



Monetary Policy and Currency Substitution in the Emerging Markets

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1. Introduction

Filer and Hanousek (2000) have speculated about the possible extent of bias in measures of inflation during transition, suggesting that biases might sum to as much as 50 per cent and that much smaller levels of bias, on the order of magnitude of those that had been found in many Western economies, might substantially alter the general impression of the extent of the success or failure of the first decade of the transition from communism to free markets.¹ We are now in a position to evaluate many of the claims in this article and find that, while the overall size of the upward bias may be as large as we speculated, the relative importance of various sources is somewhat different.

One would expect the transition to pose a particular challenge for measuring inflation. The changes involved in moving from a planned, shortage economy to a market one will involve massive changes in the availability and relative prices of various products. Thus, the transition environment is one where the classic problems of CPI measures may well be exacerbated and others, not commonly seen in more established economies, may well appear. At the same time, the necessity to obtain accurate price measurements is particularly important in transition economies. All countries in the region need to restrain government revenues (and therefore tax rates) in order to promote economic growth at a time when political realities dictate large social program, often indexed to inflation, to mitigate the effects of the transition. In addition, countries seeking European Union membership face considerable pressure to conform to the Maastricht criteria for accession to the European Monetary Union, among which are a low

¹For other discussions of possible biases in inflation during transition, see Brada, King and Kutan (2000), Koen and De Masi (1997), and Duchene and Gros (1994).

inflation rate (no more than 1.5% above the average inflation rate of the lowest three inflation countries in the EU). Obviously, upwardly biased inflation measured increase expenditure pressures and make achieving the Maastricht criteria more difficult. Similarly, if inflation rates are overstated and, therefore, real incomes understated, citizens of accession countries will appear poorer than they in reality are, thereby increasing pressure for resource transfers from current members and limitations on labour mobility, making the accession negotiations needlessly difficult. Finally, upwardly biased measures of inflation that overstate apparent income declines during the transition will have clear domestic political consequences, reducing public support of necessary reforms and increasing political instability.

In general policy makers have not fully appreciated the difference between price indices and cost of living indices. While the Czech Statistical Office has followed long established procedures for calculating price indices and has continually improved their technical capabilities over the decade, users of this data have made an implicit assumption that the consumer price index, as conventionally calculated is informative for policy purposes. This confusion is what has led to policies that have been based on an assumption that inflation is higher than it in reality is, creating excessive spending pressure and excessively tight monetary policy.

We are now in a position to evaluate the accuracy of the earlier estimates using actual data for the Czech Republic. While some sources of bias appear to be smaller than we originally supposed, overall it seems that the approximation that inflation rates during transition have been overstated by 20 to 50 per cent remains reasonable. Importantly, the most significant source of bias turns out to be quality improvements that have occurred in products across the spectrum of consumer goods. These improvements will have been missed in all quantity-based measures of

national output. Thus, it would appear that GDP deflators are also substantially overstated during transition. In effect, citizens of the Czech Republic are substantially better off than they were in 1989. This improvement in living standards has, however, taken the form of the consumption of far better products than they were able to purchase earlier while the actual quantity of products consumed has remained relatively unchanged. By focussing on quantities, measures of inflation, GDP and incomes have missed much of the improvement in living standards since the end of communism. We now turn to an examination of various sources of possible bias.

2. Substitution Bias

Filer and Hanousek (2000), using an approximation developed by Diewert (1976), speculated that consumer substitutions as relative prices changed might have resulted in an “upward bias in the CPI [that] might have been around 1.24 percentage points for 1996 and 0.77 percentage points in 1997” during years when the reported inflation rates were 8.8 and 8.5 percent respectively. Thus, reported inflation rates may have been overstated by between 9 and 14 percent.

Using the 738 representatives in the Czech consumer price basket, Hanousek, and Filer (2002zzz) calculated Fisher Exact Price Indices for the Czech Republic.² Results are shown in Table 1.

²The Fisher Exact Index, defined as the geometric mean of a Paasche and a Laspayres Index, is what is generally referred to as a “superlative index” that, under reasonable assumptions, is a true cost of living index in that it measures the change in incomes that would be required to keep a consumer utility neutral following a change in prices.

