On revaluation and the wealth effect

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Summary

Economic policy aiming for economic fluctuation stabilization generally have to rely upon the knowledge of causalities among measures taken by economic politicians and impact of these measures on economic activity. One of the most frequently mentioned causality is the link between revaluation of assets and its impact on consumption behaviour, i.e. so-called „wealth effect" that is extensively investigated by economists. Positive or negative wealth effect is considered to be the result of the rise in wealth due to changes in prices of the assets held during a given period. Hence, consequent rise in consumption is not an effect of production and income formation.

The system of national accounts provides the basis for estimation of the wealth effect on the macroeconomic level. Data on changes in volume of assets and liabilities due to price changes are displayed on the revaluation account (nominal holding gains and losses account). Furthermore, potential of the system is extended by two sub-accounts - neutral and real holding gains and losses accounts. By quantification of real holding gains and losses we can dispose of the information on the impact of a general price level change (inflation) on the real wealth of economic units. Real holding gains and losses can enable us then to assess the adequacy of change in consumption behaviour as reaction to nominal holding gains and losses.

Following text is focused on compilation of data usable for quantification of the wealth effect. First part of the paper deals with the way of quantification of holding gains and losses. In the second part, time series of real holding gains and losses for the Czech republic are presented. The procedure of the system compilation imposes some barriers to ability of the data to be a true reflection of the reality. These difficulties are mentioned in the third part of our paper.

1. Holding gains and losses

Holding of assets and liabilities can bring holding gains or losses due to price changes, no matter if these assets or liabilities are intended for production purposes or perhaps for speculation[1]. Changes in volume due to price changes are not necessarily the results of productive activity but they can affect the aggregates (especially of consumption) very significantly. As Lequiller and Blades mention:

„[holding gains and losses] … are recorded in the national accounts, and can be used by economists to calculate the wealth effect. However, these changes in value are not recorded in the income account but in a special revaluation accounts that comes after the income account in the sequence of accounts."[2]

Discussed data are recorded on the revaluation account (III.3.2) in the national accounts system. Way of quantification of revaluation for non-financial and financial assets and outstanding liabilities is the fundamental question. In the case of non-financial assets, revaluation (nominal holding gains and losses) is derived on the base of modeled value of assets at the end of the period (closing stock). From the change in balance sheet a formation and other changes in volume are deducted (derived), the residual value represents revaluation of the non-financial asset entering into the revaluation account. Spectra of sources of revaluation in the case of financial assets is far more wider than in the case of non-financial assets. Revaluation can be caused by changes in the exchange rate in case of financial assets and liabilities denominated in some foreign currency.

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[1] For interesting discussion on separation of holding gain and operating profit in the business accounting, see Prakash and Sunder [1979] or Edwards and Bell [1961]

[2] Lequiller, Blades [2006], p. 225. But as the authors mention: „there is a certain contradiction in the national accounts in that the tax on realised capital gains is deducted from disposable income, whereas capital gain on which the tax is based is not itself a part of disposable income." Dtto. p. 225-226.

Another important source of revaluation is changing interest rate that can cause changes in the value of interest rate sensitive instruments (i.e. variable-rate bonds). Important factor of revaluation is floating market value of the instruments when there is a secondary market, or changes in the value of underlying assets (in case of derivatives). On the other hand, some financial assets are not subjects to revaluation, this is the case of financial assets recorded in book value and denominated in national currency.

Although theoretically is the question of revaluation basically clear, practical implementation is far more difficult. Data for estimation of value changes can be collected directly from data sources (revaluation in the business accounting reported in the questionnaires[3]), or can be computed on the base of models (in case of non-quoted shares, foreign-currency assets and liabilities[4], etc.). Naturally, starting point for the statistics of revaluation (and financial statistics as a whole) is following basic stock-flow equation:

$$OS + T + OCVA + VC = CS; \qquad\qquad [1]$$

BO – opening stock
T – transactions
OCVA – other changes in volume
VC – valuation changes (revaluation)
CS – closing stock

