ECONOMIC GROWTH CENTER
YALE UNIVERSITY
P.O. Box 208629
New Haven, CT 06520-8269
http://www.econ.yale.edu/~egcenter/

CENTER DISCUSSION PAPER NO. 982

STRUCTURAL CHANGE IN TRANSITION ECONOMIES: DOES FOREIGN AID MATTER?

Mohsen Fardmanesh*
Temple University

and

Li Tan
American International Group
New York, NY

December 2009

Notes: Center Discussion Papers are preliminary materials circulated to stimulate discussions and critical comments.

We are grateful to Mark Rosenzweig, T.N. Srinivasan and Chris Udry for academic support and to Temple University for financial support. The views expressed herein are those of the authors and do not represent AIG or its affiliates.

*Tel: 215-204-5043, fax: 215-204-8173; E-mail address: m.f@temple.edu

STRUCTURAL CHANGE IN TRANSITION ECONOMIES: DOES FOREIGN AID MATTER?

Mohsen Fardmanesh and Li Tan

Abstract

This paper addresses whether the initial declines in the manufacturing and real wages in transition economies were anything unexpected to justify policy reversal, and whether the "often-recommended" foreign aid would have helped them curb these declines in any significant way. It answers these questions with the help of a two-sector three-factor small open economy model and simulation exercises. It concludes that, given the relative price distortions and the market disequilibria that transition economies inherited from their planning era, the initial declines in their manufacturing and real wages are to be mostly expected. Foreign aid, whose impact is noticeable only when it is in excess of 5% of GDP, does not curb the decline in their real wages in any measurable way and exacerbates the decline in their manufacturing by a few percent.

JEL code: P2

Keywords: Liberalization, Structural Adjustment, Transition Economies, East European Economies, Soviet Republics, Foreign Aid

1. Introduction

With the collapse of communist regimes in Eastern Europe and former Soviet Republics in early 1990s these countries set out to transform their centrally planned economies to market economies.[1] However, the decline in their, among others, once-prized ("priority") manufacturing and real wages at the start of their transition raised doubts about the merit and success of their liberalization,[2] to the point of reversal of (market) reforms in some of these countries. Their troubling starts with its impoverishing impact and political/security considerations entailed a call for foreign aid as well.[3] But, were the initial declines in their manufacturing and real wages anything unexpected to justify policy reversal? And would the "often-recommended" foreign aid have helped them curb these declines in any significant way?[4]

In this paper, we provide an answer to these questions by studying what the correction of the economic imbalances inherited from the planning era initially requires of these economies. More specifically, we consider what the alignment of their planning era prices with market prices via a comprehensive price and trade liberalization entails for the sectoral composition and real wages of these countries under ideal market conditions in the short run. The alignment of central planning era prices with their market equilibrium counterparts involves a rise in the price of material inputs and of the nontraded goods and services relative to the price of the manufactured goods.[5] These relative price changes entail expectedly a change in real wages and a troubling shift in the structure (i.e., employment and output) of the former centrally planned economies away from manufacturing and to nontraded goods and services. The extent and specifics of

[1] The study of this transformation has given rise to many studies, books and new journals such as *Economics of Transition*, and to a new field called "Transition Economics". Different aspects of transition, from the optimal speed of adjustment to the institutional changes, in these economies have all been analyzed resulting in an ever-growing literature. For a division of this literature into thirteen topics and a sample of studies in each topic, see Fardmanesh and Tan (2003).

[2] Their de-industrialization and falling real wages compounded by an overall output decline entailed a drop in their average standard of living.

[3] For example, Fischer (1991) provides a first analysis of the role of foreign aid in their transition reform, and Zeuli and Ruttan (1996) argue why the US should provide more aid to these economies.

[4] It should be noted that the significant influx of foreign aid expected did not materialize, and the aid that did arrive targeted building the private sector through reforming the respective institutions and laws.