Table 4. Alternative Price Indices - Czech Republic

	Modified Laspeyres (1989 or 1993 weights)	Paasche (current weights)	Superlative (Fisher Exact)	Absolute CPI bias	Bias as % of Increase in Fisher Index
1991	156.6*	148.5	152.5	4.1	7.81
1992	111.1*	112.1	111.58	-0.48	-4.15
1993	120.8*	119.3	120.03	0.77	3.84
1994	110	n.a**.	n.a.	n.a.	n.a.
1995	109.1	108.5	108.8	0.3	3.41
1996	108.8	107.8	108.30	0.50	6.02
1997	108.5	107.8	108.15	0.35	4.29
1998	110.7	109.5	110.1	0.6	5.94
1999	102.1	101.9	102	0.1	5

Source: the CSO and authors computations.

*Uses 1989 as the base period

**Because of mid-year changes of the consumer basket and weights, we are not able to calculate a Paasche index for 1994.

There is a clear pattern to the results. A conventional Laspeyres index seems to overstate the cost of living index by about 5 per cent per year due to substitution across referent items alone. The exception to this pattern is early in transition (such as 1992) when elimination of artificial shortages combined with a shift to market prices resulted in the Paasche Index exceed the Laspeyres Index.

Since referent items are broadly defined,³ it is likely that a great deal of substitution took place within referent items. This is especially important given that in the Czech Republic when a particular product is replaced in a store/item sample unit within a referent category the linking is done immediately unlike in the US where there is a seasoning process whereby items are

³Examples include “ladies’ walking shoes,” “electric iron,” or “sleeping bag.”

excluded from calculations for the first several months after price sampling starts for them to eliminate any transitory effects at the time of introduction.

Given the likelihood of substitution across various brands of products as relative prices change and the fact that broad level substitution across the very different types of products defined at the referent level accounts for about a 5 per cent upwards bias, it appears that the original overall estimate of between 9 and 14 per cent may be approximately accurate.

3. Outlet Substitution

It is clear that there has been a major shift in distribution channels during transition as conventional small retail shops are supplemented by larger hypermarkets and discount stores. Filer and Hanousek speculate that substitution to cheaper outlets might have added about 0.65 percentage points to inflation rates in 1996 and 1997.

Currently the Czech Statistical Office collects 2827 of its 27,801 (10.2 percent) item/store pair individual prices for food and beverages in hypermarkets. Independent market research firms report that such stores have captured approximately 20 per cent of the food and beverage market. Similarly, they now account for about 10 per cent of clothing and footwear sales as opposed to the 5 per cent of prices for clothing and shoes collected from hypermarkets by the Czech Statistical Office. Discount stores, which concentrate on food and beverage items, account for about 10 per cent of sales in this area as opposed to the 3 per cent of prices collected from this type of low-priced store by the Czech Statistical Office. Similar differences exist with respect to other categories such as electronic equipment or recreational items. Thus, there is

certainly room for outlet substitution to lead to overstated prices in the last half of the 1990s when these stores have become more common.

Table 2 shows that there are price differences between hypermarkets and discount stores and more traditional outlets, although these differences are smaller than 15 per cent assumed by Filer and Hanousek. More critically, there are no reported price differences in areas other than food and clothing. Given the widespread presumption among Czech shoppers that hypermarkets offer better values than conventional stores, we find this lack of differences in many product categories to be surprising. There is one highly probably possibility. Price differences exist for standardized products such as milk or rice where the brands offered are likely to be the same at all outlets. When it comes to items such as cameras or electronic goods, it is possible that hypermarkets offer better value by providing higher quality product varieties at the same price as smaller stores. Validating or rejecting this possibility an interesting area for further research.

Table 2
PRICE DIFFERENCES BETWEEN VARIOUS TYPES OF OUTLETS

	Food: Hypermarket vs. Food Shop	Food: Discount Store vs. Food Shop	Food: Hypermarket vs Supermarket	Food: Discount Store vs. Supermarket	Clothing: Hypermarket vs. Clothing Store
Price Difference	-8.9%	-9.4%	-7.4%	-7.9%	-2.9%

Tables 3a and 3b show the implicit annual overstatement of price increases in the food, beverage and clothing categories created by the under representation of hypermarkets and discount stores in the outlet sample from which prices are collected. Scaling up these observed

possible biases by the share of food, beverage and clothing in the consumer basket suggests that in total price increases were overstated by 0.10 percentage points a year, substantially less than speculated by Filer and Hanousek.

