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A test of the permanent income hypothesis on Czech voucher privatization[1]

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Abstract

In 1992 the Czech Republic privatized state assets, which resulted in some citizens receiving an unexpected windfall. Whether the windfall was consumed or saved provides a clear test of the permanent income hypothesis in a transitional economy. Analysis of data from a survey conducted specifically to test this hypothesis indicates that only a small number of transferred assets were consumed, a finding which is consistent with the permanent income hypothesis.

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1. Introduction

Since the sudden demise of Communism in the late 1980s, economists have regarded the transition from command to market economies in central and eastern Europe with intense interest. In addition to studying the transition *per se*, they have begun using the region as a testing ground to investigate the validity of classic propositions. In this paper the Czech voucher privatization scheme, which transferred state assets to Czech citizens from 1992 to 1994, is used to repeat the classic direct tests of the permanent income hypothesis (PIH) originally conducted by Bodkin (1959) and Kreinin (1961).[2] The transfer of property to Czech citizens through the voucher scheme was of a windfall nature and should not have been fully consumed under the permanent income hypothesis. Hence we test whether the one-time transfer from privatization was indeed cashed in and consumed – partially or completely. The following sections contain a brief overview of the Czech voucher privatization process, a specification of the test, a discussion of the dataset based on a sample survey, an analysis of our findings, and our conclusions.

2. The voucher privatization scheme

Prior to the end of 1989, the Czech economy was centralized. The private sector produced only a negligible fraction of GDP (estimates vary from 0.5 to 3 percent), while the vast majority of output came from about 5,000 enterprises, co-operatives and other organizations under state control. Transferring these vast assets from public to private ownership began almost immediately after the Velvet Revolution in November 1989 and proceeded on several fronts. During 1990 and 1991, the former Czechoslovak parliament authorized both restitution, which restored small and some medium-sized properties to their former owners, and a public auction programme called small-scale privatization.[3] The bulk of the transfer, however, occurred under a programme called Large-scale Privatization, which began in 1992 and involved state-owned enterprises whose worth totalled more than CZK 900 billion (more than US$30 billion).

Although large-scale privatization took several forms, the most common procedure involved first transforming an enterprise into a joint stock company.

[2] Bodkin used transfers to war veterans who received an unexpected National Service Life Insurance Dividend in 1950, while Kreinin dealt with war reparations paid by Germany to Israeli citizens in 1957–58.

[3] Estimates of the amount of property involved in restitution are sketchy since implementation was carried out by direct negotiation between current and former owners. At least 200,000 claims for agricultural land were settled from 1992 to 1996 and about 70,000 apartment buildings were returned to their former owners. Estimates of the value of restituted property range from 70 to 120 billion CZK (US$2.3–4 billion; see Mejstrik, 1997). Assets transferred through small-scale privatization programmes amounted to approximately 30 billion CZK (US$1 billion).

Almost half the value of state enterprises transformed into joint stock companies was then privatized under the voucher scheme. The first wave took place between May and December 1992 and involved 988 Czech enterprises. The second wave, which was delayed slightly, largely because Czechoslovakia split into the Czech and Slovak Republics in January 1993, added another 676 firms and finished at the end of 1994. With total property transferred worth more than CZK 343 billion (US$11 billion), voucher privatization formed the single most important type of asset transfer, representing over 10 percent of the country's assets.

Table 1. Chronology of voucher privatization: the first wave

Time framework of voucher privatization revealed	8/91 & 9/91
Purchase and registration of voucher books	11/1/91 – 2/15/92
Advertizing campaign of privatization funds	12/91 – 2/92
Assignment of vouchers to funds (desired)*	3/1/92 – 4/26/92
Announcement of participating companies	5/13/92
Round 1	5/18/92 – 6/08/92
Round 2	7/7/92 – 7/28/92
Round 3	8/26/92 – 9/15/92
Round 4	10/14/92 – 10/27/92
Round 5	11/23/92 – 12/4/92
Distribution of shares (companies)	5/93 & 6/93
Issue of IPFs shares	7/93 – 10/94
Trading of voucher shares	Since 9/93

Source: Kuponova Privatizace (Voucher Privatization).
Notes: *Despite the official starting date, some of the proceeds (and advance payments) appeared from December 1991.

The voucher scheme was organized as follows (the chronology is described in Table 1). All Czech citizens over the age of 18 who resided in the Czech Republic (and for the first wave, in what is now the Slovak Republic as well) could participate in the voucher process. Approximately 6 million Czechs representing 75 percent of those eligible chose to participate. For each wave, every eligible citizen was authorized to buy a voucher book that contained 1,000 investment 'points' for CZK 1,000 (about one week's wages). Note that the voucher book contained investment points in values of 100, 200, 500 and 1,000; therefore, the smallest bid was 100 points.[4] Dividing the total book value by the number of participants gave each voucher book an accounting value of CZK 35,000 in the

[4] In other words an individual's portfolio could be diversified into up to 10 different items, including shares of companies and investment funds.

first wave and 25,000 Kc in the second wave (see Table 2).[5] We can conclude, therefore, that the financial wealth of individuals increased significantly as a result of participating in the voucher process.

