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## How East Germans Fared Through Reunification: Accounting for Inflation and Economic Decontrol

by Edward J. Bird\*

On July 1, 1990, East and West Germany entered into an economic and monetary union as a first step to fully reunified statehood. Reunification meant major changes in the economic environment of East German households, yet West German political leaders suggested that no one would be worse off. The purpose of this paper is to measure the change in the real income of East German households between May 1990 and October 1990. In this period, the eastern economy changed in two ways that altered the relationship between nominal and real income. First, price controls ended. The prices of most goods were suddenly allowed to fluctuate freely, and shortages disappeared. Holding the price level constant, such decontrol can only raise well-being, as consumers are suddenly free to buy whatever goods they wish without waiting in lines. Yet nominal income may remain unchanged; hence the connection between nominal income and the utility it can provide is broken. Second, once controls were lifted, overall price levels rose slightly. Price inflation also breaks the connection between nominal income and the utility it can provide. The paper attempts to reconstruct real welfare levels for East Germans accounting for both the existence and then the removal of constraints in the socialist economy, and for the price inflation which ensued.

But nominal income itself can change and overwhelm these purchasing power effects. And there is ample evidence that nominal incomes changed dramatically in East Germany during this period. In the summer of 1990, East German unemployment rose dramatically. Market wages and government transfer payments rose as well. Hence, this paper also analyzes changes in nominal income using panel income data from the German Socio-Economic Panel-East. Nominal income information for May and October 1990 are then converted to real income with discount and price indices. This permits the direct examination of changes in real welfare in the sample. In particular, it will be possible to determine exactly what fraction of the population suffered a loss in economic well-being as a result of economic reunification.

### Accounting for Decontrol and Inflation

Previous efforts to measure the change in well-being among East Germans have foundered on the problem of finding an appropriate price level. Before July 1, 1990, East German prices were not realistic indicators of economic scarcity. When many of them were decontrolled<sup>1</sup>, a fundamental shift in the price structure and level ensued. At

the same time, the eastern Deutsch Mark was replaced by the western Deutsch Mark, at a ratio of about 1 to 1<sup>2</sup>. Holding real money but facing still unreal prices, East Germans dramatically altered the composition of their consumption baskets. For example, after reunification, the share of East German expenditures going to transportation rose above the share in the west (see Table 1).

This consumption shift makes construction of price indices difficult, both because it is extreme and because it represents not merely price inflation but also the removal of constraints on the economy. Standard price index techniques, however, simply do not capture the welfare effects of decontrol. A change from controlled prices to decontrolled prices could have no effect on the overall price level but a large effect on the structure of consumption, and hence welfare. Therefore applying a price index to incomes before and after the change will not adjust incomes for all the relevant welfare effects.

Previous research has duly noted these issues but has not addressed them directly. One strategy has been to avoid analyzing income levels and focus on distribution instead (Hauser et al. 1991, Frick et al. 1991). Another strategy has been to concentrate on price levels alone (Nierhaus 1991, Bundesbank 1991). Neither approach provides information on changes in levels of economic well-being, however.

One study combines price and income data. A DIW report (DIW 1992) uses March data from the second wave of the GSOEP-East, finding a 12 percent increase in real incomes between May 1990 and March 1991, with about 60 percent of East Germans experiencing gains. The calculations assume an inflation rate of about 13 percent, but make no effort to account for changes in constraints. The report focuses instead on income distribution questions, which are independent of the measurement of welfare levels.

Where it does address welfare levels, the DIW report uses data from one of two possible sources of household income information in the GSOEP-East. The first source, which the DIW report uses, is a direct question asked of the household head: "If you take everything together, how high is the monthly household income of all household members today?" The respondent is asked to give a figure net of taxes and transfers. The second source, which I will apply in this paper, attempts to combine income reported by

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\* The research was partially completed while the author was a Visiting Research Fellow at the Deutsches Institut für Wirtschaftsforschung, Berlin.

<sup>1</sup> Important items like rents and energy prices remained fixed by law and were only gradually released.

<sup>2</sup> The ratio was 1 to 1 for wages and prices. A lower ratio applied to savings and some accounts of firms.

Table 1

## Expenditure Shares in East and West Germany

Consumption Item	East Germany		West Germany, 1990
	1989	Late 1990 to Early 1991	
Food	39.0	29.9	24.3
Clothing	13.7	9.6	7.6
Housing, Energy	5.5	5.6	27.4
Furniture	11.0	11.5	7.3
Health	2.6	2.9	3.7
Transportation	12.8	22.9	16.1
Entertainment and Education	10.2	11.2	9.8
Other	5.1	6.3	3.9
Total	100.0	100.0	100.0

Note: 1989 shares for East Germany are based on four-person worker households with moderate income. 1990/1992 shares for East Germany are based on expenditures of all worker households. Shares for West Germany are based on expenditures of all private households.

