinants of savings rates for i republic in year t as a function of various conventional explanatory variables and other Soviet-/CPE-inherent factors. Definitions and sources of the variables we use are summarized in Table 4 and descriptive statistics for them are reported in Table 5.

[Table 4 here]

[Table 5 here]

The savings rate in each republic in the natural logarithm is defined as the ratio of household monetary savings to household disposable money income: household monetary savings is the sum of increments in bank (sberkassa) deposits, state bond purchases, and net credit to citizens; household disposable money income is a household's total money income deducted after household-related taxes. Both values are calculated by the author based on archival materials on household budget survey data aggregated for each republic.

Variable matrix X is a set of conventional variables presumably determining the household savings rate at the republic level: X consists of household real disposable money income per person evaluated in 1965 rubles (*income*), which is estimated by the author based on archival materials on household money income and expenditure balances (*denezhnye balansy dokhodov i raskhodov naseleniya*); the ratio of household liquid assets to income in the previous period (*liquid*) and inflation rate (*inflation*) are also our estimation data based on official statistics and household budget survey data. A is a coefficient matrix for X .

Life-cycle vector Z is composed of fertility rate (*fertility*), life expectancy (*expectancy*), youth dependency rate (*young*), old-age dependency rate (*old*), and total dependency rate (*dependency*). These data are derived from the World Development Indicators (date accessed January 14th, 2015). B is a coefficient vector for life-cycle vector Z .

In addition to the above-mentioned conventional explanatory variables and life-cycle factors, we also include Soviet-/CPE-inherent factors that might not exist in market economies, namely, shortages of consumer goods in the official sector (*shortage*) and an informal market (*informal*). Following Chawluk and Cross (1994a; 1994b), Kim (1999; 1997), and Chawluk (2000), we measure the shortage levels as defined as the ratio of household disposable money income to retail inventory. This index is considered to be one of the disequilibrium indicators

used in general disequilibrium macroeconometric analysis not only for centrally planned economies but also for market economies (Kornai, 1976; Kornai, 1980; Charemza and Gronicki, 1988; Charemza, 1989a; Chang, 1992; Chawluk, 1994; Chawluk and Cross, 1994a, 1994b; Hazans, 1999; Kemme, 1989; Kim, 1999, 1997; Chawluk, 2000). On the other hand, the size of a republic's informal economy (*informal*) is calculated as the ratio of household money expenditure spent in the informal consumer market to net material product (NMP).⁶

a , β , γ , and ε are a constant term, the coefficients of *shortage* and *informal*, and error term, respectively. In Figure 3, household savings rates, size of the informal economy, and level of shortage are shown for each republic in the period examined in our estimations. This figure shows an increasing tendency to save in each republic.

[Figure 3 here]

We estimate the above-described savings rate equation (1) using the fixed-effects model, and then estimate the dynamic relationship with inclusion of the savings rate in the previous period using system GMM (generalized method of moments).⁷ Table 6 shows results of panel unit-root tests. The variables examined do not suffer from serious panel unit-root problems, so we also estimate the dynamic savings rate function using the system GMM estimator instead of the panel co-integration used in Hübner and Koske (2010). The system

⁶ We can divide household money expenditure into two categories based on the structure of its component items according to household budget survey materials. One is the amount of expenditure spent in the state and cooperative sector, and the other is expenditure spent when households have dealings with citizens directly. The latter is considered to be informal market trade between citizens and we use it as a proxy for the informal market.

⁷ In fixed-effects models, the error term is defined as $\varepsilon_{i,t} = \mu_{i,t} + \nu_{i,t}$, where $\mu_{i,t}$ is the republic-inherent effect.

GMM estimator enables us to control republics' fixed effects and endogeneity biases simultaneously by combining level and difference equations (Loayza et al., 2000; Schrooten and Stephan, 2005; Horioka and Wan, 2007; Horioka and Terada-Hagiwara, 2012). Under this estimation, we use NMP real growth rates as the internal instrument variable for the level equation and life-cycle factors as external instrument variables for both level and difference equations.

[Table 6 here]

Note that we also should treat the *informal* variable carefully because this factor affects savings rates in two directions. Firstly, households have to accumulate money before buying consumer goods in the informal market because these goods are scarce in the official market and prices are higher. Households are required to save money for transaction reasons, which leads to a positive effect of the informal market on savings rates. On the other hand, if the informal economy is functioning well and is able to absorb excess money households have accumulated under severe shortage conditions in the official market, an informal economy reduces household money holdings, and so savings rates decrease. That is, the effect of an informal economy on households' savings rates is expressed as both an *a priori* positive consequence and an *ex ante* negative one. We can only examine its *net* effect of positive minus negative.

Secondly, as Shida (2015, Ch. 4) pointed out, the strength of the relationship between shortages and an informal economy differs among republics and regions. In the Caucasian and Central Asian republics, development of informal economies is relatively independent of the official economies. In these regions, the influence of shortages in the official sector on the development of informal economies is weaker than in other regions, so informal economies

are weakly rooted in the CPEs' shortage problems; rather, they may play a different role. Meanwhile, in relatively developed republics such as the Slavic and Baltic republics, this relationship is the strongest. In other words, shortages stimulated increases in the informal economic activities of households; thus, informal economies served as absorbers of household excess money holdings. With these considerations in mind, we need to additionally take into account a possible different role of the informal economy and variations in the relationship between the informal economy and shortages among republics. For this purpose, we include the interaction term of both variables (*shortage* × *informal*) as in the equation below:

$$\begin{aligned}
 \text{saving rate}_{i,t} = \alpha + \mathbf{AX}_{i,t} + \mathbf{BZ}_{i,t} + \beta \text{shortage}_{i,t} + \gamma \text{informal}_{i,t} \\
 + \delta(\text{shortage} \times \text{informal}) + \varepsilon_{i,t}. \quad (2)
 \end{aligned}$$

By introducing this interactional relationship between them, we can examine the spillover effect of unsatisfied household demand for consumer goods from official to informal markets. We can also investigate the shortage effect, the informal market effect, and the spillover effect separately.

4. Results

4.1 Estimating Determinants of Savings rates in the Soviet Republics

Our baseline estimation results of fixed-effects models are shown in Table 7, and the estimation results of extended dynamic models are shown in Table 8. We first overview the results of fixed-effects models, in which life-cycle factors, namely fertility rate (*fertility*: model [1]), life expectancy (*expectancy*: [2]), old-age dependency ratio (*old*: [3]), youth dependency ratio (*young*: [4]), and total dependency ratio (*dependency*: [5]) are introduced in the equation step by

step, and then all life-cycle factors ([6]) are included and examined.⁸

[Table 7 here]

In all fixed-effects models, *income* is statistically and significantly positive at less than the 1% level. The ratio of liquid assets to income (*liquid*) is not statistically significant at less than the 10% level. This result is different from Kim (1999)'s investigation, where he examined households' behavior for optimizing liquid assets, assuming that households with excess liquid assets would reduce their savings. Our empirical investigation does not support this assertion. One of the reasons is the different methodology we used for estimating amounts of liquid assets. Data limitations make it difficult for us to include households' investments in livestock. Regarding the inflation rate, *inflation* is statistically significant at less than the 1% level with a negative sign. The education level (*graduates*) is not statistically significant at less than the 10% level in all models.

With these investigations into conventional variables in mind, we examined the influence of Soviet-inherent factors on household savings rates. We reached the following two findings: firstly, the shortage indicator (*shortage*) is statistically significant at less than the 1% level with a positive sign in all models, which means that the worsening of shortage conditions

⁸ Following Kim (1997; 1999)'s methodology, we also examined permanent income and transitory income ratio: permanent incomes are defined as fixed parts of money income, that is, wages paid by the state and cooperative organizations; meanwhile, premiums and bonuses tend to fluctuate more, so they are classified as transitory incomes. We used and examined these income variables instead of absolute real income per family member (*income*). However, both variables are highly and positively correlated and suffer from multi-collinearity biases. For this reason, we omitted these estimation results from our analysis. This is partly explained by the fact that transitory incomes as defined above do not show substantial fluctuations in the short term and therefore they are paid like fixed wages. So, it is difficult to differentiate between permanent and transitory income in this way.

in the official consumer market raised households' savings rates; and secondly, the size of the informal economy as a ratio of NMP (*informal*) is statistically significant at less than the 5% level in all models, which indicates that the informal economy served as absorber of excess demand and excess money holdings of households under a shortage economy. Both the coefficients of *shortage* and *informal* change little, so our results are quite robust. These findings clearly suggest that in this CPE there were Soviet-inherent factors determining household behavior with which market economies were not endowed.

Turning to life-cycle factors, *fertility*, *old*, *young* are statistically significant at less than the 1% level. *Old* has a negative sign, while *young* has a positive sign. These findings lead to the understanding that Soviet households also accumulated financial assets for consumption in the future and used these assets in their later years. Therefore, Soviet households behaved so as to smooth income levels between periods as the life-cycle hypothesis suggests. This assertion is also supported by the life expectancy factor (*expectancy*), which is statistically significant at less than the 1% level with a positive sign in all models, where households are expected to increase savings when they expect to live longer.