Table 2. Basic facts about Czech voucher privatization

	Wave 1	Wave 2
No. of state enterprises entering the voucher scheme	988	861
Book value of shares allocated for vouchers in the particular wave (CZK billion)	212.5	155.0
Million of participating citizens	5.98	6.16
Average accounting value of assets per participating citizen (CZK)	35,535	25,160
Percentage of voucher points with privatization funds	72.2 percent	63.5 percent

Source: Minstry of Finance (Center of Voucher Privatization). Note that in addition to 676 new firms the second wave also included shares in 185 firms with a book value of 24.4 billion Kc unsold in the first wave.

Before the bidding started (January–April 1992), however, individuals had the option to assign some or all of their points to Investment Privatization Funds (IPFs). Prior to this pre- or zero-round, these IPFs had to publish basic facts about their ownership and management as well as their investment strategy. In the first wave, about 72 percent of all voucher points were deposited among more than 400 privatization funds, but in the second wave, the percentage dropped to less than 64.

After the pre-round (May 1992), at the start of the bidding process, the public was given basic financial information about each enterprise to be transferred including employment, wages, capital, sales, costs, profit or loss, liabilities, foreign trade and ownership structure. Following the pre-round the actual bidding started. In this process, citizens and IPFs used their voucher points to buy shares of available firms in a series of price-administered bidding rounds. To avoid end-of-game problems, the total number of rounds was not set. Nevertheless, observers suspected that the total number of bidding rounds would be between three and seven (actually, the first wave had five rounds and the

[5] We adopt standard Czech monetary notation. Prior to the split of the country the Czechoslovak koruna (crown) was abbreviated Kcs (CZK), placed before the numeric figure. After January 1993, the Czech koruna was abbreviated Kc and placed after the numerals. The mean value calculated one year later on the Prague Stock Exchange totaled about 60 percent of the book value for each wave. Therefore, the value of the assets received was more than 15 times the registration fee.

second wave had six rounds). One can point out that the process was by no means a standard auction, since investors' bids were quantities and the privatization authority in fact administered the prices.[6]

Each bidding round can be divided into four stages. In the first step, participants were told the administered price of the shares of each firm and the number of shares offered. Then, participants bid for shares of chosen firms. In the third stage bids were collected, matched and analysed.[7] The last stage of the bidding round in fact coincided with the first stage of the next round; results of the bidding were announced and the Price Committee set the prices for the next round.

The bidding rounds continued until the privatization authority revealed the end of the wave when a negligible proportion of unsold shares along with disposable investment points remained.

The final stage of both waves of voucher privatization was the real transfer of the purchased shares. For each participant, a share account at the Central Register was created, and shares of the companies were transferred to this account by June 1993, for the first wave and by February 1995 for the second wave. Those individuals who allocated part or all of their 1,000 points to (an) IPF(s) obtained the shares of the IPF(s) immediately after the issue (see Table 1 for detailed timing of the transfers).

3. Privatization transfers and the PIH

When studying the PIH, it is necessary to address the key question of whether a windfall was expected or not. In terms of the Czech voucher privatization scheme, we must take into account people's expectations about the programme before it was implemented. Although we cannot exclude the possibility that people expected a windfall from voucher privatization, we tend to believe that the expectation was not amount-specific and did not lead to consumption in advance. Our belief relies on three lines of argument. First, other surveys done by the agencies FACTUM and IVVM lead to the conclusion that people mainly participated in the first wave to support economic transition (and not because of expected returns). Second, the financial market was completely undeveloped and

[6] For a thorough discussion of the Czech bidding scheme, see Allen and Smidkova (1998), Hanousek and Kroch (1998), Filer and Hanousek (2001) and Svejnar and Singer (1994) among others.

[7] The rules for accepting bids were as follows: if bids for a firm did not exceed its supply of shares, these demands were satisfied and the remaining shares were deferred to the next round. If the demand for a firm's shares exceeded supply by less than 25 percent and the clearing of the market could be realized by prorating IPFs' demand, then individual investors had their demand met while IPFs were rationed in proportion to their bids. In such a case, all shares were sold and the firm was not available for purchase in the succeeding rounds. If demand overshot supply by more than 25 percent, then no bids were accepted and all shares were deferred to the next round.

people had no experience with the capital market. Even if they might have had some expectations regarding a potential windfall, it was very hard for them to foresee its size and borrow and consume against it in advance. Third, evidence is also provided by a comprehensive study by Vecernik (1996);[8] it shows that 'the understanding and desired participation [still] increased somewhat just prior to the first wave in May 1992 … , but the number of people interested in active participation only approached the 50 percent level from the previous 35 percent.' Moreover, Vecernik (1996) also argued that people in this 35 percent group expressed their political support for the transition process rather than any expectation of specific returns.