Source: Statistisches Amt der DDR, Heft 4, August 1990 (column 1); Statistisches Bundesamt Zweigstelle Berlin, Heft 56, February 1992 (column 2); DIW/IAW, Niveau und Struktur der Verfügbaren Einkommen, May 1991 (column 3).

all the individuals in a household into a household measure. Ulrich Rendtel, Rolf Langeheine and Roland Berntsen (1992) discuss the pitfalls of both measures, illustrating that they tend not to correlate well in the western waves of the GSOEP data base<sup>3</sup>.

This paper is the first to directly measure the effects of reunification on economic well-being, controlling for inflation and decontrol of socialist-era constraints. The paper also contains an overall household income measure derived from disparate components in the GSOEP-East questions, rather than use the all-inclusive income question in the actual data.

#### Money Metric Utility and Decontrol<sup>4</sup>

The money metric utility of a unit of currency is equal to the expenditure function evaluated at the level of utility the consumer achieves. Money metric utility thus depends on utility function parameters, which in general are unknown. Estimating them from free-market data is difficult; estimating them from constrained-market data is nearly impossible. Fortunately, utility parameters for East Germans can be found by assuming that East and West Germans will have the same preferences. In this case, a relatively straight-forward procedure can be used to measure the money metric utility of East German Deutsch Marks. The

procedure is based on Collier (1986). Assume utility is Cobb-Douglas<sup>5</sup>:

$$U(x, y) = x^a y^{1-a}$$

where  $x$  and  $y$  are commodities and  $a$  is a parameter. The demand curves from this function imply that the parameters of the utility function are equal to the expenditure shares on the goods:

$$a = \frac{px}{M}$$

where  $p$  is the price of  $x$  and  $M$  is income. Thus, the third column of Table 1, which reports western budget shares for

<sup>3</sup> The problems associated with this type of all-inclusive income question include: the respondent may not know the incomes of other members, the question takes no account of certain annual types of income, like the Christmas bonus, and the respondent may have poor recall of the true tax burden as a monthly measure. The problems associated with very detailed income questions include: household-level variables like asset income have to be assigned to individuals, individuals may be missing, and tax rates are not reported accurately for individuals or households.

<sup>4</sup> This section presents an abbreviated description of the real welfare index. More information is available in Bird (1993).

<sup>5</sup> Collier uses a much more general utility function. Advantages and problems with Cobb-Douglas are discussed supra.

the eight major consumption goods, provides parameters for the eastern utility function. These parameters allow one to derive an expenditure function for East Germany that relates any level of utility to an amount of income necessary to achieve that utility. If we imagine that the constrained eastern consumer achieves utility  $U_0$  and that the unconstrained consumer would achieve utility  $U_1$ , then the welfare index is simply the ratio of the expenditure function evaluated at  $U_0$  to the same function evaluated at  $U_1$ . For the Cobb-Douglas function, this happens to be  $U_0/U_1$ . Thus the purchasing power of eastern Deutsch Mark income,  $Y$ , can be expressed in real income,  $R$ , as  $R=(U_0/U_1)*Y$ . For East Germany,  $U_0$  is the utility function evaluated using May 1990 consumption goods.  $U_1$  is the utility function at its optimum, which can be derived using the function itself and price data. This procedure yields a  $U_0/U_1$  ratio of 0.752, implying that in May 1990 an East German Deutsch Mark income of DM 100 was "worth" only DM 75.2. To compare May and October incomes, the May incomes must be pre-multiplied by 0.752.

The drawbacks of using Cobb-Douglas preferences have been described in some detail elsewhere (Deaton and Muellbauer 1980). I have adopted the function here primarily as a simple example of Collier's technique. Collier (1986) uses a more realistic utility function and more detailed budget data to find that constraints in 1977 imposed a 13 percent welfare loss. This paper will use welfare loss discount factors of 0, 13 and 25 percent.

The above welfare cost measures assume the East German price system is constant. In a true decontrol situation, prices do change and will come to better reflect true opportunity costs of production. Hence the gain in utility from decontrol will equal the welfare effects measured here, minus the welfare effects of changing price structures. To these we now turn.