Summarizing the results of fixed-effects models, we can derive a general understanding regarding Soviet households' saving behavior. That is, although Soviet households' savings can be explained within the life-cycle hypothesis-based analytical framework, Soviet-inherent factors, namely shortages and an informal economy, also existed. In all models, the F-test rejected pooled OLS (ordinary least-squares) estimation and supported fixed model estimation, so republic-unique factors also influence savings rates at the republic level.

Based on the above-explained baseline estimation, we derive statistically significant explanatory variables and extend our analytical framework to dynamic models. Here, we introduce the following variables into the dynamic equation: *income*, *shortage*, *informal*, and

inflation as conventional factors on the one hand, and *fertility*, *expectancy*, *old*, *young*, and *dependency* as life-cycle factors on the other hand. The determinants of savings rates for the Soviet republics are estimated using the system GMM estimator, the results of which are shown in Table 8. In the model from [1] to [5], we examine conventional factors with inclusion of each life-cycle factor in a stepwise way.⁹

[Table 8 here]

Table 8 reports the estimation results. First, we found that the savings rate in the previous period (*saving_rate*, lagged) is statistically significant at less than the 1% level with a positive sign, and that Soviet households had habitual saving behaviors just as households in a market economy have. Furthermore, in all models, our main two variables *shortage* and *informal* have statistically significant positive signs at less than the 10% level. System GMM estimations likewise support our hypothesis that shortages of consumer goods in the official market have a positive effect on households' savings rates and that development of an informal economy has an absorbing effect on them. In addition to these findings, the coefficient of *inflation* is in accordance with fixed-effects models, and has a statistically significant negative sign. As for life-cycle factors, although the coefficients of each variable have the same sign, only *old* is statistically significant at less than the 1% level; the other variables are not statistically significant at less than the 10% level.

⁹ We estimated the saving rates function using system GMM in three ways according to what kind of variables are used as instrument variables for saving rates in the previous period: the first one is the model in which instrument variables are not specified; in the second one, real NMP growth rate is used as the instrument; the third one uses the per-capita real income growth rate. In Table 8, we only show our estimation results estimated in the second way, because the three ways of calculating the estimation results do not vary.

In summary, our empirical investigation into households' savings rates in the Soviet republics confirm the two main effects of shortages and an informal economy, which are not included in conventional models for market economies.

4.2 Forced Savings rates in the Soviet Republics

This section further inquires into the effect Soviet-inherent factors on households' savings rates, and then attempts to calculate forced savings rates. The first step to achieving these purposes is to decompose household saving motives into voluntary and involuntary ones. Some earlier studies argued that households do not have voluntary saving motives because of the existence of shortages in the official market, and others objected to this argument because of the widespread existence of an informal economy under shortage conditions. The previous section shows the existence of Soviet-inherent effects of shortages and an informal economy, but this examination does not make it clear how shortages and an informal economy relate to households' motives to save. The central research question here is whether an informal economy absorbs not households' accumulated excess savings, but accumulated excess savings stemming from shortage problems. Therefore, the interactional relationship between them should be empirically examined. Taking these considerations into account, we estimated the above-mentioned savings rate equation (2) by introducing the interaction term of an informal economy with shortages (*shortage*×*informal*). It is assumed that an estimation model with the inclusion of this interaction term enables us to identify spillover of unsatisfied demand and unused excess money holdings from the official market to the informal market. And we also assume that this model makes it possible to divide the roles of the informal economy into one independent of shortages and the other closely connected to shortage conditions in the official market.

[Table 9 here]

The estimation results are shown in Table 9. Our main findings are described in three ways. Firstly, the coefficient of *informal* is statistically significant at a less than 5% level in all models of fixed effects and system GMM estimators, whose signs are reversed in Tables 7 and 8, and have a negative sign. That is, the more widespread an informal economy is, the higher the savings rate is. From this finding, we interpret the role of the informal economy as enhancing the savings rates of Soviet households. Even those facing shortages find alternative ways to obtain scarce consumer goods in the informal market although their prices are higher than those in the official market; therefore, households save money based on voluntary transaction motives for future consumption. In other words, households save money before obtaining goods in the informal market, which raises households' savings rates. Informal economies play an *a priori* savings-stimulating role rather than an *ex ante* savings-absorbing one.

Secondly, the interaction term of an informal economy with shortages is statistically significant with negative signs at less than the 10% level in both fixed effects and system GMM estimations. This result is interpreted as follows: savings are partly spent in a marginally increased informal market corresponding to marginal worsening of shortages. Note that this absorbing role of the informal market should be distinguished from the overall function of the informal economy because causes of informal economic activities are either dependent on or independent of the official market situation. Our focus is on the former case. Needless to say, an informal economy does not play the role of absorbing excess or unsatisfied demand of households in the latter case. In addition, coefficients of *shortage* stay positive and statistically significant in all models estimated, even if we aggregate the values of both coefficients of *shortage* itself and its interaction term with *informal*. Consequently, given the possible different

relationship between them, we can conclude that the interactional relationship between them plays the role of absorbing demand spillover from the official to the informal market.

Now, we are able to evaluate households' motives to save both voluntarily and involuntarily. Based on the estimation results shown in Table 9, we divide savings into involuntary ones forced by shortages on the one hand, and voluntary ones to be used in the informal market instead of in the official market under shortage conditions. We should again remember that voluntary savings not originating from shortages are considered differently from voluntary savings caused by the opportunity for households facing shortages in the official market to move to the informal market to obtain scarce goods.

Soviet-inherent factors determining forced and voluntary savings are clustered into three:

- (1) The shortage effect forces households to save financial assets and has a positive sign for the savings rates of households. By considering the relationship between shortages and the informal economy, we can evaluate the net effect of shortages after discounting savings absorbed by the informal economy;
- (2) The informal economy effect is also a net effect. The gross effect of the informal economy as a whole plays *a priori* savings-enhancing and *ex-ante* savings-absorbing roles irrespective of the shortage situation in the official market. The inclusion of the interaction term enables us to extract the savings-enhancing role of the informal economy, which is not dependent on shortages;
- (3) The demand spillover effect is the absorbing role of the informal economy under shortage conditions. This is the same as the opportunity for households to fulfill their unsatisfied demand and spend their excess savings in the informal market.

These three factors are expressed in natural logarithmic form in our equations; therefore, savings rates stemming from them can be obtained by transforming these factors

into exponent forms.¹⁰ Here, we attempted to estimate the magnitude of each effect as preliminary estimation results. Estimations are based on models from [1] to [5] presented in Table 9. The simple average of five models clustered by region (region-averaged) and period-averaged values for each region are shown in Figure 4 and Table 10, respectively. The results show clear regional differences in each effect. The shortage effect is the strongest in the Baltic region, followed by the Slavic region. Shortage problems were the most severe in these regions, which were relatively developed accompanied by the highest living standards. Shortages caused households' savings rates to increase by 11.2% points (period-averaged) in the Baltic regions, and by 10.4% points in the Slavic region. On the other hand, the Caucasian and Central Asian regions were less developed in the territory of the Soviet Union; thus, shortage problems were also relatively mild. Increases in savings rates caused by shortage effects in these regions were 9.7 and 7.6% points, respectively.

[Figure 4 here]

[Table 10 here]

Meanwhile, although informal economy effects do not vary among regions and are placed in the range from 3.6% points to 5.9% points, the magnitude of demand spillover effects

¹⁰ Gross and net forced rates are calculated based on the above-described equation (2) in the following way: $saving\ rate_{i,t} = \alpha + \beta shortage_{i,t} - \gamma informal_{i,t} + \delta(shortage \times informal) + AX_{i,t} + BZ_{i,t} + \epsilon_{i,t}$. All variables including saving rates in the previous period are values in the natural logarithm. To simplify the computation process, we use point-estimation data. Estimated values are in natural logarithmic form, and then transformed into exponent form. The saving rate stemming from the shortage factor is defined as: $saving\ rate_{i,t}^{shortage} = \exp(\beta shortage_{i,t})$. The saving rate motivated by informal economic activities is defined as: $saving\ rate_{i,t}^{informal} = \exp(\gamma informal_{i,t})$. The demand spillover effect is defined as: $saving\ rate_{i,t}^{interaction} = \exp[\delta(shortage \times informal)]$.

shows a sharp contrast to the shortage effects. Consequently, the net effects of shortages in the official consumer market differ among regions in the decreasing order of the Baltic (5.6%), Slavic (4.4%), Central Asian (1.2%), and Caucasian (0.4%) regions. Shortage problems are almost fully eliminated by the potential for households to shift their unsatisfied demand from the official to the informal market in the Central Asian and Caucasian regions. While shortage problems remained stable in the 1960s and 1970s and had an increasing tendency towards the end of the 1980s in the Slavic and Baltic regions, even under the condition that the informal economy can serve as stabilizer of the economy, shortage problems were not observed in the other regions.