As we have mentioned before, there were two waves of voucher privatization in the Czech Republic, the first in 1992 and the second in 1994. While we can claim that for the first wave the transfers were unexpected prior to when the first draft of the time framework was revealed (August/September 1991), and that the actual value of the windfall was unknown before trading of shares began on the Prague Stock Exchange (PSE) in September 1993, it is hard to use that argument for the second wave starting in 1994. Therefore, we will analyse the effects of the windfall from the first wave separately.[9] Moreover, when the bidding process began it was hard to judge when it would end. Experts estimated that it would take between eight and sixteen months to finish the bidding, and another three to six months to place shares on organized markets.[10]

Additionally, as we can speculate from the pattern of voucher book sales (see Table 3), people did not attribute anything special to the voucher book and looked at the voucher scheme as some sort of national lottery. As we can see from Table 3, the first 7.3 percent represents the 'good' citizens who bought voucher books because the government recommended them to do so. The massive gap in buying coincides with the big advertising campaign initiated by the IPFs promising a large return on the initial investment/fee of CZK 1,000. The surge in registration was in no way induced by the closing of the registration period, because registration continued until the end of February 1992. Therefore, starting at the end of December 1991, people understood that the voucher book should have a certain value and only from this moment forward could they take it as an

[8] His study is based on the survey 'Economic Expectations and Attitudes', which has been run since 1990 by a professional survey institute. For more information on this survey, see the internet site at http://archiv.soc.cas.cz/english/.

[9] Results for the second wave are available upon request. Note that estimated APCs (average propensity to consume) did not significantly decline in the pooled analysis. We speculate that there is a significant effect of the costs of cashing in the windfall. Typically, after May 1995 (when shares from the second wave were transferred to individuals) and because people had relatively small portfolios, they sold *all* shares (if there was a trade), and cash was either consumed or invested. Of course, this behaviour may bias our total APCs upwards.

[10] Note that the PSE was re-opened on April 6, 1993, but the bulk of shares coming from the first wave of voucher privatization began trading in September 1993.

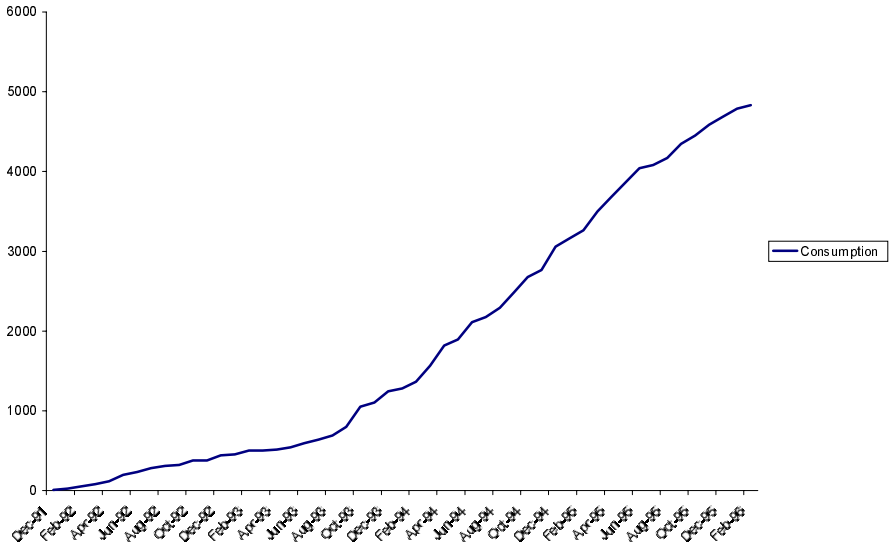
asset with a positive (though unknown) value.[11] In addition, as we can see from the cumulative distribution of consumed windfall (see Figure 1), the observed pattern is consistent with the PIH; note that the break point (September 1993) corresponds to the period when the bulk of shares from the first wave started trading at the PSE, and the lower spending prior to this period is related to advance payments provided by several IPFs.

Table 3. Pattern of voucher book sales: the first wave *(percent)*

	Czech Republic	Slovak Republic
November 1991	2.9	2.0
December 1991	4.4	3.4
January 1992	88.1	89.1
February 1992	4.6	5.5

Source: Kuponova Privatizace (Voucher Privatization).

Figure 1. Cumulative distribution of consumed transfers



[11] Again, this conclusion is strongly supported by Vecernik's study based on the survey mentioned previously, wherein he points to the campaign by investment funds. These funds promised to pay ten times more the initial investment (1000 CZK) within a year in exchange for 'voucher management'; as a result, the number of people interested in voucher scheme participation increased from 35 to 50 percent and, in the end, reached over 80 percent of the eligible population.

It has been pointed out to us that extending the reference period of our study on both ends might have been considered since the expectation of a windfall and consequent advance consumption cannot be excluded; and people could also spend the windfall after the reference period covered in our survey. We must admit that we do not have any evidence concerning what happened after the reference period. But this type of problem is quite common to any survey study. We believe that trends observed during the reference period will not drastically change beyond this period. Nevertheless, we are hesitant to say anything about possible trends explicitly. Note that only higher consumption in subsequent years would bring additional evidence against the PIH – and we do not have any reason to believe that this was the case.

The macroeconomic situation in the Czech Republic was stable throughout the entire period studied. For the purpose of our analysis we should mention four main points: 1) a stable inflation rate and a positive and stable interest rate for savings prevailed; 2) the majority of Czechs had positive savings prior to the voucher scheme (so the liquidity constraint should not be very significant); 3) Figure 1 does not show any unusual spending related to the only significant shocks that occurred in January 1993 (the introduction of VAT and the split of Czechoslovakia); and 4) there was a very low and stable unemployment rate (below 4 percent).

4. Specification of the test

In the permanent income framework, the voucher privatization transfer itself represented a windfall increase in income, and according to the PIH, should have resulted in increased consumption that was spread out over an individual's remaining life rather than largely being consumed in the years immediately following receipt.