### Price Level Changes

There are two types of price level changes. First are the price changes that occurred in the period of immediate concern, May 1990 to October 1990. Second are the price changes that will occur as the West and East German price systems merge into one united system.

The first type of price change can be calculated using the expenditure shares of West Germany as weights. Changes in individual-item prices translate into an overall price-level increase of 1.9 percent. Standard practice would be to use East German budget shares in either May or October 1990 as weights, corresponding to Laspeyres and Paasche indices. East German shares, however, are distorted at both times. I believe West German expenditure shares are more stable and better reflect the natural underlying choices of a typical East German point. Therefore I will assume an inflation of 1.9 percent occurred in the East German currency between May and October 1990.

The second price change is more difficult to measure. In one sense, we can simply assert that price changes subsequent to October 1990 are beyond the time frame of the paper and are therefore ignored. This, however, would exaggerate the positive aspects of economic decontrol. In the preceding section, we assumed a sudden freedom of East Germans to purchase whatever goods they wished, with their current income, and facing constant prices. In the preceding paragraph, we measured the change in prices between May and October 1990. But in fact price changes in these five months did not bring eastern prices into line with the true opportunity costs of goods. As the true opportunity costs became evident in the prices East Germans faced, the welfare benefits of the new freedom eroded. Because these effects occurred after October 1990, obviously we cannot account for them here. Yet they are important and should be kept in mind when evaluating the welfare effects of decontrol before October 1990.

### East German Nominal Incomes

#### Constructed Household Income in the GSOEP-East

The first wave of the GSOEP-East includes some 4,453 persons in 2,179 households. Selecting only those cases of the first two waves where individual weights, household-size, sex and age variables were all non-missing further reduces sample size to 2,002. A validation study suggests, however, that this heavy selection does not produce a biased sample.

The basic method of constructing income is to aggregate personal-level income variables for all persons observed in a household, and add to this the value of household-level income. This total is then divided by an equivalence scale to create a per-person welfare level. I use the U.S. Census Bureau equivalence scale.

Monthly personal incomes are relatively straightforward and make up most of the income of households. The GSOEP-East survey of May 1990 obtains wage and transfer data for that month. The GSOEP-East survey of early 1991 obtains wage and transfer data for October 1990. These figures form the basis of the study.

Annual personal income sources, such as the Christmas bonus, are divided by twelve to create a monthly measure. The same is done for annual household income items, such as capital income and gifts from West German relatives. These annual figures for 1990 are assigned to both May and October 1990, and while they therefore affect welfare levels they cannot not be responsible for any welfare changes.

Tax rates are not directly reported, but, for those individuals who work, gross and net monthly wages are obtained for both May and October. From these an average tax rate can be calculated and is applied to all non-governmental sources of income. Non working individuals are

assumed to bear no tax burden, and this overstates welfare levels. The only way around this problem is to construct a tax simulation module, an effort well beyond the present scope.

### Results for Individual Welfare

The base case assumes a 2 percent inflation of the price level between May and October 1990 and ignores the effects of decontrol. Table 2 presents statistics for the income distribution in May and October. Mean income rises by 5.2 percent, while the variance of the log of income (an inequality measure) rises by 43.4 percent from a very low base (0.53). Poverty, defined as income below 40 percent of the mean, falls, however, from 6.5 percent to 6.4 percent. The increase in mean income represents an increase of 1 percent every month, an extraordinarily rapid growth. The price of this growth appears to be increasing inequality, although not by the immiseration of the poor. The only event consistent with higher inequality and lower poverty is an increase in the upper tail. While average incomes increased by 5 percent, some individuals did much better than this, without generating greater poverty.

Table 2 further shows that 60 percent of East Germans gained as a result of reunification, while 40 percent lost. These figures are consistent with the DIW report using the all inclusive household income measure (DIW 1992). The bottom half of Table 2 presents results for market income, defined as pre-tax, pre-transfer income from private market

sources. Mean market income rose by 7.4 percent.<sup>1</sup> Inequality rose by 0.98 points, however, compared to the 0.23-point increase in disposable income. Market income poverty rose by more than 50 percent, while disposable income poverty fell. Without the western safety net, 30.6 percent, or nearly a third, of East Germans would have been poor after reunification. With the safety net, however, poverty remained at about 6.5 percent. About 50 percent of East Germans gained market income, while 50 percent lost market income; this suggests that the safety net turned 10 percent of losers into gainers to create the 60-40 split observed in disposable incomes. The importance of western transfer programs in securing a peaceful transition is apparent.