Table 3a
IMPLIED BIAS FROM OUTLET SUBSTITUTION TOWARDS HYPERMARKETS
1997 - 2001

	Estimated Market Share - 1997	Estimated Market Share - 2001	Official Market Share	Estimated Price Difference	Implied Annual Bias
Food & Beverages	0%	20%	10%	8%	0.2%
Clothing & Shoes	0%	10%	5%	3%	0.04%

Table 3b
IMPLIED BIAS FROM OUTLET SUBSTITUTION TOWARDS DISCOUNT STORES
1994 - 2001

	Estimated Market Share - 1994	Estimated Market Share - 2001	Official Market Share	Estimated Price Difference	Implied Annual Bias
Food & Beverages	0%	10%	3%	9%	0.1%

4. Quality Improvements and New Goods

As is well known, planned economies had a tendency to sacrifice quality for quantity since the latter is easier to measure and specify in a planning environment (see Stiglitz 1994).

Thus, it is not surprising that the transition involved a massive upgrading in quality.⁴ In the Czech Republic, automobiles made by Škoda went from being the butt of countless jokes⁵ to a car that placed first in the JD Powers survey of consumer satisfaction among UK drivers in 1998. Yet according to the official quality adjustment of the Czech Statistical Office, the Škoda that won that consumer satisfaction survey was only a 5 per cent higher quality car than the model made by the communists at the start of transition. Similar improvements in quality occurred in a wide range of products, most entirely missed by statistical offices in the region.

Mikulcová (2001a), Mikulcová and Stavrev (2001) and Mikulcová (2001b) provide hedonic estimates of the measurable quality improvement due to changes in observable characteristics for automobiles, video cameras and video recorders in the Czech Republic. Between 1993 and 1995 prices for the automobile component of the Consumer Price Index (2.5 per cent of the entire basket) were reported to have increased by 23.1 percent after adjustment for quality improvements with the model change. Hedonic regressions, on the other hand, suggest that prices increased by only 4.5 per cent during this two year period. Thus, failure to correct for only observable differences in these cars led to price increases being overstated by 0.25 percentage points per year during this two year period. For video cameras the Czech Statistical Office reported a decrease in prices of 7.9 per cent between 1996 and 1998 while a quality-adjusted hedonic regression found an actual price decrease of 19.3 percent. The corresponding

⁴Given the broad nature of products in the Czech consumer price basket, there were very few “new” products introduced over the past decade. Rather, the referent was redefined to reflect changes in brands or characteristics. We leave it for further research, therefore, to investigate the introduction of previously unavailable items into post-communist societies.

⁵**Q.** What do you call a Škoda driver who says he has a speeding ticket? **A.** A dreamer

official change in prices for VCRs was minus 15.6 per cent between 1996 and 2000, a period when hedonic regressions based on observable characteristics suggest that prices fell by 37.6 percent. VCRs comprise 0.41 per cent of the Czech consumer basket. This implies that quality changes in VCRs alone caused inflation to be overstated by 0.03 percentage points per year over the second half of the 1990s.

Of course, observable characteristic changes provide at best a lower bound on the extent of post communist quality improvements. Much of the story consist of improvements in the performance of apparently identical products. Thus, for example, hedonic regressions will miss the portion of quality improvement in an automobile that comes from better fitting parts assembled more tightly leading to an improved ride and lower noise levels.⁶ How much better do consumers think the current Škoda is than the version available at the start of the transition? Hanousek and Filer (2002zzz) report the results of asking a focus group of consumers exactly this question. Between 1990 and 2001 the price of the Škoda automobile included in the consumer price basket as measured by the Czech Statistical Office increased from 86,708 crowns to 260,000 crowns or 199.9 per cent. Slightly less than a quarter of this increase was attributed to quality changes by the CSO, such that the automobile component of the CPI was reported to have increased by 155.1 per cent. When consumers were asked what would be a fair price in today's