The impetus to consume the windfall immediately could be supported by the assumption that expectations of a successful transition may have increased an individual's anticipated future labour and capital income due to rapid growth in the economy. If this individual was liquidity constrained, receipt of the one-time gain from voucher privatization may have enabled him to increase consumption in line with his expectations of greater future income, thus contributing to the windfall being largely devoted to current consumption. It is appropriate, therefore, to test what fraction of this one-time transfer was cashed in and consumed. The simplest specification for testing the PIH could be written as follows:

$$C_T = \alpha_0 + \alpha_1 Y + \alpha^* \delta W + \varepsilon, \tag{1}$$

where C_T denotes total consumption, Y is income and W refers to the privatization windfall. The coefficient δ stands for the fraction of the total windfall treated as a gain by the general public.

The vast majority of participants recognized that they had received a windfall, but until they cashed it in they did not know its value. Since we observe windfall consumption over a period of several years, we cannot get relevant data on income and total consumption to estimate equation (1) directly. Instead, we formulate our null hypothesis as follows: individuals receiving lump sum transfers from voucher privatization will increase consumption spending so as to amortize this income over their remaining life expectancy.

Therefore, we postulate

$$C_W = \alpha^* \delta W + \varepsilon \tag{2}$$

to study consumption from the windfall, where C_W refers to windfall consumed, while W stands for the total windfall as before.

This specification raises the Barro–Ricardian question of whether the public perceives the transfer as an increase in net wealth (Barro, 1974). It can be argued that the state is only divesting itself of assets that would otherwise provide a future source of transfers. In other words, assigning these assets to individuals creates an off-setting change in the present value of potential future transfers; hence individuals are no better off after the transfer.

Three strong arguments exist to the contrary, however. First, the state and individuals had very different preferences during the transition. Despite government propaganda, it is doubtful that citizens of former Communist countries viewed government-owned enterprises as being operated in the citizens' best interest. Moreover, it is unlikely that the public saw the sophisticated links between the state budget, state-owned enterprises, and transfers to individuals.[12] Second, these enterprises were neither the most important nor the only source of budget revenue. In fact, in many cases they were managed inefficiently and represented a drain on the state budget. Third, the transfers through the budget were not equal across the population.

A rejection of the Barro–Ricardian proposition can be translated into rejection of the restriction $\delta = 1$ in equations (1) and (2). Note that in terms of equation (2), the coefficients α^* and δ are not jointly identifiable. Fundamentally, we have two options: 1) assume that $\delta = 1$ and test whether the fraction of consumed windfall α^* is in line with the PIH, or 2) set $\tilde{\alpha} = \alpha^* \delta$ and estimate $\tilde{\alpha}$ under the PIH (i.e., α^* assuming its PIH value). Since δ is in this case identified, we can test if $\delta = 1$ to

[12] Vecernik (1996, p.154) uses a similar argument in a different context when he says that 'the property was rigorously administered by the Communist political and economic bureaucracy. As the property was never in people's hands, it could, in fact, never be fairly redistributed to them.'

verify to what extent the public treated the privatization transfers as a real windfall.

5. The dataset

The data for this study were collected in January 1996 by adding a special section to the regular Omnibus Survey (personal interviews) conducted by the research firm Median.[13] The original sample size was 1,500 individuals, of whom 1,263 (84 percent of the sample drawn) were personally interviewed and verified (see appendix for a detailed description of the survey questions). As part of the basic survey information on respondents' sex, age, income, education, job and place of residence was obtained. Differences in characteristics between the actual sample and the Czech population were negligible according to standard tests. Although it might be interesting to study reasons why people did not participate in the voucher scheme, it is beyond the scope of this paper. Our analysed sample was reduced to approximately 75 percent of the original sample size by excluding those who did not participate in voucher privatization. This was done for the following reasons. First, we wanted to study consumption from the privatization transfers and second, as we were told by the firm doing the survey, the missing data from the original sample drawn could be attributed mostly to two groups of 'outliers': a) very old people, Romanies, and other people who are not very connected to society; and b) very busy people, usually newly incorporated individuals who felt their time and other activities had much higher value than any possible return from the voucher scheme.

After determining whether the respondent had participated in the voucher process, we asked those who had participated what proportions of their receipts from voucher privatization had been: (a) spent on goods and services;[14] (b) invested elsewhere; (c) transferred to newly emerged pension funds;[15] (d) given to a family member; and/or (e) retained in their original form as an investment/equivalent of a long-term deposit. Windfalls that were cashed in were converted to 1995 Kc using the official Consumer Price Index for the date on which they were converted to cash. Note that the survey does not record total spending. Our variable WINDF corresponds only to the fraction of the windfall W that was transferred/invested/cashed in and/or spent (see question B14 in the

[13] *Median* is one of the major firms doing surveys in the Czech Republic. It specializes in media research and public opinion polls.

[14] Note that in the Czech language it is hard to distinguish between durable and non-durable goods. Interviewers were instructed to try to explain that durable goods such as automobiles should be considered investments, but many respondents probably included them among other goods, thereby biasing the results reported below against the PIH.

[15] There was a good incentive to shift assets into these funds as the government provided matching funds to those who contributed to pension funds.