[5] Under planning "non-priority" material inputs were assessed below their world prices, the "priority" manufactured goods were assessed above their world prices, and the "non-priority" non-traded goods and services were assessed below the "would-be" market equilibrium prices evidenced by chronic shortages for these good and services.

these changes and the impact of foreign aid on them are addressed in this paper with the help of a theoretical two-sector three-factor small open economy model and simulation exercises.[6]

Our results indicate that, given the relative price distortions and the market disequilibria that transition economies inherited from their planning era, the initial declines in their manufacturing and real wages are mostly expected. Also, foreign aid, whose impact is noticeable only when it is in excess of 5% of GDP, does not improve their real wages in any measureable way and exacerbates their structural shift and decline in manufacturing by a few percent.

The organization of the remainder of the paper is as follows. Section 2 presents the initial disappointing experience of the former centrally planned economies of Eastern Europe and Soviet Republics with regard to their real wages and manufacturing, and states the general level of foreign aid they received in the early years of their transition. Section 3 describes the theoretical model and presents its qualitative results. Section 4 provides quantitative values for the theoretical results via simulation exercises. Section 5 presents some concluding remarks. The Appendix presents certain parameter definitions and derivations.

2. The initial experience of transition economies and their foreign aid

We consider the changes in the real wages and sectoral employment and output in the former centrally planned economies of Eastern Europe and Soviet Republics in the early 1990s.[7] From the start of their transition all of these economies faced a decline in their real wages and manufacturing employment and output along with a rise in the employment and output of their non-tradable goods and services.[8] Within two to three

[6] Our goal is not to model a pre-reform planning economy that uses arbitrary prices and, hence, faces excess demands/supplies but the opposite. Our goal is to model what the elimination of some given price misalignments and excess demands/supplies inherited from the planning era would do to real wages and sectoral structure of a post-reform market economy if such a system appeared over night.

[7] Data availability restricts our scope to these variables. For performance data, see Economic Survey of Europe (1994/1995, 2000, 2002) and TRENDS IN EUROPE AND NORTH AMERICA (1995, 1996/1997, 1998/1999, 2001). We follow Goldstein and Officer (1979) for the tradable/nontradable sectoral dividing lines.

[8] The real wage was on a decline in all of the transition economies since 1989 and reached its lowest level in most of them within one to two years of their liberalization. We take these into account in reporting the real wage changes in this study.

years of their liberalization their sectoral structure exhibited a significant change. As Table 1 indicates, the five Central European transition economies (CETE-5),[9] which dominate the parameter estimates used in our simulations in Section 4, experienced an average decline of -14% in their real wages. The respective figure for the three South European transition economies (SETE-3) was -17%,[10] for the three Baltic States (BALT-3) was -28%,[11] and for the twelve economies of the Commonwealth of Independent States (CIS-12) was -40%.[12] Considering all of these transition economies together, they experienced an average decline of -28% in their real wages.

As for the sectoral employment, all transition economies experienced a structural change towards jobs in the non-tradables (services) and away from the tradables (industry).[13] In CETE-5 the employment share of industry declined by an average of -15% while that of services increased by an average of +20%.[14] In SETE-3 the respective figures were -23% and +13%.[15] In BALT-3 they were -21% and +14%;[16] and in CIS-12 they were -30% and +17.[17] Considering all of the transition economies together, the employment share of industry declined by an average of -25% while that of services increased by an average of +17%.

As for the sectoral output, following the change in their sectoral employment all transition economies experienced a shift in their output structure away from industry and

[9] CETE-5 includes Czech Republic, Hungary, Poland, Slovakia, and Slovenia.

[10] SETE-3 includes Albania, Bulgaria, and Romania. Due to lack of data we exclude the war-stricken former Yugoslav Republics: Bosnia and Herzegovina, Croatia, The FYR of Macedonia, and Yugoslavia. The figures reported here pertain to Bulgaria and Romania respectively; no real wage data are available for Albania for early 1990s.

[11] Estonia, Latvia, and Lithuania constitute this group. The figures reported here pertain to the latter two; no data are available for Estonia.

[12] CIS-12 includes Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Republic of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan. The real wage data are not available for Armenia, Tajikistan, Ukraine, and Uzbekistan. Also, for Belarus and Turkmenistan the period 1993/94 is considered due to lack of data for earlier years.