⁶Another classic Škoda joke best illustrates this point. It seems that a group of workers from a communist era Škoda plant were visiting a German auto company and noticed a cage containing a large number of cats. When asked what the cats were for, the Western engineers replied that the workers placed a cat in a completed car when they went home for the night and if the cat had suffocated the next morning then they knew the door and window seals were tight enough. A few months later the Germany workers paid a return visit to the Škoda plant and also saw a cage containing cats. When they remarked that it appeared that their testing methodology had been adopted, the Škoda workers replied that it had, with one minor modification. When they came in the next morning if the cat was still in the car then the seals were tight enough.

market for the 1990 vintage Škoda, they reported that they would be willing to pay 135,000 crowns right now for the older version (assuming it were on sale as a new car) given that they could also purchase the current version for 260,000 crowns. Thus, instead of allocating 22 per cent of the total price increase to quality changes as reported by the CSO, consumers themselves allocated 72 percent of the price change to quality improvement.⁷ On a compound basis, the CSO reported that automobile prices increased 9.8 per cent a year after quality adjustments (11.6 per cent a year before such adjustments). When consumers' opinions regarding quality improvements are considered, the true price increase was 4.5 per cent a year, less than half the official level.

Hanousek and Filer (2002zzz) conducted a similar exercise for 64 products out of the 750 in the consumer basket. Because of their greater than average importance, these products accounted for a total of 16.2 per cent of the weight in the basket. Table 4 contains the results of asking consumer to report their evaluation of the relative quality of various groups of items.⁸ Across all these items (weighted by their share in the consumer price basket), the official annual inflation rate over the decade of the 1990s was 9.1 per cent a year after official quality adjustments (and 9.6 per cent a year without such adjustments). When consumers' perceptions of quality improvements are allow for, however, the annual increase in prices is reduced to 5.2 per cent.⁹

⁷Calculated as $(260,000 - 135,000)/(260,000 - 86,708)$.

⁸For the individual items themselves see Hanousek and Filer (2002zzz), available at http://www.cerge-ei.cz/publications/working_papers/pdf/Wp184.pdf.

⁹This difference probably understates the true impact of changes during the transition since it is based on prices paid when products were available and ignores the impact of waiting time or constrained

Reported quality improvements are smallest for food and beverages, averaging around 13 per cent. Thus, the vast majority of the price increase of somewhat over 100 per cent for these items was true inflation. Indeed, for some foodstuffs, consumer groups reported no quality improvement or even a quality decline since the end of communism. Respondents reported the greatest increase in quality for personal care products and recreational products, followed by clothing and home care products.

Table 4
Summary of focus group quality adjustment estimates

Product Description	Weight 1990	Number of Items Studied	% Price Increase	Index Increase	Captured Change	% Quality Change	% Actual Price Increase
Food	68.3	18	110.94	111.08	-0.14	13.72	86.29
Beverages	4.9	2	242.86	228.09	14.77	12.24	214.29
Clothing	5.6	6	259.86	229	30.86	165.13	47.4
Shoes	1.4	2	290.65	272.28	18.37	98.69	97.51
Accommodation	0.9	2	264.20	261.18	3.02	136.6	70.22
Furniture	9.7	4	212.56	202.89	9.66	68.66	97.91
White Goods	1.6	2	227.21	216.91	10.3	-0.97	229.09
Home Appliances	7.3	6	204.86	198.27	6.59	86.38	59.68
Electric Supplies	1.1	1	310.00	329.67	-19.67	266.84	11.76
Home Care Products	3.5	3	529.88	511.11	18.77	147.72	162.51
Transportation	27.6	4	206.61	163.09	43.52	86.72	69.33
Recreational Products	15.6	7	36.65	34.16	2.49	266.78	-50.13
Amusement Services	1.9	2	202.37	202.12	0.25	95.92	54.69
Personal Care Products	9.0	5	71.25	70.65	0.60	289.07	-33.38
Total of Studied Items	161.9	64	149.99	139.41	10.58	84.17	65.95

choices under the planned economy.