Appendix). Similarly, as a referee noted, our variable CONS does not record total spending, but rather spending out of the windfall. It might falsely state the actual total spending resulting from the privatization. Responses pertained to the full period between the beginning of voucher privatization, i.e., December 1991, and the survey in January 1996 (a period of four years).

Respondents could convert their windfall into cash either by accepting shares and then selling them in the secondary market or by accepting advance payments from IPFs in return for pledging their shares to these funds. Risky shares are not equivalent to cash, but given that a secondary market developed shortly after distribution of firm and IPF shares, the transfer could be regarded as equivalent to cash income. In order to limit problems with people's expectations of the privatization transfers, we focused only on results from the first wave of voucher privatization.[16]

As a referee mentioned, probably the most important issue for testing the PIH is asset substitution (i.e., some people can increase their consumption even before selling their shares). Our survey picks up significant amounts of consumption from late 1993 (ignoring the relatively few advance payments from the IPFs). But under the PIH, actual consumption could have risen before then. Again this would probably reduce α^*. We are of the opinion that the errors are likely to be small. First, the savings rate for households and individuals was stable during the period studied except for a fall and steep rise in 1996–97 (out of our sample period) which can be attributed to a lack of trust in banks, resulting from several bank failures. After several moves by the central bank, the credibility of banks was restored and withdrawn money appeared in deposits again.[17] Another reason why we do not believe that the substitution effect played a significant role is the fact that the financial market was undeveloped, and even if there had been some related expectation about the windfall, it was very hard to foresee its size and whether or when it would be possible to cash it in.

6. Results

First, we looked at the different behaviour of various income groups. It is very likely that low-income individuals would tend to spend a larger share of their windfall than higher income ones. We divided the population into four monthly earnings categories: up to 5,000 Kc, 5,001–8,000 Kc, 8,001–12,500 Kc, and 12,501 Kc or more.[18] The size of the windfalls for those that participated in the voucher process and knew the size of their windfall is shown across the four income groups in Table 4.

[16] Nevertheless, including the second wave windfall in our computation did not change our findings.

[17] Nevertheless, if information about the privatization dribbled out slowly over time, it might be hard to detect this in the aggregate time series for savings and consumption.

[18] Average monthly earnings in 1995 were about 8,000 Kc while the exchange rate was US$1 = 26.6 Kc.

Table 4. Survey results: windfall from first wave of voucher privatization
(in thousands of Kc)

Income category	Obs.	Mean	Median	Std. Dev.	Min	Max
< 5,000 CZK	210	14.30	11.72	10.08	0.98	82.83
5,000–8,000 CZK	149	15.56	12.13	13.60	1.98	110.13
8,000–12,500 CZK	66	20.56	12.34	20.39	0.96	121.63
> 12,500 CZK	35	31.84	14.54	31.84	5.64	411.37
Total	460	16.94	12.13	22.94	0.96	411.37

Both the mean and the variance of the windfall rise with income.[19] Similar results are found with respect to education, where the mean (median) windfall for those with a basic school education was 13,600 Kc (11,500 Kc), a figure that increased to 15,000 Kc (11,900 Kc) for those with a high school education without exams,[20] 19,900 Kc (12,600 Kc) for high school graduates with exams, and 24,600 Kc (16,300 Kc) for university graduates. It can be argued that higher income (and better educated) groups allocated their vouchers or timed the disposition of their shares better. In addition, there is an increasing pattern in average consumption by education category (9.295, 9.492, 11.394 and 16.037) which might indicate that better educated people might have expected higher benefits from the transition. However, neither ratios of mean (median) consumption to mean (median) windfall of 0.683, 0.633, 0.573 and 0.652 nor a test of whether APC is constant across education categories (W-test χ^2_3=4.31, p-value=0.23) support this hypothesis.

Table 5. Survey results: handling of the shares from the 1st and 2nd waves of voucher privatization
(A set of mutually non-exclusive questions reporting fractions of respondents)

Question	Wave 1			Wave 2		
	Yes	No	N/A	Yes	No	N/A
Voucher privatization shares equivalent to a term deposit	43	36	21	62	21	17
Voucher privatization windfall used to buy non-durables	27	48	25	13	62	25
Voucher privatization shares turned into another investment	10	63	7	4	70	26
Voucher privatization shares transferred to a pension fund	0.3	71	29	0.4	73	27
Voucher privatization shares given to family members	3	68	28	2	72	26

[19] This result holds for the median windfall as well as the mean.
[20] A proxy for vocational rather than academic training.

Table 5 reports the first test of the PIH by showing how respondents reported using their windfalls. The key result is that only a relatively small number of individuals reported spending a part of their windfall on non-durable goods. The basic test of the PIH is based on the prediction that under the PIH all transitory income is spent over the entire remainder of an individual's life. This suggests that the windfall from voucher privatization should be used to increase consumption throughout an individual's life.

The population was grouped by age and sex, and the life expectancy for each group was determined using standard life tables from the 1996 Czech Statistical Yearbook. One central issue of our analysis is how to treat missing values. In an explanatory note the firm making the survey reported that many respondents indicated that they treated the shares from voucher privatization as an increase in their assets that they would spend later and that, since they did not follow the stock market, they did not know the actual value of these shares. On the other hand, the surveyors speculated that those who spent a large portion of their windfall would have been likely to know how much was available to them and report a true value for its size. This pattern suggests that missing values are unlikely to be random. Note that because of transaction costs (and small portfolios), conditional on cashing in, most people cashed in all shares at once; this means that the data ratio C_W/W is mostly either 0 or 1 (about 90 percent of relevant observations).