These findings lead to the understanding that households' saving behaviors differ at the republic and the region levels due to differences in the magnitudes of voluntary and involuntary saving motives. We define involuntary savings in two ways. The first is "gross" forced savings, which only consider the shortage effect. The second is "net" forced savings, which consider the informal economy's absorbing role under shortage conditions. The proportion of forced savings to total savings is calculated as the ratio to actual value of total households' savings rates in the following equations:

$$\text{"gross" forced savings ratio (\%)} = \text{shortage effect} / \text{savings rate}$$

$$= 100 * \frac{\exp(\beta * \text{shortage})}{\text{savings rate}}$$

$$\text{"net" forced saving ratio (\%)}$$

$$= (\text{shortage effect and demand spillover effect}) / \text{savings rate}$$

$$= 100 * \frac{\exp(\beta * \text{shortage}) + \exp(\delta * \text{interaction})}{\text{savings rate}}$$

The preliminary results of republics' forced saving ratios in the period from 1965 to 1985, and the period-averaged data shown in Figure 5, reveal differences among republics. As

the figure shows, net forced saving ratios in the Central Asian republics excluding Kazakhstan are at a lower level, around zero percent during the period examined despite high gross forced savings ratios. Almost the same tendency can be observed in the Caucasian republics. The Baltic and Slavic republics have the opposite tendency, where both net and gross forced savings ratios are higher throughout, increasing towards the last years of the Soviet Union.

[Figure 5 here]

Based on these findings, we reveal the situation just before the collapse of the Soviet Union. Figure 6 compares net and gross forced savings ratios in the decreasing order of the latter by each republic. Actual savings rates of households do not vary in the range between 14% for Kyrgyzstan and 26% for Belarus, but forced savings ratios differ substantially among republics. The gross forced savings ratio in the Baltic and Slavic republics is over 60%, when only the shortage effect is considered. But once we consider both the shortage and demand spillover effects enabled by the existence of an informal economy, forced savings ratios are greatly reduced. In fact, the gross forced savings ratio of over 60% is reduced to less than 50% as a net forced savings ratio. In particular, in Estonia and Russia where the magnitude of the demand spillover effect is the smallest, the net forced savings ratios reached 40% and 47% in 1988, respectively. Furthermore, the net forced savings ratios in the Central Asian and Caucasian republics decreased to less than 10%. From the estimated data for 1988, we can derive the following understandings: problems of forced savings in the consumer sector are interpreted as those of the developed republics in the Baltic and Slavic regions. In less developed republics in the Caucasian and Central Asian regions, even with severe shortages of consumer goods, forced savings were mitigated by the possibility of demand spillover to informal economies, and informal economies themselves motivated households to voluntarily

save money to obtain non-shortage goods. We expect that these differences in terms of forced savings and the consequent monetary overhang inevitably have different influences on the initial conditions of economic transition in former Soviet countries.

[Figure 6 here]

Finally, we briefly check the reliability of our estimation results by comparing them with a previous study of Kim (1999, p. 622). Although the coefficient of pairwise correlation between them is high at 0.77, these two series are different in the following point. As Figure 7 shows, our estimation result indicates greater stability before the 1980s and then shows a substantial increase especially in the Perestroika period since 1985. Kim also revealed this rapid increase, but movement before this fluctuates more. This is because he estimated the forced savings rate using only the informal-economy-adjusted shortage indicator, that is, demand spillover multiplied by the shortage index, as we used. But this model building is not appropriate, because not all of the informal economy is rooted in shortages in the official market. For this reason, we separate the roles of shortage, informal economy, and demand spillover as explained above. By taking into account the different roles of each effect, we can evaluate the genuine net forced savings ratio. Nonetheless, both estimations indicate that the forced savings rate in the Soviet Union just before its collapse reached more than 40% of total households' savings.

[Figure 7 here]

5. Conclusion

In this paper, we empirically examined the determinants of households' savings rates in the

Soviet republics in the period from 1965 to 1989, by utilizing republic-level panel data of a household budget survey of our own reconstruction. We also decomposed saving motives into voluntary and involuntary ones based on our estimations. We revealed that Soviet-inherent factors, namely the shortage effect, informal economy effect, and demand spillover effect, indeed influenced households' saving behavior at the republic level. By taking these findings into consideration, forced savings are divided into two categories: one is gross forced savings where only the shortage effect considered; the other is net forced savings where the demand spillover effect is also considered.

We found large differences in both of the forced saving ratios. Based on our findings, we conclude that views of forced savings and related monetary overhang problems are applicable only to the developed republics in the Baltic and Slavic regions where net forced savings rates reached over half the total savings just before the collapse of the Soviet Union. In contrast, savings stemming from shortage problems could be absorbed by the large informal economies of the Central Asian and Caucasian republics.

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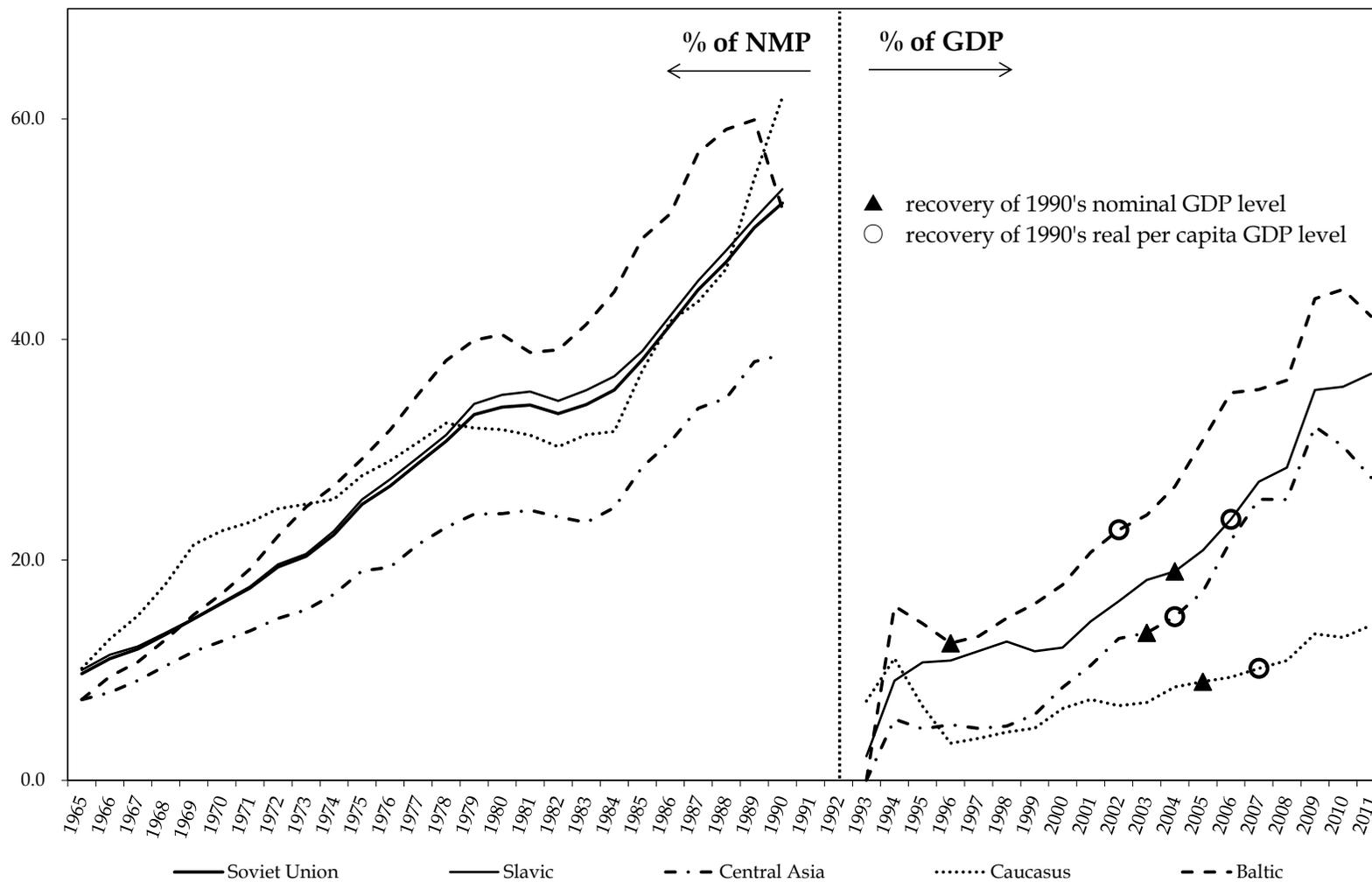


Figure 1: Comparison of Financial Development in the Soviet/Former Soviet Countries: Relative Sizes of Bank Deposits

Source: Author's compilation. Ratios of sberkassa deposits to net material product (%): data on stock of bank deposits of the population is taken from the *Soviet Statistical Yearbook* (various years). NMP data for each Soviet republic is provided by Professor Kuboniwa, Institute of Economic Research, Hitotsubashi University. Ratios of bank deposits to GDP (%): Global Financial Development Database (GFDD) (accessed on January 14th, 2015). Available at:

<http://data.worldbank.org/data-catalog/global-financial-development>.

Note 1: Deposit/NMP or GDP ratios for each region are averaged figures, weighted by the size of the mid-year population in each republic.

Note 2: Recovery years of 1990's nominal GDP and real GDP per capita are identified based on GFDD's nominal GDP and real GDP in 2005 prices.