5. Conclusion

Simulations in Filer and Hanousek (2000) suggested that official measures of inflation in consumer prices in the Czech Republic might have overstated inflation by as much as 50 per cent in 1996 and 1997. These estimates, however, were based on a series of assumptions that had not been verified. Now, examination of results from a variety of studies over a longer period suggests that the degree of bias suggested in the earlier work may have been close to accurate. While differences due to substitution seem to be about as large as the earlier work suggested once substitution across products within referent groups is allowed for, outlet substitution appears to be less significant than at first appearance.

The most important factor, by a large order of magnitude however, is the improvement in quality that occurred as the substandard goods of the planned economy were replaced by world-class products. Czech consumers believe that 46 percent of the apparent annual inflation rate of 9.6 per cent over the decade represents an improvement in the quality of the goods they can purchase. In short, according to consumers themselves they are living substantially better at the end of the 1990s than they were when the transition started. This increase in well being has largely been missed by official statistics that report relatively unchanged real incomes because it has occurred primarily in terms of consumption of higher quality goods and services rather than greater unit consumption.

These findings are consistent with other evidence suggesting that conventional measures of consumer price inflation. Filer and Hanousek (2002) report the results of surveys of Romanian households in early 2001. Although the official inflation rate for the year 2000 was 40%, the average increase in income for households who reported that their economic status was

about the same in 2000 as the year before was only 7.3 percent. The implicit inflation rate that maximized the number of respondents whose reported income change, adjusted for price changes, was consistent with the reported change in economic well being was between 10 percent and 20 percent.

Finally, we note that currency movements are consistent with local inflation measures being overstated. Between 1993 and 2000, for example, the average annual GDP growth rate for the Czech Republic expressed in real crowns was 1.8 percent. The growth rate in D Marks, however, was 11 percent per year.

References

- Brada, Josef C, Arthur E. King and Ali M. Kutan, 2000, "Inflation Bias and Productivity Shocks in Transition Economies: The Case of the Czech Republic," *Economic Systems*, 24 (2): 119-138.
- Diewert, W. Erwin, 1976, "Exact and Superlative Index Numbers." Journal of Econometrics. 4 (2): 115-45.
- Duchene, G. and Gros, D. 1994. *Cases of Output Decline in Reforming Economies*, Center for European Policy Studies, Brussels.
- Filer Randall K., and Jan Hanousek, 2000. "Output Changes and Inflationary Bias in Transition," *Economic Systems*, 24 (3): 285_294.
- Filer, Randall K. and Jan Hanousek, (2002) "Survey-based Estimates of Biases in Consumer Price Indices During Transition: Evidence from Romania ," *Journal of Comparative Economics*, Forthcoming
- Fisher, Irving, 1927, *The Making of Index Numbers: A Study of Their Varieties, Tests, and Reliability*. New York: Augustus M. Kelly, reprinted 1967.
- Hanousek, Jan and Randall K. Filer, 2002, "Consumers' Opinion of Inflation Bias Due to Quality Improvements in Transition in the Czech Republic," Prague: CERGE-EI Working Paper 184.
- Hanousek, Jan, and Randall K. Filer, 2002, "Evaluating Imperfections and Biases in Price Indices During Transition," Prague: CERGE-EI Working Paper 189.
- Koen, Vincent and Paula De Masi (1997) "Prices in Transition: Ten Stylized Facts" Washington: IMF Working Paper No. 97/158
- McClelland, Robert, 1996, "Evaluating Formula Bias in Various Indexes Using Simulations," BLS Working Paper 289. Washington, DC: U.S. Bureau of Labor Statistics.
- Mikulcová, Elena, 2001 "Replacement of a Consumer Basket Component by Another of Higher Quality: Automobiles in the Czech Republic," Prague: CERGE-EI Discussion Paper 2001-55.
- Mikulcová, Elena, 2001 "Replacement of a Consumer Basket Component by Another of Higher Quality and the CPI Adjustment for Quality Change - Video Recorders," Prague: CERGE-EI Discussion Paper 2001-71.

Mikulcová, Elena and Emil Stavrev, 2001 “Replacement of a Consumer Basket Component by Another of Higher Quality and the CPI Adjustment for the Quality Change - Camcorders”
Prague: CERGE-EI Discussion Paper 2001-70.

Stiglitz, Joseph E. 1994. *Whither Socialism?*, Cambridge, MIT Press