There are three main possibilities for dealing with these missing values. First, we could apply a Heckman (1979) two-step procedure (later labeled Heckman or H), using a probit equation to predict those who have no missing values and then analyze the consumption of this set including a sample correction variable. Second, we could perform the analysis using only the sub-sample with fully defined values (labeled as assumption A or A). Finally, we could use the full sample of those who participated in the first wave, replacing the missing values with appropriate predictions (labeled as assumption B or B). While the mean value of the windfall for individuals in the same income group would seem to be an appropriate value to substitute for missing windfalls, as we have argued above, the mean value of consumption is inherently inappropriate for those who do not know this value. Indeed, these respondents are likely to have no consumption at all from their windfall.[21]

Note that the Heckman two-step procedure should be the best method for treating the missing values, provided the selection equation fits the presence of missing values well. While assumption A produces significant bias against the PIH, assumption B would introduce (smaller) bias in favour of the PIH. Unfortunately, the Heckman selection equation fits some of the age groups quite poorly (although total $R^2 = 0.12$). For its specification we used the following

[21] The original data treats consumption equal to zero for those having missing (unknown) windfall. Since assumption B sets missing values of C_W to 0 it would bias estimated APCs down.

variables: age, age squared, and a set of dummies for size of the municipality, position, and income category (detailed results are available from the authors upon request).

The fraction of the individual's windfall that should have been spent during the four-year period covered by the survey, if the individual had annuitized the windfall over his or her remaining expected life, was calculated under the assumption that real interest rates were 4 percent.[22] The theoretical value α^* [23] was compared with the estimated fraction of the windfall spent over the same period according to the following model:

$$C_W = \sum_{i=1}^{k} \tilde{a}_{iM} I[Sex = M] I[age \in group_i].W + \sum_{i=1}^{k} \tilde{a}_{iF} I[Sex = F] I[age \in group_i].W \qquad (3)$$

where C_W denotes the windfall consumed, W stands for total windfall and for six age groups we used: less than 25, 26–35, 36–45, 46–55, 56–65 and more than 66.

Table 6 reports the estimates of $\tilde{a}_{iM}$ and $\tilde{a}_{iF}$ as well as the annuitized value $\tilde{a}_i^*$ for several age and sex groups. One can argue that by construction the survey could only start picking up significant amounts of consumption from late 1993 on, when vouchers started to be traded which leaves only about 2.5 years until the end of the reference period in January 1996. Although our reference period is four years, a referee suggested we compare estimated $\tilde{a}_{iM}$ and $\tilde{a}_{iF}$ with $\tilde{a}_i^*$ computed for a reference period of 2.5 years, which of course would produce smaller $\tilde{a}_i^*$. Note that the column corresponding to the shorter reference period should be read with caution. First, in order to show the smallest $\tilde{a}_i^*$, we do not take into account any interest generated by unspent annuity. A second, and more important, point is that in those age groups where we observe significant differences between estimated and projected values of $\tilde{a}_i^*$, we have several observations corresponding to advance payments from IPFs.

The fraction of the windfall consumed does not grow with age across all age groups, as would be predicted from the lower remaining life expectancy of older consumers. Nevertheless, we are of the opinion that the results are still consistent with the PIH, since, more critically, under the treatment of missing values we regard as more appropriate (assumption B), (1) confidence intervals of total APCs cover projected values of total APCs; and (2) the annuitized fraction of the windfall that should have been spent according to the PIH – for almost every age and gender group – falls within the 95 percent confidence interval surrounding the estimate of the fraction of voucher privatization windfall actually spent for

[22] This seems an acceptable assumption given that the Czech Republic, like most emerging markets, suffers from a severe shortage of capital, and it is consistent with values in other emerging markets.

[23] Let us assume that A is the constant annual annuity generated by the unit windfall. Then $\alpha^*=A\{(1+r)+(1+r)^2+(1+r)^3+(1+r)^4\}$, where r is the corresponding interest rate, in our case 4 percent.

consumption.[24] Two relatively meaningless exceptions are women over age 66 (who consume too little based on their remaining life) and men aged 36 to 45 (who apparently also consume too little), although in both categories the annuitized amount falls within the 90 percent confidence interval surrounding the estimated share spent on consumption.

The most interesting apparent deviation occurs for both men and women aged 26 to 35, who apparently consume more than they would if the windfall were annuitized. The results for this group may reflect the fact that some people, usually young and highly educated, expect high benefits in terms of their lifetime prospects from the transition in general. The evidence from the survey is mixed. When we estimated a simple model[25]

$$C_W = \sum_{i=1}^{4} \widetilde{a}_i I[education = i]W + \varepsilon \qquad (4)$$

using the original four education categories for those younger than 35, we received a pattern similar to that of any chosen approach for treating the missing values. Although for all estimated assumptions (A, B and H) we determined that $\widetilde{a}_1 \geq \widetilde{a}_2 \leq \widetilde{a}_3 \leq \widetilde{a}_4$ (i.e., 'possible' increasing propensity to consume out of the windfall with increasing education, reflecting a higher permanent income expectation for highly educated people), we do not reject the hypothesis that $\widetilde{a}_i$ is constant across education categories (using the Wald test).