Table 1: Previous Studies on Soviet Household Savings

| paper | region | time | estimation model | | explanatory valuables | |
|------------------------------|------------------------------|-------------|------------------------------|--------------------------------|---|---------------------------------|
| | | | hipotesis | method | shortage | informal market |
| Pickersgill (1976) | Soviet Union, time-series | 1955–1971 | absolute/permanent income | OLS | – | – |
| Picckersgill (1980) | Soviet Union, time-series | 1955–1977 | absolute income | OLS dynamic OLS | repressed inflation rate (+), net agricultural products (–) | – |
| Ofer & Pickersgill (1980) | immigrants, cross-section | mid 1970's | permanent income | OLS | – | – |
| Cottarelli and Bleger (1991) | Soviet Union, time-series | 1964–1985 | lifcycle | VEC | repressed inflation rate (+) | – |
| Moktari (1996) | immigrants, cross-section | late 1970's | permanent income | OLS | subjective evaluation (+)*** | – |
| Asgary et al. (1997) | immigrants, cross-section | late 1970's | absolute income | OLS | subjective evaluation (+)*** | informal expenditures (–)*** |
| Kim (1997) | Soviet Union, time-series | 1965–1989 | permanent income | dynamic OLS, co-integration | shortage (disequilibrium) indicator (+)*** | – |
| Kim (1999) | Soviet Union, time-series | 1965–1989 | permanent income | VAR, VEC | informal market ajusted-shortage (disequilibrium) indicator (+)*** | |

Source: Author's compilation.

Note 1: Coefficients of income variables (absolute, permanent, and temporary) are statistically significant at less than the 10% level with a positive sign in all the estimation models.

Note 2: ***: 1%; (+): positive coefficient; (-): negative coefficient; no star: statistically insignificant at less than the 10% level; -: not included in the estimation.

Table 2: Household Motives to Save in 1982 and 1984: Average Values

(% per household)

| | households with savings, share (%) | made by reducing everyday living expenses | purpose to save: for | | | | |
|--------------|------------------------------------|---|-------------------------------------|------------------------|-------------------------------------|-------------------------|---------------|
| | | | expensive consumption in the future | child-rearing expenses | maintaining living after retirement | unexpected expenditures | not specified |
| Soviet Union | 85.5 | 39.1 | 27.1 | 35.6 | 19.2 | 47.7 | 10.2 |
| Russia | 88.0 | 36.4 | 26.1 | 31.2 | 17.9 | 50.6 | 12.1 |
| Ukraine | 86.4 | 45.5 | 27.6 | 40.8 | 23.9 | 44.3 | 6.9 |
| Belarus | 86.0 | 43.6 | 22.9 | 43.5 | 23.9 | 42.1 | 8.1 |
| Uzbekistan | 74.5 | 38.7 | 37.3 | 36.4 | 13.3 | 39.5 | 8.4 |
| Kazakhstan | 82.4 | 37.9 | 26.6 | 44.5 | 15.1 | 46.8 | 7.4 |
| Georgia | 75.5 | 53.8 | 24.7 | 40.4 | 24.1 | 28.4 | 8.3 |
| Azerbaijan | 81.7 | 40.1 | 28.9 | 39.2 | 18.1 | 45.6 | 7.5 |
| Lithuania | 90.1 | 39.6 | 34.0 | 37.6 | 24.8 | 45.1 | 11.1 |
| Moldova | 79.9 | 43.0 | 30.2 | 44.2 | 25.7 | 41.7 | 7.0 |
| Latvia | 86.8 | 27.8 | 29.5 | 28.0 | 19.9 | 59.0 | 9.8 |
| Kyrgyzstan | 75.2 | 41.6 | 24.1 | 48.8 | 13.7 | 37.9 | 5.1 |
| Tajikistan | 84.1 | 48.4 | 42.0 | 34.9 | 11.8 | 49.5 | 10.6 |
| Armenia | 68.5 | 58.6 | 41.1 | 69.0 | 20.8 | 31.8 | 3.3 |
| Turkmenistan | 64.2 | 30.4 | 33.6 | 35.3 | 10.5 | 38.5 | 10.7 |
| Estonia | 81.4 | 23.1 | 26.8 | 31.2 | 19.7 | 50.5 | 15.4 |

Note: The survey in 1982 covered 30,089 households of workers and employees, and 29,078 households of collective farmers; 1984's survey covered 36,889 and 22,533 households, respectively. These two categories of households are integrated into one category representative of each republic, by weighting the estimated proportions of each category based on the 1979 and 1989 population censuses.

Source: Author's compilation based on RGAE archival materials and population census data: ф. 1562, оп. 65, д. 2733; ф. 1562, оп. 67, д. 2423; *Итоги всесоюзной переписи населения 1979 года: число и состав семей в СССР, 1990, Том 6, ч. 2, С. 216-246; Итоги всесоюзной переписи населения 1989 года: число и состав семей в СССР, 1993, Том 3, С. 336-367.*

Table 3: Duration of Savings and Causes of Unexpended Savings ⁽¹⁾

| | | how much households are prepared for purchasing expensive goods | | | why households do not spend savings | | |
|---|-------------------------------------|---|----------|---------------|-------------------------------------|-----------------|----------|
| | | over half the prices | all | average years | unavailability | quality problem | other |
| how much households are prepared for purchasing expensive goods | over the half the prices | 1.00 | | | | | |
| | all | 0.55 *** | 1.00 | | | | |
| | average years | 0.72 *** | 0.79 *** | 1.00 | | | |
| why households do not spend savings | unavailability | 0.24 | 0.41 ** | 0.32 | 1.00 | | |
| | quality problem | 0.05 | 0.29 | 0.08 | 0.21 | 1.00 | |
| | other | 0.43 ** | 0.43 ** | 0.49 *** | -0.05 | 0.26 | 1.00 |
| how long households do not use savings | average years | 0.34 * | 0.54 *** | 0.43 ** | 0.56 *** | 0.65 *** | 0.52 *** |
| how long households need to prepare money for purchases | average years | 0.37 ** | 0.47 *** | 0.31 | 0.77 *** | 0.54 *** | 0.28 |
| total years of holding of saved money | average years | 0.32 * | 0.43 ** | 0.32 * | 0.76 *** | 0.54 *** | 0.30 |
| motivations to save | expensive consumption in the future | -0.31 * | -0.06 | -0.11 | -0.04 | -0.04 | -0.18 |
| | child-rearing expenses | -0.05 | -0.03 | -0.16 | -0.19 | -0.12 | -0.30 |
| | maintaining living after retirement | 0.36 ** | 0.17 | 0.27 | -0.16 | -0.05 | 0.00 |
| | unexpected expenditures | 0.18 | 0.07 | 0.15 | 0.38 ** | 0.08 | 0.37 ** |
| | not specified | -0.09 | 0.06 | 0.13 | 0.11 | 0.12 | 0.28 |

Note: Pairwise correlation statistically significant at: ***: 1%; **: 5%; *: 10%. Correlation is estimated based on 1984 survey data regarding fifteen commodity groups in fifteen union republics by family category. Households who answered no savings for purchasing a specified commodity are treated as zero.

Source: Author's compilation based on RGAE archival materials and population census data: ф. 1562, оп. 65, д. 2733; *Итоги всесоюзной переписи населения 1979 года: число и состав семей в СССР, 1990, Том 6, ч. 2, С. 216-246; Итоги всесоюзной переписи населения 1989 года: число и состав семей в СССР, 1993, Том 3, С. 336-367.*

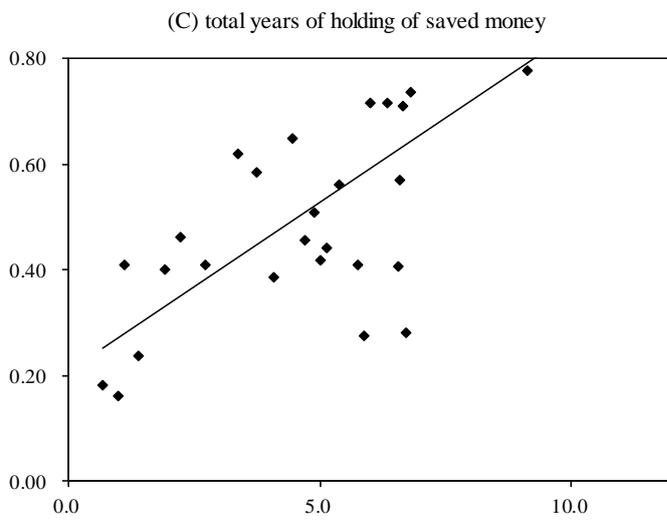
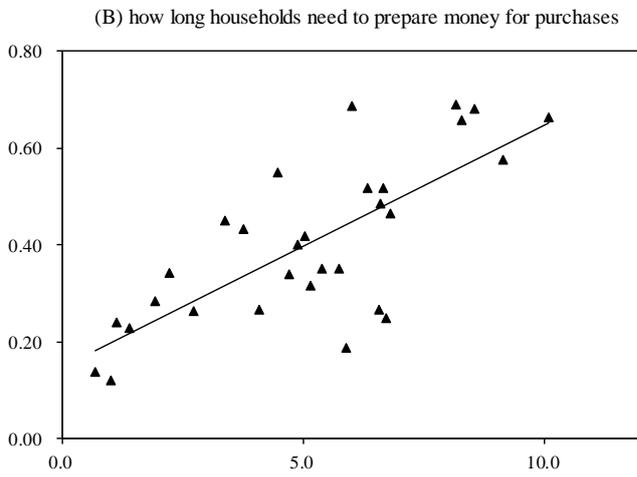
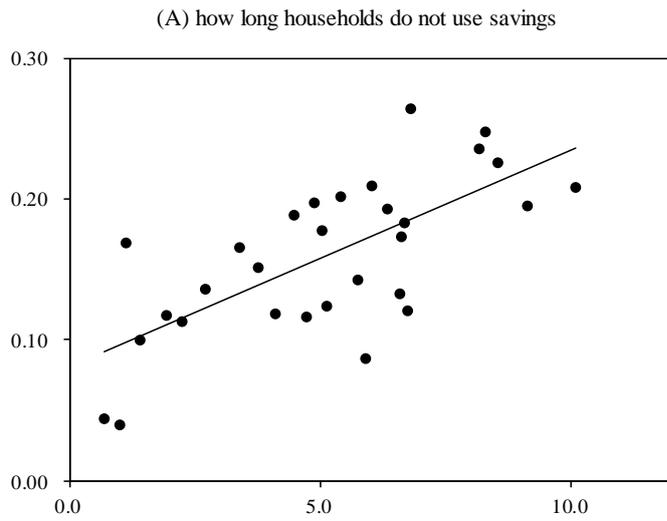