[13] The structural job shift is even stronger if manufacturing which is a subset of industry and more in line with our analysis is considered instead. Because of lack of manufacturing data for many transition economies we use the industry data.

[14] Slovenea is excluded due to lack of data.

[15] Once again, Albania is excluded due to lack of data.

[16] Estonia is excluded due to lack of data.

[17] Armenia, Belarus and Turkmenistan are excluded due to lack of data. Moldova had no mentionable change/rise in its services employment share till 2003. Also, Tajikistan first experienced a decline (of about 15%) in its services employment share before seeing a rise in it.

towards services.[18] In CETE-5, excluding Slovakia,[19] the GDP share of industry dropped by an average of -19 while that of services increased by an average of +14%. In SETE-3 the respective figures were -35% and +23%. In BALT-3 the respective figure for industry was -33%.[20] In CIS-12 they were -35% and +30%.[21] Considering all of the transition economies together, the GDP share of industry dropped by an average of -31 while that of services increased by an average of +25%.

As for foreign aid, nearly all transition economies received foreign aid following their liberalization. The CETE-5 received per year an average aid of 1.265% of their GDP in the early years of their transition.[22] The respective figures for the SETE-3, the BALT-3, and the CIS-12 were 1%,[23] 0.74%, and 1%.[24] The figure for all of these economies together is about 1%.[25]

The questions to be answered are whether the abovementioned initial declines in the manufacturing and real wages in transition economies were anything unexpected to justify policy reversal, and whether the foreign aid in the abovementioned ranges helped these countries curb these declines in any significant way. We address these questions with the help of the theoretical and simulation analyses undertaken in the next two sections.

3. The model and the parametric results

3.1. The model[26]

Consider a 'small' open economy where two final (consumption) goods[27] are produced with labor (L), capital (K),[28] and a traded basic/material input (B). These are

[18] As with employment changes, the structural output shift is even stronger if manufacturing which is a subset of industry is considered instead. Once again, because of data availability we use industry data.

[19] Slovakia had exceptionally large changes of -40% and +70%.

[20] The figure for services is excluded due to lack of consistent data in early 1990s.

[21] Turkmenistan is excluded due to lack of consistent data over time.

[22] This figure excludes Slovenia for which no foreign aid is reported.

[23] This figure is for Bulgaria and Romania; Albania is excluded due to its special situation of receiving an exceptional 15.2% of its GDP in aid.

[24] This figure excludes Georgia and Kyrgyzstan due to lack of data/aid.

[25] For individual country figures, see Cungu and Swinnen (2003).

[26] We use the general equilibrium version of the model used in Fardmanesh and Tan (2003) and extend it to include foreign aid.

[27] We leave out the agricultural product/sector that faced a decline in all East European countries and focus on the manufacturing decline.

[28] Human capital is not accounted for in this study and, consequently, the fact that human-capital adjusted wages are low in the East European countries relative to western standards plays no role here. Such a gap causes the migration of their skilled workers to high-wage countries, as observed after liberalization.

denoted as M[29] (manufacturing) and N[30] (services). The former is tradable while N is non-tradable. Production for both follow a two-level CES production process with weak separability[31] and output of the two goods is linearly homogenous in value added (V) and B. Value added (V), in turn, is linearly homogenous in L and K. Further, assume L is perfectly mobile between the two sectors while K is sector specific. In our de-facto short-run analysis, endowments of all three inputs are fixed. We also assume K is domestically owned and has a zero rate of depreciation.[32]

With these assumptions, we represent production functions in the two sectors by:

$$M = M(V_M(L, K_M), B) \qquad (1)$$

$$N = N(V_N(L, K_N), B) \qquad (2)$$

where M and N denote a real quantity supplied of the two goods, V_j is the value-added in sector j (j=M,N), and K_j is the (fixed) capital stock in sector j (j=M,N).