[24] As a referee mentioned, the total APC computed from the whole sample and the weighted APC computed by using results for each age group differ. We admit sensitivity of the OLS to several observations (especially for some age groups inflating the APCs), but it is hard to come up with estimates of (total) APCs that would not be overly subjective, i.e., either not excluding those individuals not spending their windfall or vice versa. We also used quarterly dummies to control for common shocks and seasonality. The estimated coefficients were much lower than those presented in Table 6. To bound the extent of the bias, we can argue that the windfall was certainly not expected before the revolution in 1989, and therefore we may add two years to the agents' horizon (i.e., to remaining life expectancy in Table 6). One can verify that two years added to the life horizon does not make a significant difference. For example when we deal with the reference period of 2.5 years, α^* associated with the shortest remaining life expectancy of 10 and 12 years are equal to 0.31 and 0.27, respectively. For longer life horizons the differences are negligible.

[25] It would be interesting to analyse the interaction age versus sex versus education in equation (3). Because of the small sample size for some age groups, we lacked degrees of freedom to do this control. Unfortunately, if we added only four terms (education dummies) into equation (3), we experienced high multicolinearity; none of the coefficients were significant.

Table 6. The propensity to consume out of the windfall transfers: the first wave of voucher privatization

(Heteroskedastity-consistent standard errors are in parentheses)

Age category and no. of observations				Mean age (B)	Mean rem life exp.[a]	Tobit $\tilde{\alpha}$ (A)	OLS $\tilde{\alpha}$ (A)	OLS $\tilde{\alpha}$ (B)	OLS $\tilde{\alpha}$ (H)	α^*	
Age	**Sex**	**Obs (H,A)**	**Obs. (B)**							**2.5 yrs**	**4 yrs**
<25	M	19	84	22.3	48	0.26 (0.10)	0.34 (0.07)	0.23 (0.05)	0.23 (0.09)	0.12	0.21
	F	13	59	22.5	55	0.46 (0.25)	0.61 (0.19)	0.28 (0.10)	0.38 (0.21)	0.11	0.20
26–35	M	59	128	30.2	41	0.67 (0.09)	0.77 (0.07)	0.42 (0.05)	0.66 (0.08)	0.13	0.21
	F	54	140	30.6	48	0.69 (0.10)	0.77 (0.08)	0.37 (0.04)	0.64 (0.09)	0.12	0.21
36–45	M	40	127	40.8	31	0.16 (0.03)	0.16 (0.02)	0.15 (0.04)	0.16 (0.02)	0.14	0.24
	F	49	134	40.5	37	0.34 (0.09)	0.41 (0.07)	0.21 (0.04)	0.38 (0.07)	0.13	0.22
46–55	M	42	126	50.3	23	0.38 (0.07)	0.42 (0.06)	0.26 (0.04)	0.40 (0.06)	0.17	0.28
	F	77	159	50.5	28	0.39 (0.07)	0.47 (0.05)	0.32 (0.04)	0.44 (0.05)	0.15	0.25
56–65	M	25	84	60.9	15	0.62 (0.16)	0.72 (0.12)	0.25 (0.06)	0.66 (0.13)	0.22	0.35
	F	37	98	60.7	20	0.60 (0.12)	0.70 (0.09)	0.34 (0.05)	0.64 (0.09)	0.18	0.30
> 66	M	20	51	70.2	10	0.85 (0.13)	0.89 (0.10)	0.51 (0.06)	0.82 (0.11)	0.31	0.49
	F	19	60	71.5	12	0.03 (0.19)	0.30 (0.14)	0.12 (0.07)	0.35 (0.18)	0.27	0.43
Total	M	204	490	44.1	29.2[b]	0.25 (0.08)	0.28 (0.02)	0.22 (0.014)	0.23 (0.02)	0.15	0.25
	F	246	539	46.2	32.8[b]	0.42 (0.05)	0.53 (0.04)	0.29 (0.02)	0.42 (0.04)	0.14	0.22
Total					31.2[b]	0.29 (0.02)	0.35 (0.11)	0.24 (0.04)	0.26 (0.09)	0.14	0.23

Notes: Obs. (H,A) and Obs. (B) denote the number of observations under assumption A (or Heckman) and B, respectively. α^* means proportions that should be spent in four years, if constant annuity is generated from the windfall for the rest of the expected life under a 4 percent interest rate.

[a]***Source***: Abridged life tables of 1994, Czech Statistical Yearbook 1996; [b]Weighted averages of mean remaining life expectancy by age category.

In terms of PIH, the fact that both men and women aged 26 to 35 consumed more than predicted is still consistent with the PIH, since this group is at a stage in their life-cycle where without the windfall they would be borrowing to finance consumption associated with family formation and so on. In addition, the liquidity constraint for this group was far tighter after 1990 when subsidized loans to young couples were abolished. (These outstanding loans represented a non-negligible amount hovering around 15 billion CZK.) Indeed, the PIH predicts that individuals who would otherwise borrow to finance consumption would consume the windfall up to the level equal to the annuitized fraction of the increase in lifetime income plus the full amount of the previously planned borrowing for consumption. Greater consumption would then be financed not from investing the windfall, but from funds available from having avoided future repayment obligations for debts that would have been incurred without the windfall.