Figure 2: Goods Unavailability and Saving Duration

Horizontal axes (X): How long on average households hold savings; years before obtaining specific goods in fifteen groups are multiplied by the number of items for which households make savings.

Vertical axes (Y): Degree of goods unavailability

Source: Author's compilation based on the data used in Table 3.

Table 4: Definitions and Source of Variables Used in the Estimations

| Variable | Definition | Source |
|-----------------------|---|---|
| dependent variable | | |
| <i>saving rate</i> | Households' saving rates in the Soviet republics in the natural logarithm. | Author's estimation based on archival materials of household budget survey. See Shida (2015, Appendix 2). |
| explanatory variables | | |
| <i>shortage</i> | Shortage (disequilibrium) indicator in the natural logarithm: ratio of households' disposable money incomes to retail inventories at state and cooperative shops. | Author's estimation based on soviet official statistical yearbooks for each republic and archival materials of household budget survey. See Shida (2015, Ch. 4, Appendix 2). |
| <i>informal</i> | The sizes of the informal market in the natural logarithm: ratios of informal expendiutes of households spent outside the state and cooperative sectors to net material products for each republic. | Author's estimation based on NMP data and archival materials of household budget survey. NMP datais providedn by Prof. Kuboniwa (IER, Hitsubashi Univ.). See Shida (2015, Ch. 4, Appendix 2). |
| <i>income</i> | Real income of households evaluated in 1965 rubles in the natural logarithm. | Author's estimation based on archival materials of household budget survey. See Shida (2015, Appendix 2). |
| <i>liquid</i> | Ratio of liquid assets to incomes in the natural logarithm. | Author's estimation based on archival materials of household budget survey. See Shida (2015, Ch. 5, Appendix 2). |
| <i>inflation</i> | Inflation rate in the natural logarithm. | Author's estimation based on kolkhoz market price index for Soviet Union as a whole and archival materials on household budget survey. See Shida (2015, Appendix 2). |
| <i>graduates</i> | The education level in the natural logarithm: number of graduates from higher education insitutions per 1000 population. | Soviet official statistical yearbooks (various years). |
| lifecycle factors | | |
| <i>fertility</i> | Fertility rate. | World Bank's World Development Indicators. |
| <i>expectacy</i> | Life expectancy in the natural logarithm. | ibid. |
| <i>old</i> | Old dependency ratio in the natural logarithm: ratio of the population over 65 years old to total population. | ibid. |
| <i>young</i> | Young dependency ratio in the natural logarithm: ratio of the population under 5 years old to total population. | ibid. |
| <i>dependency</i> | Total dependency ratio in the natural logarith: the sum of young and old dependency ratios. | ibid. |

Note: Coefficients of pairwise correlation between each exogenous variable and sem_nmp, and shortage_mid. Significance level: ***: 1%; **: 5%; *: 10%.

Source: Compiled by the author.

Table 5: Descriptive Statistics of Variables

| variable | Obs. | Mean | Std. Dev. | Min | Max | Correlation with saving rate |
|------------------------|------|------|-----------|-------|------|------------------------------|
| <i>saving rate</i> | 375 | 2.66 | 0.22 | 2.10 | 3.39 | - |
| <i>shortage</i> | 370 | 1.77 | 0.21 | 1.13 | 2.30 | 0.32 *** |
| <i>informal</i> | 375 | 2.68 | 0.42 | 1.77 | 3.50 | -0.32 *** |
| <i>income</i> | 375 | 6.70 | 0.44 | 5.84 | 7.83 | 0.75 *** |
| <i>liquid</i> | 375 | 3.60 | 0.44 | 2.68 | 4.59 | 0.75 *** |
| <i>inflation</i> | 360 | 4.62 | 0.03 | 4.52 | 4.70 | -0.15 *** |
| <i>fertility</i> | 375 | 1.09 | 0.41 | 0.55 | 1.93 | -0.50 *** |
| <i>expectancy</i> | 375 | 4.20 | 0.06 | 4.03 | 4.28 | 0.53 *** |
| <i>graduates</i> | 375 | 4.09 | 0.23 | 3.26 | 4.48 | 0.46 *** |
| <i>class structure</i> | 375 | 4.41 | 0.12 | 3.92 | 4.57 | 0.47 *** |
| <i>old</i> | 375 | 1.98 | 0.36 | 1.33 | 2.57 | -0.57 *** |
| <i>young</i> | 375 | 3.42 | 0.27 | 3.02 | 3.84 | 0.58 *** |
| <i>dependency</i> | 375 | 0.44 | 0.25 | -0.06 | 0.76 | -0.13 ** |

Source: Compiled by the author.

Note: Coefficients of pairwise correlation between savings rate and each explanatory variable. Significance level: ***: 1%; **: 5%; *: 10%.

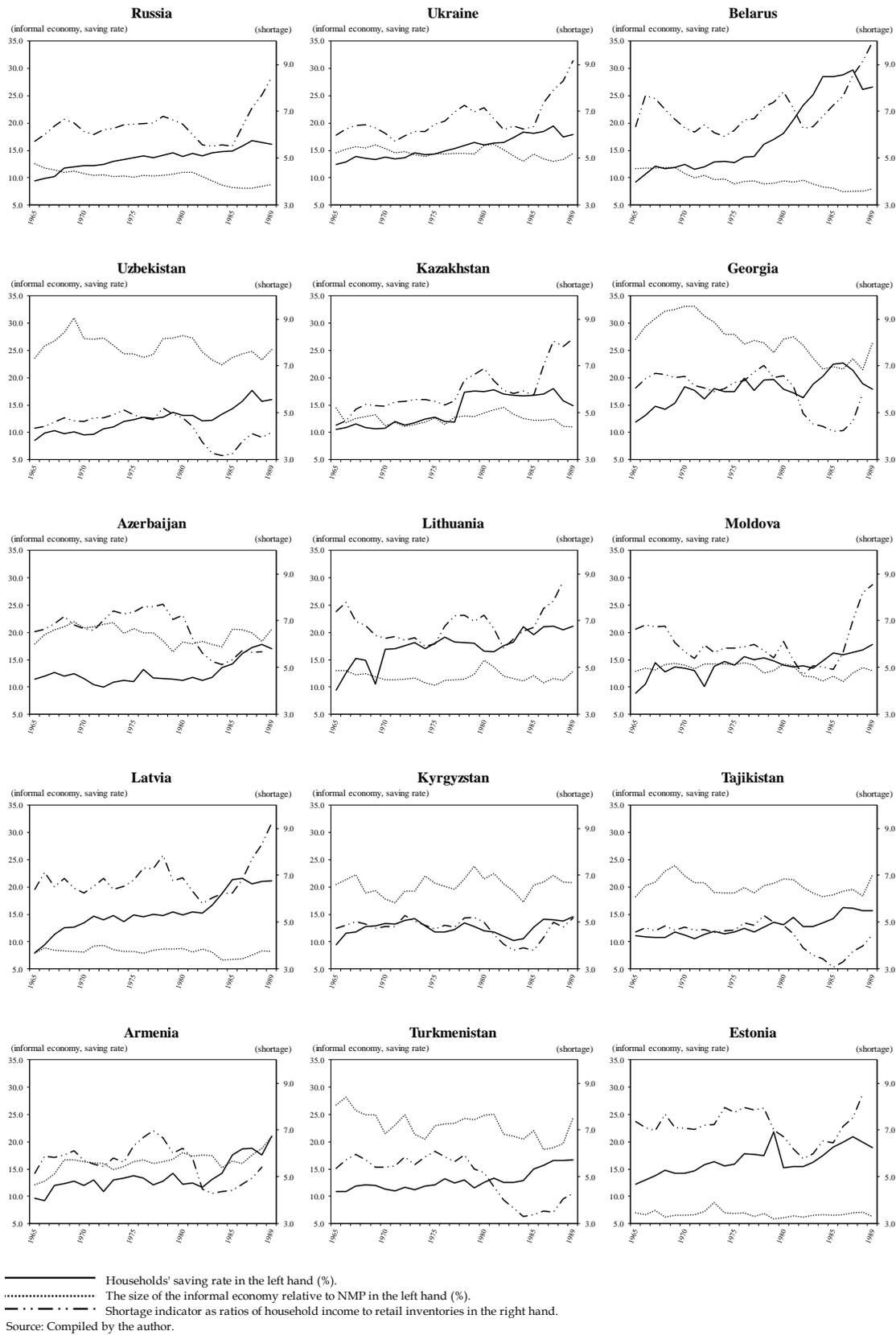


Figure 3: Savings Rate, Shortages, and Informal Economy in the Soviet Republics:

1965-1989

Table 6: Panel Unit-root Tests

| Levin-Lin-Chu unit-root test | adjusted t-value | |
|------------------------------|------------------|-----------------|
| | level | 1st differences |
| <i>saving rate</i> | -1.93 ** | -8.21 *** |
| <i>informal</i> | -2.53 *** | -4.31 *** |
| <i>income</i> | -3.01 ** | -7.22 *** |
| <i>liquid</i> | -7.05 *** | -5.14 *** |
| <i>inflation</i> | -4.92 *** | -14.85 *** |
| <i>fertility</i> | -2.43 *** | -10.56 *** |
| <i>expectancy</i> | -0.06 | -6.33 *** |
| <i>graduates</i> | -12.33 *** | -8.97 *** |
| <i>old</i> | -8.97 *** | -14.08 *** |
| <i>young</i> | -33.17 *** | -12.22 *** |
| <i>dependency</i> | -55.30 *** | -9.61 *** |

| Im-Pesaran-Shin unit-root test | Z-t-tilde-bar | |
|--------------------------------|---------------|-----------------|
| | level | 1st differences |
| <i>shortage</i> | 3.42 | -6.12 *** |

Ho: Panels contain unit roots.

Ha: Panels are stationary.

Note: Unit roots of all variables but *shortage* are examined by Levin-Lin-Chu tests, and *shortage* is examined by the Im-Pesaran=Shin test.

Significance level: ***: 1%, **: 5%, *: 10%.

Table 7: Estimation Results: Fixed-effects Models

| <i>saving rate</i> | FE | FE | FE | FE | FE | FE |
|--------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Model | [1] | [2] | [3] | [4] | [5] | [6] |
| <i>income</i> | 0.478 *** (0.069) | 0.479 *** (0.068) | 0.484 *** (0.066) | 0.470 *** (0.069) | 0.449 *** (0.068) | 0.469 *** (0.083) |
| <i>shortage</i> | 0.195 *** (0.048) | 0.170 *** (0.047) | 0.250 *** (0.049) | 0.168 *** (0.047) | 0.180 *** (0.049) | 0.282 *** (0.054) |
| <i>informal</i> | -0.185 *** (0.070) | -0.156 ** (0.068) | -0.199 *** (0.067) | -0.155 ** (0.068) | -0.163 ** (0.069) | -0.172 ** (0.068) |
| <i>liquid</i> | 0.019 (0.059) | 0.021 (0.057) | 0.025 (0.053) | 0.068 (0.055) | 0.055 (0.055) | -0.032 (0.064) |
| <i>inflation</i> | -0.712 *** (0.194) | -0.695 *** (0.193) | -0.680 *** (0.190) | -0.719 *** (0.194) | -0.715 *** (0.194) | -0.646 *** (0.186) |
| <i>graduates</i> | -0.082 (0.054) | -0.084 (0.054) | 0.003 (0.056) | -0.059 (0.056) | -0.077 (0.055) | 0.069 (0.061) |
| <i>fertility</i> | -0.127 (0.080) | | | | | 0.059 (0.175) |
| <i>expectancy</i> | | 0.654 ** (0.320) | | | | 0.145 (0.402) |
| <i>old</i> | | | -0.317 *** (0.077) | | | -1.149 ** (0.217) |
| <i>young</i> | | | | 0.145 *** (0.142) | | -2.511 *** (0.591) |
| <i>dependency</i> | | | | | 0.031 (0.093) | -1.713 *** (0.399) |
| constant | 3.300 *** (0.994) | 0.297 (1.708) | 3.173 *** (0.969) | 2.449 ** (1.204) | 3.174 *** (0.996) | 13.240 *** (2.957) |
| number of obs | 355 | 355 | 355 | 355 | 355 | 355 |
| R-sq | 0.666 | 0.668 | 0.680 | 0.665 | 0.664 | 0.699 |
| F test | 14.640 *** | 14.730 *** | 16.160 *** | 14.390 *** | 14.310 *** | 16.340 *** |

Significance level: ***: 1%, **: 5%, *: 10%.

Note: The figures in parentheses are standard errors.

Table 8 Estimation Results: System GMM Models

| <i>saving rate</i> | system GMM |
|-----------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Model | [1] | [2] | [3] | [4] | [5] |
| <i>saving rate</i> (lagged) | 0.727 *** (0.035) | 0.727 *** (0.035) | 0.712 *** (0.035) | 0.729 *** (0.035) | 0.731 *** (0.035) |
| <i>income</i> | 0.081 *** (0.026) | 0.091 *** (0.025) | 0.113 *** (0.025) | 0.095 *** (0.033) | 0.074 ** (0.030) |
| <i>shortage</i> | 0.102 *** (0.032) | 0.087 *** (0.030) | 0.121 *** (0.032) | 0.084 *** (0.030) | 0.099 *** (0.032) |
| <i>informal</i> | -0.099 ** (0.046) | -0.085 * (0.045) | -0.100 ** (0.045) | -0.085 * (0.045) | -0.094 ** (0.045) |
| <i>inflation</i> | -1.283 *** (0.129) | -1.275 *** (0.129) | -1.248 *** (0.129) | -1.275 *** (0.130) | -1.278 *** (0.130) |
| <i>fertility</i> | -0.067 (0.046) | | | | |
| <i>expectancy</i> | | 0.139 (0.196) | | | |
| <i>old</i> | | | -0.146 *** (0.049) | | |
| <i>young</i> | | | | 0.003 (0.086) | |
| <i>dependency</i> | | | | | 0.070 (0.058) |
| constant | 6.163 *** (0.639) | 5.425 *** (1.018) | 6.060 *** (0.622) | 5.966 *** (0.773) | 6.081 *** (0.634) |
| number of obs | 355 | 355 | 355 | 355 | 355 |
| Wald chi-squared | 3217.340 *** | 3215.010 *** | 3282.160 *** | 3206.870 *** | 3205.090 *** |
| Sargan test | 340.570 | 341.880 | 340.210 | 342.150 | 340.480 |
| Prob > chi2 | 0.361 | 0.343 | 0.366 | 0.339 | 0.362 |

Significance level: ***: 1%, **: 5%, *: 10%.

Note: The figures in parentheses are standard errors.

Table 9: Estimation Results: Fixed Effects and System GMM Models with Interaction Terms

| <i>saving rate</i> | FE | FE | FE | FE | FE | system GMM |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Model | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] | [9] | [10] |
| <i>saving rate</i> (lagged) | | | | | | 0.848 *** (0.028) | 0.847 *** (0.028) | 0.847 *** (0.028) | 0.846 *** (0.028) | 0.845 *** (0.028) |
| <i>income</i> | 0.459 *** (0.028) | 0.459 *** (0.026) | 0.493 *** (0.025) | 0.509 *** (0.039) | 0.477 *** (0.034) | 0.021 (0.021) | 0.027 (0.020) | 0.026 (0.020) | 0.017 (0.022) | 0.013 (0.023) |
| <i>shortage</i> | 1.278 *** (0.323) | 1.231 *** (0.328) | 1.051 *** (0.321) | 1.324 *** (0.316) | 1.335 *** (0.319) | 0.391 ** (0.178) | 0.367 ** (0.168) | 0.384 ** (0.167) | 0.385 ** (0.170) | 0.425 ** (0.178) |
| <i>informal</i> | 0.580 ** (0.239) | 0.565 ** (0.236) | 0.376 *** (0.236) | 0.647 *** (0.228) | 0.646 *** (0.233) | 0.239 ** (0.119) | 0.217 ** (0.108) | 0.229 ** (0.108) | 0.238 ** (0.112) | 0.263 ** (0.117) |
| <i>interaction: shortage * informal</i> | -0.406 *** (0.120) | -0.392 *** (0.121) | -0.304 ** (0.120) | -0.433 *** (0.116) | -0.434 *** (0.118) | -0.124 ** (0.063) | -0.113 * (0.058) | -0.119 ** (0.058) | -0.122 ** (0.060) | -0.136 ** (0.063) |
| <i>inflation</i> | -0.721 *** (0.189) | -0.714 *** (0.189) | -0.677 *** (0.186) | -0.704 *** (0.189) | -0.713 *** (0.189) | -1.357 *** (0.135) | -1.358 *** (0.135) | -1.371 *** (0.134) | -1.355 *** (0.134) | -1.348 *** (0.134) |
| <i>fertility</i> | 0.071 (-0.690) | | | | | -0.012 (0.019) | | | | |
| <i>expectancy</i> | | 0.319 (0.303) | | | | | 0.008 (0.110) | | | |
| <i>old</i> | | | -0.260 *** (0.075) | | | | | 0.002 (0.019) | | |
| <i>young</i> | | | | 0.167 (0.128) | | | | | -0.122 ** (0.060) | |
| <i>dependency</i> | | | | | -0.031 (0.088) | | | | | 0.038 (0.033) |
| constant | 1.055 (1.116) | -0.313 (1.487) | 1.563 (1.057) | -0.112 (1.259) | 0.715 (1.077) | 5.810 *** (0.691) | 5.786 *** (0.858) | 5.840 *** (0.682) | 5.918 *** (0.682) | 5.736 *** (0.690) |
| number of obs | 355 | 355 | 355 | 355 | 355 | 355 | 355 | 355 | 355 | 0 |
| R-sq | 0.675 | 0.676 | 0.686 | 0.676 | 0.675 | | | | | |
| F test | 21.750 *** | 21.830 *** | 23.390 *** | 21.740 *** | 21.360 *** | | | | | |
| Wald chi-squared | | | | | | 2786.600 *** | 2787.360 *** | 2788.100 *** | 2789.480 *** | 2792.710 *** |
| Sargan test | | | | | | 312.730 | 303.020 | 316.820 | 315.750 | 313.370 |
| Prob > chi2 | | | | | | 0.834 | 0.831 | 0.790 | 0.802 | 0.828 |

Significance level: ***: 1%, **: 5%, *: 10%.