Let a_{ij} denote the quantity of factor i (i=L,K,B) required to produce a unit of commodity j (j=M,N). Then the following conditions hold when all factors are fully employed/utilized:

$$a_{KM} M = K_M \qquad (3)$$

$$a_{KN} N = K_N \qquad (4)$$

$$a_{LM} M + a_{LN} N = L \qquad (5)$$

Further let W be the return to labor, R_M and R_N the returns to capital in sectors M and N and P_M, P_N and π be the prices of M, N and B, respectively. Finally setting P_M equal to one as the choice of numeraire, profit-maximization conditions for the two sectors are given by:

[29] This assumption of a single/homogeneous manufacturing good overlooks the change in the composition of this sector caused by the disappearance of some M goods in the beginning of the transition (e.g., the outdated computer industry in Bulgaria) and by the appearance of some new M goods after the liberalization.

[30] The distinction between the tradable and non-tradable goods is essential here, as in Dutch Disease analyses.

[31] We do not consider the changes in "productive efficiency" resulting from the removal of the central planning constraints. Our short run focus warrants this abstraction that allows for the use of stable production functions in the model.

[32] This simplifies our calculations without changing the results.

$$a_{LM}W + a_{KM}R_M + a_{BM}\pi = P_M = 1 \qquad (6)$$

$$a_{\mathrm{LN}}W + a_{KN}R_N + a_{BN}\pi = P_N \qquad (7)$$

We explicitly model an important characteristic of the former centrally planned economies viz, the inherited excess demand in the non-tradable goods market. Domestic demand for the two goods is determined by their (relative) prices and (real) national income (Y),[33] with both goods being normal in the aggregate. They are represented by:

$$M^d = M^d(P_N, Y) \qquad (8)$$

$$N^d = N^d(P_N, Y) \qquad (9)$$

Here unlike previous models Y, national income,[34] includes a measure of foreign aid (T) measured in terms of M. Specifically:

$$Y = M + P_N N - \pi(B^d - B) + T \qquad (10)$$

B is the (fixed) endowment of material input, B^d is the material input demanded/used by the entire economy, and the term $\pi(B^d-B)$ is the net import of the material input measured in units of M.[35] The economy-wide demand for the material input is:

$$B^d = a_{BM}M + a_{BN}N \qquad (11)$$

Given our small open economy framework, the domestic demand for and domestic supply of the tradable good M need not equal. Similarly, the economy-wide demand for and domestic endowment of material input B need not equal. But, since the

[33] Corden and Neary (1982) is one of the early studies that modeled demand in this way; Y equals domestic consumption expenditures.

[34] The use of Y, gross domestic product net of material usage, as national income implies that both net foreign earnings excluding aid and capital depreciation are zero. A fixed exchange rate is implicitly assumed as well. Considering a more realistic case of a trade deficit and negative foreign earnings only reinforces the impact of the shortage and, hence, strengthens our results.

[35] This term is positive for transition economies that are net importer of material.

trade balance is assumed exogenous and set at zero, the overall trade in M and B must be balanced.[36]

Unlike the market for good M, the domestic demand for and supply of the non-tradable good N must equal in equilibrium. Given a shortage of J units of good N inherited from the planning era, the market clearing condition for good N implies:[37]

$$\hat{N} = \hat{N}^d(P_N, Y) + \hat{J} \qquad (12)$$

where $\hat{J}$ represents the inherited shortage as a percentage of the equilibrium quantity of good N, and $\hat{N}^d$ and $\hat{N}$ represent the rate of change in domestic demand for and supply of good N.

The adjustment process from central planning to a market economy involves a comprehensive price and trade liberalization. The liberalization allows the price of N to rise (eliminating the shortage in the respective market), the price of B to rise to its world level, and the price of M to fall to its world level. Therefore prices of N and B rise relative to that of M. Following these two relative price changes, the economy adjusts from its centrally planned (dis)equilibrirm to a market-determined equilibrium. The structural impacts of the liberalization are addressed by studying the respective market equilibrium conditions. The (non-tradable) good and factor markets clear and profits are zero.

3.2. The parametric results

The impacts of the liberalization are derived parametrically from the above conditions.[38] A proportional rate of change is denoted by a circumflex (^), e.g., $\hat{x} = dx/x$. In all cases, the first term on the right-hand side captures the impact of the rise in the (relative) price of material input denoted by $\hat{\pi}$. The second term captures the impact of

[36] This assumption may seem restrictive for our short-run analysis. However, allowing for a trade imbalance (deficit), even when granting it an impact on consumption, only exacerbates the impact of the inherited shortage and leaves the respective results qualitatively intact.