From the wealth effect consideration point of view, it is important to note that the revaluation accounts is a sum of revaluation, no matter if these changes in prices are realised or un-realised. This can be the important difficulty because the wealth effect is the question of reaction on un-realized changes in prices of the assets[5]. Just mentioned fact will be shortly illustated by following example. We consider the rising market value of a share from 1000 to 1500 currency units. Now we suppose that holder of this share will decide to sell his asset, i.e. he decides to realize the rise in price. If we introduce this decision into formule [1], we obtain following figure:

1000 + (-1500) + 0 + 500 = 0

Value 500 represents the rise in share price, (-1500) is the result of holder´s decision to sell his asset (transaction). Now we assume that the holder is expecting that the price will proceed further with rise in the future. Owing to this expectation he decide to hold the share:

1000 + 0 + 0 + 500 = 1500

In both cases the net wealth has increased by 500. But in the first case, the growth in the net wealth is caused by the realised holding gains. In other words, holder of the stock has transformed the stock into other asset (probably deposits). In the second example, the net wealth has grown up due to unrealised holding gains in the stock prices. Of course, the difference in the reaction of holders is displayed in the balance closing. In the first case, the amount of stocks held has fallen to zero, in the other case this amount has risen to 1500. From the wealth effect point of view, the unrealised holding gains and losses can create unsustainable rise in the consumption[6]. But it is almost unfeasable to assess this sustainability on the base of revaluation accounts because we can not separate realised and unrealised nominal holding gains (and losses). The national accounts system can „only" offer the answer if these holding gains and losses are neutral or real (see following chapter).

Following table shows the results of quantification of assets and outstanding liabilities nominal revaluation in year 2007 in the case of the Czech republic by institutional sectors and by particular instruments.

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[3] Gains or losses generated by revaluation can be charged on cost accounts or on equity..
[4] That is based on the procedure recommended in the manula IMF, charter 5, p.11.
[5] There are also another important issues in the case of the wealth effect as a type of asset, liquidity of asset, age of owner, etc. See Kubíček [2002]
[6] In the case that the rise in price of asset is only temporary.

Table 1: Revaluation account, czech annual national accounts, 2007

III. 3.2 Revaluation accounts	S.1	S.11	S.12	S.13	S.14	S.15	S.2
			CHANGES IN ASSETS:				
Non-finacial assets	586 020	240 606	7 178	194 385	139 887	3 964	0
Financial assets	8 553	-46 017	-102 496	161 144	-4 161	83	-22 301
Monetary gold and SDR	758	0	758	0	0	0	0
Currency and deposits	-55 118	-10 825	-36 300	66	-8 059	0	-32 030
Securities other than shares	-47 117	-1 905	-45 381	58	107	4	-2 321
Loans	-11 363	-498	-11 348	483	0	0	0
Shares	174 934	12 764	-3 621	159 564	6 148	79	-17 784
Insurance technical reserves	0	0	0	0	0	0	0
Receivables	-53 541	-45 553	-6 604	973	-2 357	0	29 834
TOTAL	594 573	194 589	-95 318	355 529	135 726	4 047	-22 301
		CHANGES IN LIABILITIES AND NET WORTH:					
Liabilitirs	88 865	151 325	-58 751	-2 520	-1 189	0	-103 371
Currency and deposits	-55 035	0	-55 035	0	0	0	-32 113
Securities other than shares	-348	-613	2 442	-2 177	0	0	-49 090
Loans	-11 363	0	-11 020	-343	0	0	0
Shares	157 966	164 807	-6 841	0	0	0	-816
Insurance technical reserves	0	0	0	0	0	0	0
Payables	-2 355	-12 869	11 703	0	-1 189	0	-21 352
Changes in the net wealth	505 708	43 264	-36 567	358 049	136 915	4 047	81 070
TOTAL	594 573	194 589	-95 318	355 529	135 726	4 047	-22 301

Source: CZSO

Data on nominal holding gains and losses are inputs into quantification of neutral and real holding gains and losses. Sense of these accounts (neutral and real holding gains and losses) is to extend an analytical apparatus of the system of national accounts, to record the effect of a general price level change on the real value of non-financial and financial assets and outstanding liabilities[7]. Logic of these accounts appears from the fact that rise in general price level can decreas real value of nominal gains or can deepen real losses in the case of nominal holding losses. On the contrary, real value of outstanding liabilities is lowered by increasing general price level[8]. Real holding gains and losses statistics shows if particular sector (or economy as a whole) gained some real profit from holding assets and liabilities despite the inflation effect.