Note: The figures in parentheses are standard errors.

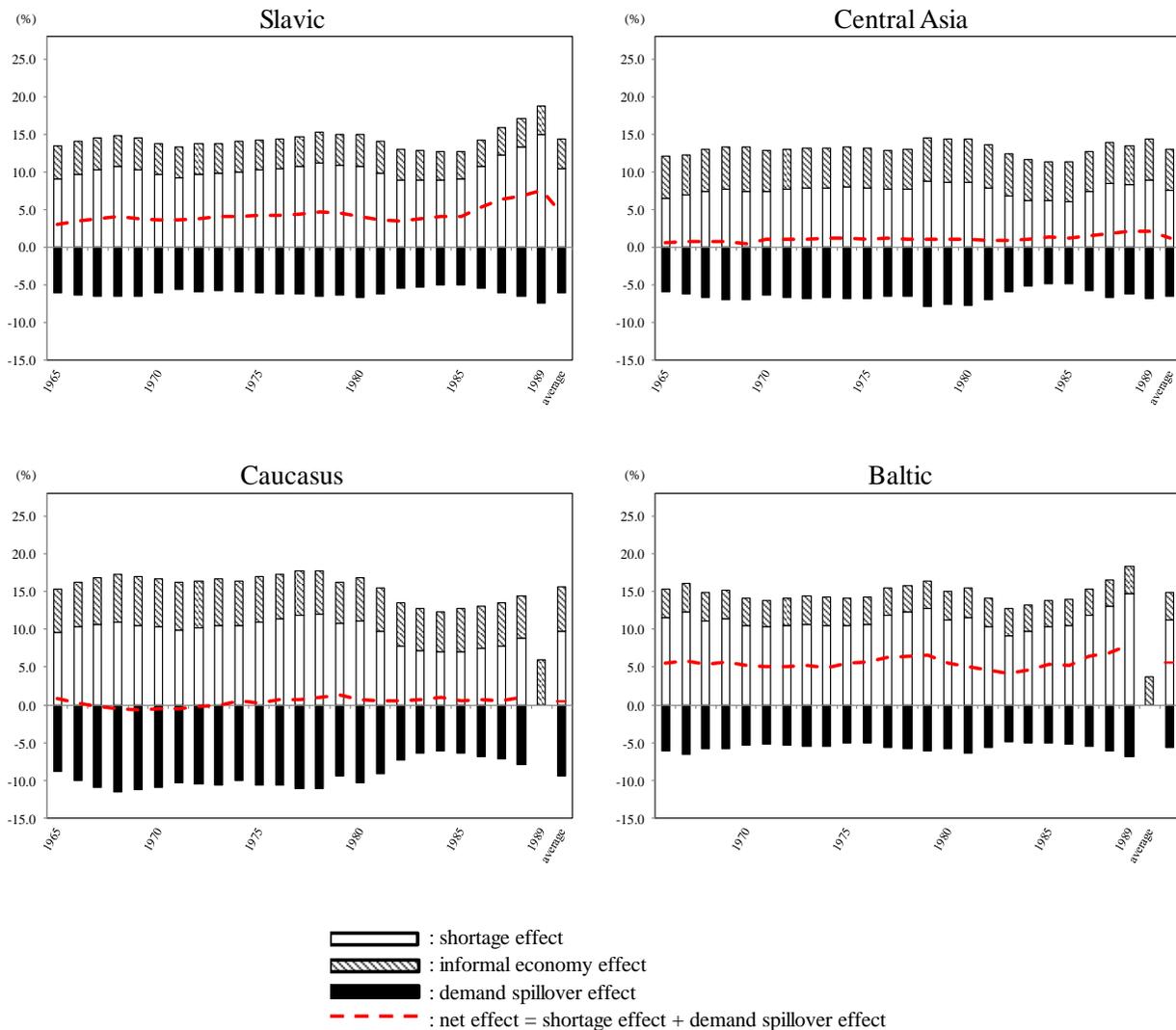


Figure 4: Regional Variations in the Magnitudes of Effects on Forced Savings Rates

Source: Estimated and compiled by the author, based on models [1] to [5] in Table 9.

Note 1: Effects are calculated by transforming the values in logarithmic form (coefficients of each variable multiplied by values of each variable) into exponent form.

Note 2: Effects are expressed in terms of households' savings rates (%). For example, a 10% shortage effect means that the existence of the shortage effect raises the savings rate by 10% points.

Note 3: The net effect is the sum of the shortage effect and demand spillover effect caused by the informal economy.

Table 10: Regional Comparison of Soviet-inherent Factors Determining Households' Savings Rates: Period-Averaged in 1965-1989

| | (%) | | | |
|--------------|---------------------------|-----------------------------------|-----------------------------------|------------------------------|
| | shortage effect [1] | informal economy effect [2] | demand spillover effect [3] | net effect [4]=[1]+[3] |
| Slavic | 10.4 | 4.0 | -6.1 | 4.4 |
| Central Asia | 7.6 | 5.5 | -6.5 | 1.2 |
| Caucasus | 9.7 | 5.9 | -9.4 | 0.4 |
| Baltic | 11.2 | 3.6 | -5.6 | 5.6 |

Source: Compiled by the author, based on Figure 4.