7. Conclusions

The Czech Republic has several strong advantages for the purposes of our analysis. First, the voucher privatization process was transparent and occurred relatively quickly. Second, both the economy and consumer behaviour have been very stable. Third, out of a total population of ten million Czech citizens, an astonishing six million – that is virtually every household – participated in the scheme. Fourth, the privatization transfers were unexpected before the voucher scheme actually started and the value of a windfall was not known until the shares began trading at the Prague Stock Exchange. In comparison to both Bodkin's and Kreinin's studies, which dealt with only a small fraction of the population,[26] Czech voucher privatization provides a sample for testing the PIH almost equivalent to a full population, thus avoiding problems with the distribution of windfalls.

In the present paper we test the following null hypothesis: individuals receiving lump sum transfers from voucher privatization will increase consumption spending in order to amortize this income over their remaining life expectancy. The empirical evidence is to a certain extent mixed, and the results strongly depend on how the missing values are treated. This fact together with the finding that proportions of windfall consumed do not increase with age can be interpreted as a mild rejection of the PIH. On the other hand, the propensity to consume a significant part of the windfall immediately might reflect (strong and

[26] Note that only 4 percent of the Israeli urban population received personal restitution from Germany, while the number of veterans who received the National Service Life Insurance Dividends amounted to less than 9 percent of the US population and were concentrated in certain age groups. In other words, both windfalls influenced a much smaller portion of the population than the Czech voucher transfer.

positive) expectations of a successful transition resulting in an increase in permanent income.

In addition, when studying privatization transfers we have to deal with the Barro–Ricardian question of whether the public perceives the transfer as an increase in net wealth. As we discussed in Section 4, coefficients δ and α, reflecting the Barro–Ricardian question and the PIH, respectively, are not jointly identified. Nevertheless, δ is identified under the PIH, and it can be seen from Table 6 that the null hypothesis H_0: $\delta = 1$ is not rejected. This shows, in other words, that under the PIH the public treated the privatization transfers as a real windfall. On the other hand, because coefficients δ and α are not jointly identified, our results are also consistent with the case of $\delta < 1$ and $\alpha > \alpha^*$.

Several problems remain, nonetheless, in implementing a direct test of the PIH using the Czech voucher programme. First, the transfer occurred over more than two years as citizens exchanged their vouchers for shares in companies or shares in investment privatization funds (IPFs) offered under the scheme. Second, the unit in our sample survey was an individual not a household, and we do not have information on marital status to deal with cross-substitution within a family. Third, three types of windfalls were involved: (1) outright advance payment for vouchers offered by some IPFs; (2) shares in IPFs for those who assigned their points to these funds; and (3) shares in companies. Note that *ex post* transfers of shares are not identical to cash transfers, because shares bear a certain risk, and this complication is ignored in applying the PIH. For simplicity's sake, liquidity constraints are not taken into account, and we consider only the real value of the transferred windfall.[27] Fourth, and probably most important, based on the sample survey we cannot separate the substitution effect, i.e., we do not have any evidence to show whether an individual used, instead of his windfall, personal savings for consumption. However we do know that the savings rate for households and individuals was stable during the period studied. Another reason why we do not believe that the substitution effect played a significant role is a general suspicion of (young) financial markets in the Czech Republic. Consequently, cashing in the windfall probably occurred prior to spending money from bank accounts. Finally, the survey does not contain information on dividend distribution, perhaps not so crucial since in the first years only very few firms paid dividends and dividend yield has been negligible (Prague Stock Exchange Annual Reports, 1993–95).

[27] In general, advance payments were fully liquid, and shares in investment funds were less liquid than most shares of privatized companies.

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Appendix

Part B of the questionnaire (related to the first wave)

We received information regarding the first wave of privatisation based on the following questions. Similar questions were asked for the second wave (denoted C):

B01 Did you participate in the first wave of privatization?
B02 If you did not participate in the first wave, can you explain why?
B03 How did you invest your voucher points in the first wave:
(a) Yourself as an independent DIK (a holder of investment vouchers, abbr. from Czech).
(b) Through an investment privatization fund.
(c) Combination (a part independently, another part through a fund).
B04 Which reasons contributed to your decision to invest vouchers yourself?
(a) You had enough information on companies.
(b) You understood the process of privatization.
(c) You believed you would be able to choose well.
(d) You were disgusted with the marketing by investment privatization funds.
(e) You did not believe in the credibility of funds.
(f) Other – which one(s).
B14 Shares acquired in the first wave of privatization:

	Amount in ,000 Kc	Month(s) , year(s)
You hold as an equivalent of term deposit		
You sold to spend on non-durables		
You sold and invested in a different way		
You transferred to a pension fund		
You transferred to (a) family member(s) as a gift		

Basic facts

Gender, Age
Education (primary, secondary, secondary with diploma, university)
Present employment – specify (in detail)
Position (student, employee, member of a cooperative, entrepreneur without employees, entrepreneur with employees, full-time home maker, unemployed, working in retirement age, non-working in retirement age)
Income range (>5,000, ...<20,000)
Location (permanent address)
Size of municipality (as regards permanent address)