Key moment in the process of quantification is the choice of index representing general price level change. This index will than serve to calculation of neutral holding gains and losses. Methodology ESA 96 (6.45) recommends to applicate for calculation implicite deflator of final domestic uses

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[7] Rybacek [2009]

[8] As Alchian and Klein argue, such calculations suffer by imperfections. Such imperfection is the strong concentration on current prices but in many cases will be realised the future purchasing power of assets. Authors thus conslude, that: „the ideal price index would also include the current price of future consumption." Alchian a Klein [1977], p. 5.

excluding change in inventories. Application of the only price deflator is necessary consequence of balancing process in the national accounts system. In the case of application of two different indexes we would obtain different results for revaluation of one instrument. In reality, the changes in prices can be assessed by both parties differently. Households can evaluate some price change differently than non-financial corporation, probably with regard to changes in prices of goods and services purchased and used up by these sectors (CPI vs. PPI). But the system requires to use only one information for both counterparties which is enabled by application of the only one price index for all parties involved in the holding of financial assets and liabilities[9].

Calculation of neutral holding gains and losses (NG) is based on the following formula:

$$NG = p_0 \times q \, (r_1/r_0 - 1) \qquad\qquad [2]$$

, where „$p_0 \times q$" is current value of assets at the beginning of the period (opening stock) and r_1/r_0 is the factor of change in the general price level in the period, in our case implicit deflator of final domestic uses.

Neutral holding gains and losses comport with the changes in the value of assets and liabilities that are in line with the change of the general price level. In other words, we estimate rise in prices of assets and liabilities that would neutralize the rise in price level to the extent that real value of assets and liabilities would remain constant. That is, in essence, model estimation necessary for real holding gains and losses quantification.

For quantification of real holding gains (RG) and losses we can use following simple formula:

$$RG = G - NG \qquad\qquad [3]$$

, real holding gains and losses are the results of excess of nominal holding gains and losses (G) over neutral holding gains and losses (NG). Alternatively, we can also use following a little bit more complicated formula:

$$RG = (p_t/p_0 - r_1/r_0) \times p_0 \times q \qquad\qquad [4]$$

Now it is clear that more quick rise in assets prices over the general price level will generate real holding gain. In the case of general price level rising more quick than asset prices, the real holding losses are recorded. Negative value of RG [4] for outstanding liabilities signifies in fact real gains, price level is growing faster than the value of lability. Hence, these gains are displayed by plus sign.

Real holding gains and losses in the Czech republic

Now it is evident that the real holding gains and losses are determined by the price level changes and nominal changes in the prices of assets and libailities. Following table depicts time series of real holding gains and losses in the period 2001-2007[10].

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[9] Price index issue is discussed in the chapter „Alternative calculation".
[10] The CZSO Publisher time series 1995-2007, see
http://apl.czso.cz/pll/rocenka/rocenkavyber.makroek_rozvaha

Table 2: Real holding gains and losses, Czech republic, 2001-2007

	2001	2002	2003	2004	2005	2006	2007
Non-finacial assets	**-34 721**	**19 388**	**69 589**	**-80 175**	**193 092**	**209 626**	**199 408**
Non-financial corporations	-48035	-51916	-6113	-65996	51049	71026	56862
Financial corp.	-198	-1672	-300	-1631	770	1049	2163
Government inst.	12173	45044	36443	-6435	87199	81255	80777
Households	1297	27507	39427	-6122	52296	55064	57881
NISD	42	425	131	9	1777	1231	1725
Financial assets	**-335710**	**-176571**	**-121310**	**-314539**	**140150**	**-242559**	**-327369**
Non-financial corporations	-108920	-76818	-41431	-124987	-22011	-65608	-151311
Financial corp.	-159514	-37536	-57273	-194880	18956	-200717	-230164
Government inst.	-14607	-46370	-1323	83648	163093	67926	122738
Households	-51943	-15583	-21847	-77747	-20281	-44414	-67578
NISD	-727	-264	564	-574	394	253	-1054
Liabilities	**318044**	**68514**	**90259**	**284894**	**-88061**	**194774**	**271066**
Non-financial corporations	157237	7452	25342	56914	-143018	23435	31752
Financial corp.	125108	49140	51330	161461	28527	127606	188495
Government inst.	21621	7448	8063	38586	17655	25089	31317
Households	13763	4389	5422	27420	8561	18430	19129
NISD	315	86	101	513	214	214	373
Total	**-52387**	**-88668**	**38538**	**-109821**	**245180**	**161841**	**143105**
Non-financial corporations	283	-121282	-22202	-134069	-113980	28854	-62696
Financial corp.	-34603	9932	-6243	-35050	48253	-72061	-39507
Government inst.	19187	6122	43184	115799	267947	174270	234832
Households	-36884	16313	23003	-56448	40575	29080	9432
NISD	-370	246	796	-52	2385	1698	1044