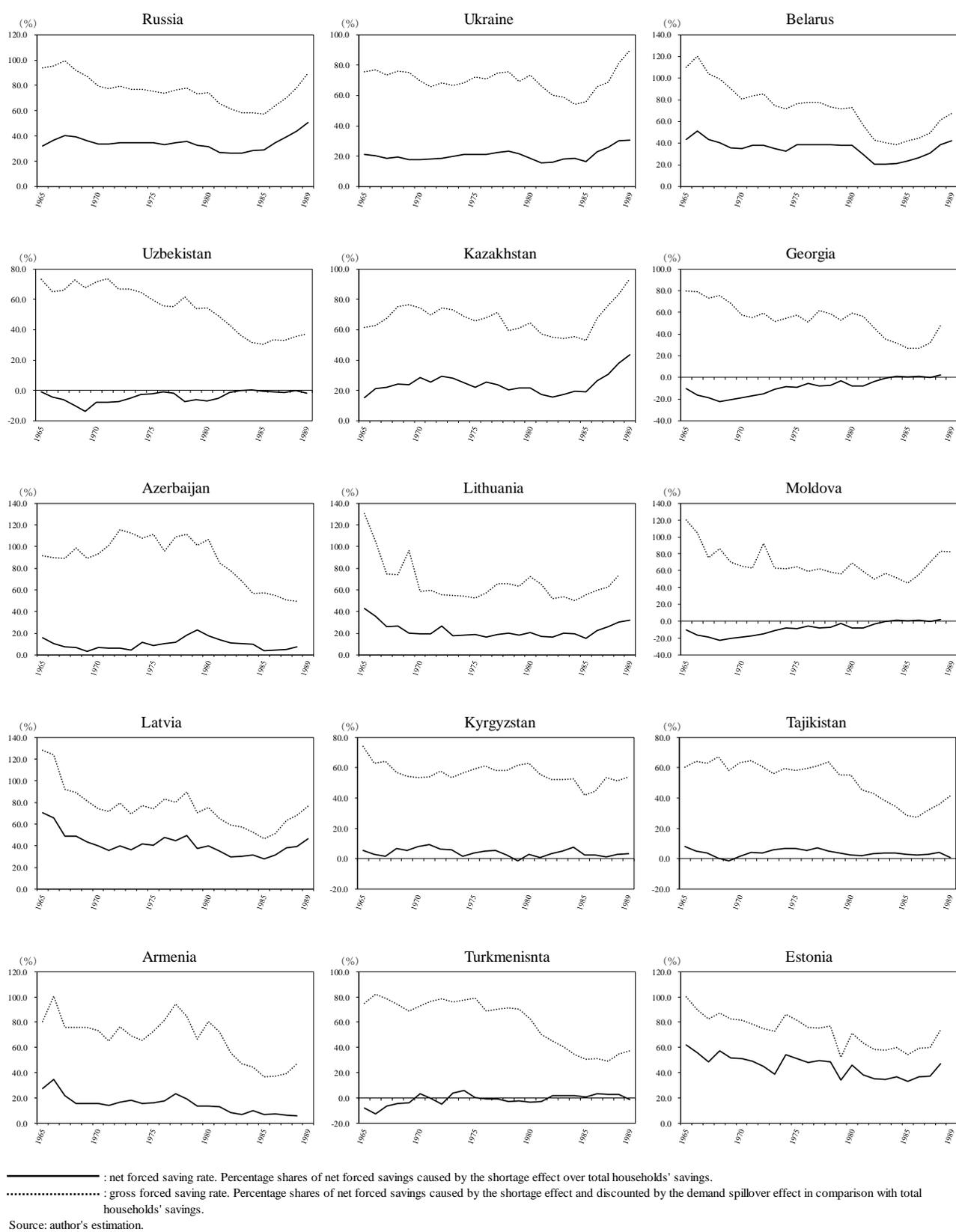


Figure 5: Net and Gross Forced Savings Rates in the Soviet Republics, 1965-1989

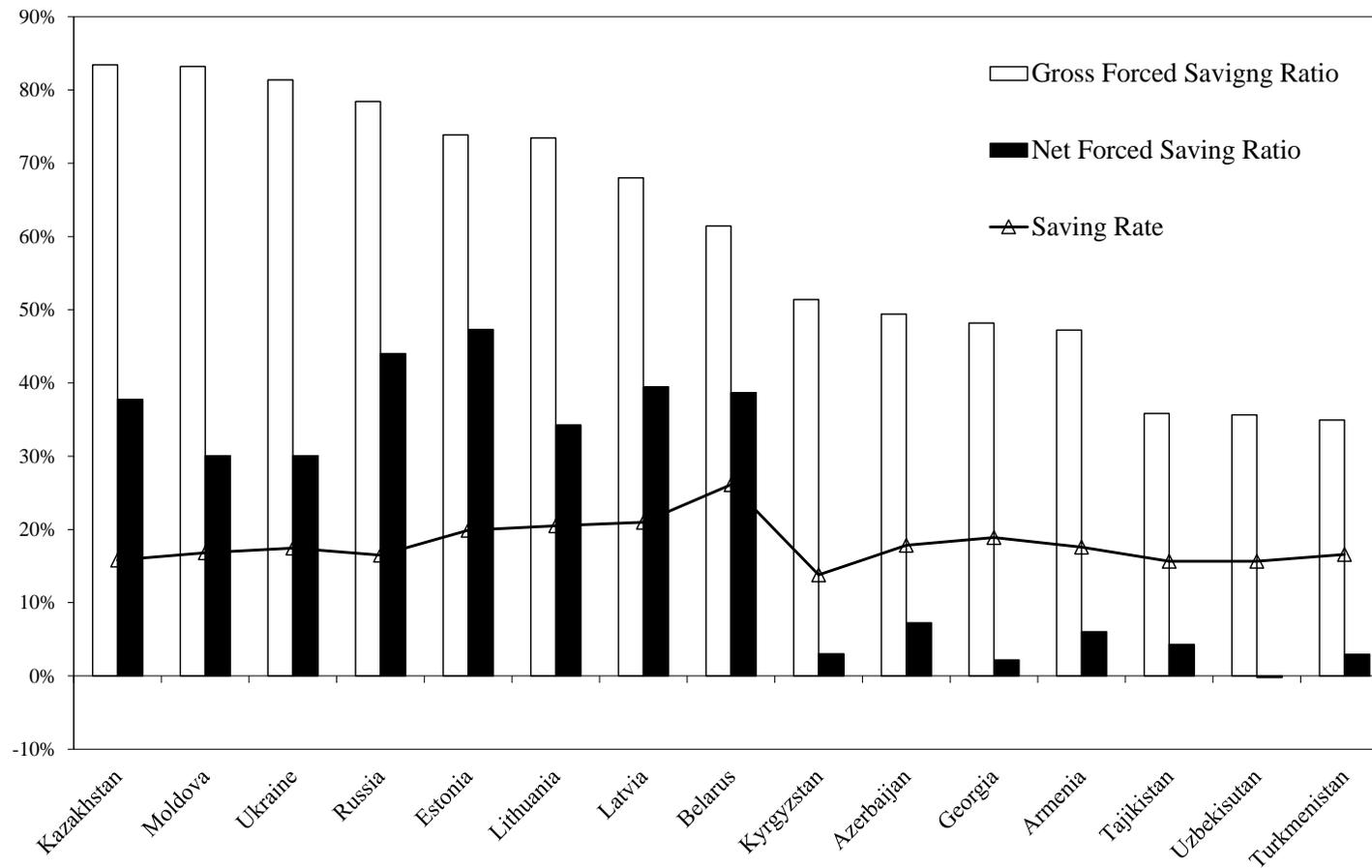


Figure 6: Comparison of Forced Savings Ratios in Republics: 1988

Source: Compiled by the author, based on Figure 5.

Note: The year 1988 is the final year for which all the data necessary for estimation are available.

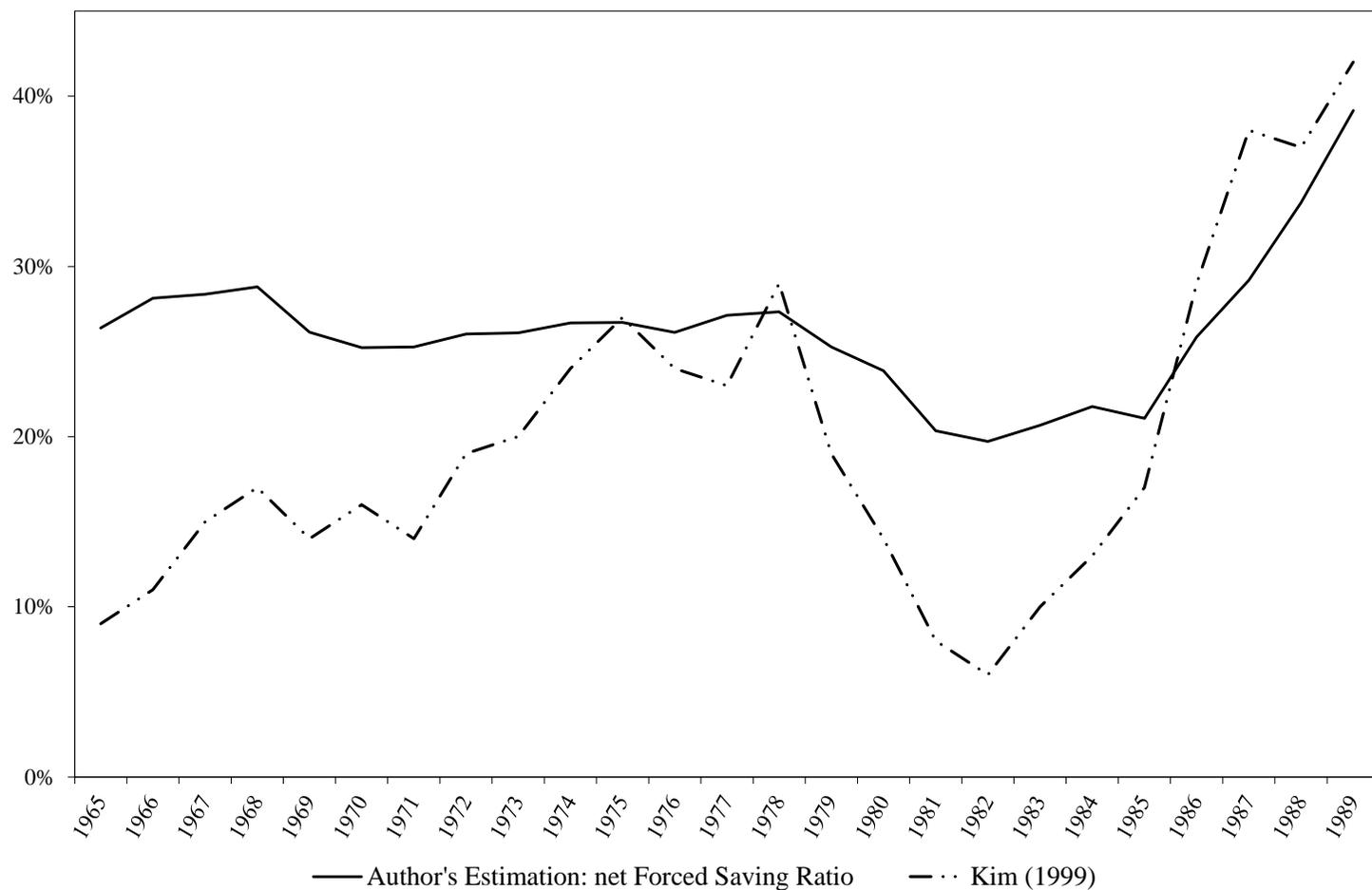


Figure 7: Forced Savings Rate in the Soviet Union as a Whole, 1965-1989

Source: Author's estimation and Kim (1999), p. 662, Table 6.

Note: The net forced savings ratio for the Soviet Union as a whole is the average value of republics' data weighted by the mid-year population.