Table 3 presents disposable incomes under various assumption about inflation and decontrol. Income distribution figures are not affected by any of these variations. The 2 percent inflation figure in the base case is derived from West German expenditure shares as reported in Table 2. Line 2 presents results on the assumption that a 5 percent price decline occurred. The increase in average disposable well-being is now 13 percent. Clearly the price level affects the measurement of well-being, with the distorted East German share system leading to much higher estimates of the benefits of reunification. There is no unambiguously appropriate correction for these differences, since there is no theoretically proper set of weights for price indices. Until the eastern and western price systems become fully coordinated, Deutsch Marks in the eastern states will purchase different utility levels than those same Deutsch Marks in the western states, and changes in price levels in the two areas will continue to hamper objective assessment of well-being.

Taking into account the effects of constraints on the purchasing power of the eastern Deutsch Mark involves discounting May 1990 income figures. Based on the preceding discussion of purchasing power estimates, two discount values, 13 and 25 percent, are applied. Table 3, lines 3 and 4, report the results. Not surprisingly, mean disposable well-being goes up a great deal, by more than 20 percent for the 13 percent discount factor, and by almost 50 percent for the 25 percent discount factor. The removal of quantity constraints has a major impact on well-being.

Finally, line 5 presents the change in disposable income under the best possible case (from the standpoint of western politicians): the eastern Deutsch Mark is discounted 25 percent for purchasing power, and following reunification a 5 percent deflation occurs. Under these conditions, average East German economic well-being rises by 60 percent in the five months between May and October 1990. The worst possible case analyzed here (no decontrol effect, 2 percent inflation) results in a 5.2 percent increase in economic well-being. This range, 5.2 to 60.2 percent, is large, yet it covers only positive figures. It is apparent that, on average, East Germans were better off as a result of economic reunification.

Table 2

**Summary Statistics for Income,  
May and October 1990**  
N = 2,002

	May 1990	October 1990	Percent Change
<b>Disposable Incomes</b>			
Mean	693	729	5.2
Variance of Logarithm <sup>1</sup>	0.53	0.76	43.4
Poverty rate <sup>2</sup>	6.5	6.4	-1.5
<b>Market Incomes</b>			
Mean	647	695	7.4
Variance of logarithm <sup>1</sup>	3.89	4.87	25.2
Poverty rate <sup>2</sup>	19.8	30.6	54.5

Note: All figures are in terms of real October 1990 Eastern Deutsch Marks, assuming a 2 percent inflation between May and October 1990. — <sup>1</sup>) A measure of overall inequality. — <sup>2</sup>) Defined as 40 percent of mean income.

Source: GSOEP-East, waves 1 and 2.

Table 3

**Mean Incomes, with Variations on Inflation and Decontrol**

N = 2,002

Disposable Incomes	May 1990	October 1990	Percent Change in Mean Income	Percent Gainers
Inflation = 2 percent	693	729	5.2	60.0
Inflation = -5 percent	645	729	13.0	71.4
Purchasing power discount of the May 1990 Deutsch Mark is 13 percent <sup>1</sup>	603	729	20.9	78.5
Purchasing power discount of the May 1990 Deutsch Mark is 25 percent	488	729	49.4	87.3
25 percent discount, -5 percent inflation	455	729	60.2	89.7

Note: All figures are in terms of real October 1990 Eastern Deutsch Marks. — 1) May 1990 Deutsch Marks reduced to reflect the fact that a given quantity of income could not purchase the consumer's desired bundle at the then-effective prices.  
Source: GSOEP-East, waves 1 and 2.

Column 5, however, suggests that even in the best case, not all East Germans gained. The percent of people who lost economic well-being between May and October 1990 is 40 percent under the worst-case scenario, and still 10 percent under the best-case scenario. Even when we assume that socialist constraints were extremely onerous, and that socialist prices were too high, reunification was not a good deal for a substantial number of East Germans<sup>6</sup>.

<sup>6</sup> The choice of equivalence scales does not appear to affect the conclusions. In the base case scenario, disposable incomes rise by 6.1 percent when left unadjusted for equivalence. Market incomes rise by 9.8 percent. These figures are slightly higher than the changes in equivalent income of 5.2 and 7.4 percent respectively. They do not appear to be large enough to generate concern that the choice of equivalence scale is driving the results.