Source: CZSO

Following graph depicts waveform of real hoding gains and losses:

Graph 1: Real holding gains and losses, Czech republic, 1998-2007
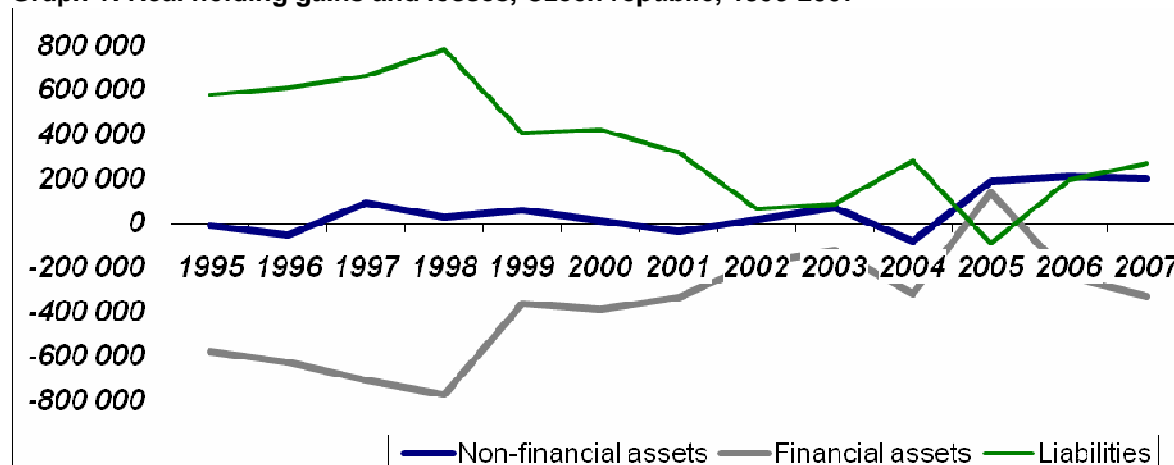
Source: CZSO, own computation

Practically, in all period we can observe the rise in real value of non-financial asstes with acceleration in the last three years of the period. This acceleration can be caused by rising demand

for housing. Generally, we can conclude that the course in the case of non-finacial assets is far more stable than in other cases. In all years the financial assets yielded real losses (exluding 2005). This means that the rise in the general price level wasn´t met by rise in the value of financial assets (nominal holding gains and losses). Only in 2005, the holding gain from financial assets are positive, the crucial factor is the rapid growth in price of the quoted shares held by government sector (CEZ).

On the liability side, we can observe mirror effect of rising general price level. Higher inflation and depreciating liabilities in the second half of nineties are exchanged by the period of lower inflation and lower real holding gains. In sum, if the positive effect of depreciating liabilities will exceed the negative effect of depreciating assets depends on the amount of total assets and liabilities held by institutional units or sectors. However, the causes of real gains or losses are far more complex phenomena including not only inflation that exceeds the topic of our paper.

Alternative calculation

As was already mentioned, the methodology of national accounts recommends for calculation of real holding gains and losses only one price deflator, i.e. implicit deflator of final domestic uses. But if we want to judge the reality of the changes for particular unit or sector, it is reasonable to take into account price index relating to goods and services purchased by this units or sectors. To be more concrete, in the case of houselholds we should apply CPI (but probably also durables not involved in CPI, especially housing[11]). If we would apply CPI as a closest aproximation of cost side of households, we can obtain alternative information on real holding gains and losses (see below).

The process of compilation of the national accounts doesn´t allow application of various price indicies. The reason is simple, to keep equality of resources and uses, assets and liabilities, the reality of changes in value must be equal for both parties (in the case of financial assets and liabilities). If we try to deflate the rise in price (1000) in the case of debtor by application of PPI = 1,05 and in the case of creditor by CPI = 1,03, we obtain change in the real value for creditor 952, but for debitor 971. For practical reason, we have to use only one price index.

For interpretation of results can this procedure imply significant complication, because the index applied for the calcution shouldn´t correspond to economic nature of subjects. If the nature is consumption but the apllied price index represent the prices of all assets produced during some period, the results can be more or less far from reality. Following graph displays the sensitivity of results (total real holding gains and losses) to index applied for calculation real holding. As can be seen, by application of year-to-year CPI, the results would be significantly different.

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[11] As Alchian and Klein mention, an ideal price index should include prices of all goods and services (including non-financial assets) and, in addition, not only current but also future prices of these goods and services. One of the reason can be that current values of financial assets will used for exchange for goods and services at future prices! Practical problem is the existence of futures markets. Both authors rejected CPI and deflator as indicators of inflation or as tools for deflation and they evolved their own price indicator. See Alchian a Klein [1973].

Graph 2: Sensitivity of the real holding gains and losses to price index choice[12]
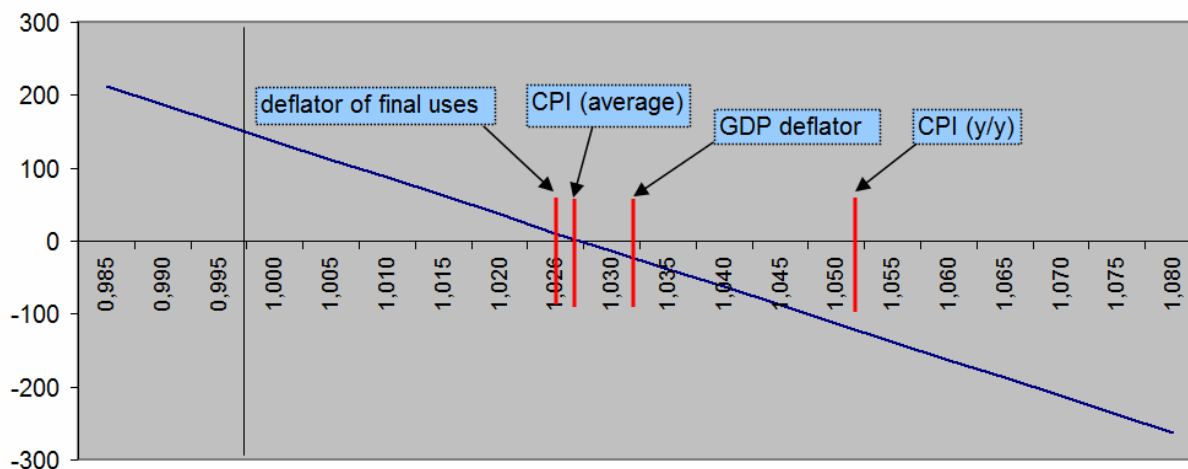
Source: CSZO, own computation

The most significant spread is between deflator used for calculation and year-to-year inflation. By application of the later index, the real holding gains and losses would be decreased by 142 milliards. Now we will concentrate just on the households sector (S.14) which is naturally the most important sector in the case of the wealth effect. Deflating nominal gains and losses by deflator recommended by methodology, the real holding gains reach almost 10 milliard czech crowns. But, by application of the CPI, we obtain completely different picture. In the case of CPI, the households sector suffer 133 milliardy real loss. This example can also show how in essence arbitrary choose of price index can completely reverse the idea of reality provided by statistical data and can also change conclusions if the rise in consumption is based on real rise in the wealth and, thus, is sustainable or not.

Conclusion

As was mentioned, application of national accounts data for the wealth effect estimation has its good reasons but also its restrictions. Important problems were identified as a separating of realized and unrealized holding gains, gaining data from business accounting, etc. The results on real holding gains and losos are also highly sensitive to price index used for deflation, as was showed in the last part of the paper.

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[12] The blue line in the graph 2 diplays changing total holding gains and losses (vertical axis) to price index value (horizontal axis).