Table 4

**Characteristics of Gainers and Losers**

N = 2,002

Characteristics in May 1990	Mean Among Gainers <sup>1)</sup>	Mean Among All Others	Mean Among Losers <sup>2)</sup>
May 1990 Disposable Equivalence Income (DM)	490	710	693
Sex (1 if female)	0.587	0.540	0.536
Age	49.5	44.4	44.8
Marital status (1 if married)	0.572	0.683	0.650
College-prep degree (1 if respondent has <i>Abitur</i> )	0.086	0.127	0.116
Employment (1 if currently working)	0.426	0.663	0.630
Retirement (1 if pensioner)	0.374	0.208	0.227
Entrepreneur (1 if self-employed)	0.063	0.011	0.025
Job risks (1 if respondent indicated that the loss of his or her job was "probable" or "certain" as a result of unification)	0.221	0.314	0.315

1) "Gainers" are those whose incomes rose by more than 31 percent. — 2) "Losers" are those whose incomes fell by more than 15 percent.  
Source: GSOEP-East, waves 1 and 2.

## Characteristics of Gainers and Losers

The distribution of winners and losers is an important political issue. I define "winners" as those individuals whose household equivalent incomes (assuming no decontrol effect and a 2 percent inflation) rose by more than 31 percent between May and October. The 31 percent figure represents the 90th percentile of the distribution of relative income changes. "Losers" are defined as those whose incomes fell more than 15 percent, this being the 10th percentile of the same distribution. Table 4 presents some characteristics of these groups. The characteristics are as of May 1990, and hence represent the individuals' situations before economic reunification.

Gainers stand out from the others in a number of respects. Most apparent is employment status, as gainers are about six times more likely to have been self-employed in May 1990 than losers. They are less likely to have been well-educated, with college prep degrees. This is consistent with the notion that the *nomenklatura*, who most likely were over-represented among the college-educated classes, were quickly disenfranchised during the unification process. In terms of simple demographics, the gainers are older, poorer and more likely to be female. They are less likely to be married and more likely to have been retired. Thus it seems that, aside from the entrepreneurs, the group most likely to win under reunification is elderly widows.

Other studies have found interesting age effects in the evolution of wages following reunification (Bird, Schwarze and Wagner 1993). Table 5 gives gains and losses among

workers (not necessarily full time) aged below 35, 35-54, and 55-64, and for all persons aged 65 and above. Of all the groups, the elderly enjoy the largest relative increase in income, at 20 percent. Workers below age 55 experience increases of 2 percent. Workers aged 55 to 64 face average income losses of 8 percent. These figures are consistent with the notion that firms that must lay off workers begin by granting early retirement to the more senior workers: wage earnings fell among the most senior workers, while pensions appear to have been sweetened considerably. The same story is supported by the poverty rate information in the second panel of the table. Poverty rates rise the most for older workers, but hardly changes among the elderly. There is also a large rise for the young, but this is from a low base. The rise in poverty for older workers begins at a fairly high base (the national poverty rate in East Germany was 6.5 percent in May 1990 — Table 2) and rises by a large absolute amount, about 4 percentage points. Unity thus appears to favor the retired, at the expense of the nearly-retired.

## Conclusion

Reunification made the average East German better off between May and December of 1990. His or her level of well-being rose by at least 5 percent. Under certain measures of inflation, and taking the removal of purchasing constraints into account, average well being may have risen by as much as 60 percent. By these measures the promise that reunification would be costless to the East Germans was fulfilled, at least in the short term.

Table 5

**Income Changes by Age and Employment**  
**N = Young Workers, 588; Middle-Aged Workers, 1,092;**  
**Older Workers, 139; All Eldery, 200**

Disposable Incomes	May 1990	October 1990	Percent Change
Workers, aged 34 and below	763	779	+ 2.1
Workers, aged 35 to 54	782	798	+ 2.0
Workers, aged 55 to 64	850	781	- 8.1
All persons, aged 65 and above	545	656	+ 20.4
<b>Poverty Rates<sup>1)</sup></b>			
Workers, aged 34 and below	4.15	5.00	+ 20.5
Workers, aged 35 to 54	3.52	3.63	+ 3.1
Workers, aged 55 to 64	6.27	10.23	+ 63.2
All persons, aged 65 and above	2.56	2.60	+ 1.6

<sup>1)</sup> Poverty rate defined as 40 percent of the mean income among all respondents.

Source: GSOEP-East, waves 1 and 2.

Two caveats darken this conclusion, however. First, the lifting of purchasing constraints occurred initially in an environment of highly unrealistic prices. As eastern and western prices converge, East German purchasing power will fall. Second, even under the best case scenario, some

10 percent of the eastern population saw a decline in well-being between May and October 1990. Under the worst case, this figure is 40 percent. As East German purchasing power falls, there will be more losers unless nominal incomes keep pace.

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