[37] This arises from the pre- and post-liberalization market conditions of $N_{pre}+J=N^d_{pre}$ and $N_{post}=N^d_{post}$ which indicate a shortage of J units initially.

[38] See Appendix.

the inherited shortage for N denoted by $\hat{J}$. The third term captures the impact of foreign aid denoted by $\hat{T}$ which is measured as a percentage of national income.

The impact on the price of the non-tradable good, on the overall price level, on the wage rate, all measured in units of M and considered only for deriving the impact on the real wage, are represented by:

$$\hat{P}_N = \frac{n_2 + \gamma_2}{n_1 - \gamma_1}\hat{\pi} + \frac{1}{n_1 - \gamma_1}\hat{J} + \frac{\eta_N \phi_T}{n_1 - \gamma_1}\hat{T} \qquad (13)$$

$$\hat{P} = \frac{\phi_N n_2 + \phi_N \gamma_2}{n_1 - \gamma_1}\hat{\pi} + \frac{\phi_N}{n_1 - \gamma_1}\hat{J} + \frac{\phi_N \eta_N \phi_T}{n_1 - \gamma_1}\hat{T} \qquad (14)$$

$$\hat{W} = \left(\frac{b_1 n_2 + b_1 \gamma_2}{n_1 - \gamma_1} - b_2\right)\hat{\pi} + \frac{b_1}{n_1 - \gamma_1}\hat{J} + \frac{b_1 \eta_N \phi_T}{n_1 - \gamma_1}\hat{T} \qquad (15)$$

$$\left(\frac{\hat{W}}{P}\right) = \left(\frac{b_1 n_2 - \phi_N n_2 + b_1 \gamma_2 - \phi_N \gamma_2}{n_1 - \gamma_1} - b_2\right)\hat{\pi} + \frac{b_1 - \phi_N}{n_1 - \gamma_1}\hat{J} + \frac{(b_1 - \phi_N)\eta_N \phi_T}{n_1 - \gamma_1}\hat{T} \qquad (16)$$

The liberalization expectably raises the price of the non-tradables. The inherited shortage for N raises P_N, but the rise in the material price has an ambiguous effect on it. The increase in π discourages the production of N and, hence, raises P_N. At the same time, however, the decline in the national income, caused by the reduced production of N (and M), reduces the demand for N and, hence, reduces P_N. But the direct positive impact of the significant shortage and the higher material cost plausibly dominates the indirect negative secondary impact of the higher material price through the national income channel/effect. Given P_N rises, the liberalization also raises the overall price level,[39] P.

[39] The reason for considering this variable here is to separate the impact of the liberalization on the real wage via the goods prices. Otherwise, the concept of "overall price level" has no role to play in our real-side analysis.

With the price of the manufactured good being the numeraire, the increase in P is proportional to that in P_N.[40]

The liberalization expectably raises the wage rate as well.[41] The change in W is positively related to the increase in P_N caused by the shortage, and is negatively related to that in π. For a given employment, an increase in P_N raises the marginal revenue product of labor in general and, hence, increases the return to labor. Yet, an increase in π, like technical regress, depresses the return to labor (and capital), for given commodity prices.[42] But, the positive impact of the large shortage dominates the negative secondary impact of the rise in the material input price.

The impact on the real wage or on the welfare of a representative worker is ambiguous, since both P and W increase. It depends, among others, on their consumption pattern, or the spending shares of M and N. If they spend a large (small) share of their income on the non-tradables (tradeables), as is the case in the East European countries and former Soviet Republics, their real wage could fall, and vice versa.

The impact on the employment in sectors M and N is captured by:

$$\hat{L}_M = (-\frac{f_1(n_2+\gamma_2)}{n_1-\gamma_1} - f_2)\hat{\pi} - \frac{f_1}{n_1-\gamma_1}\hat{J} - \frac{f_1\eta_N\phi_N}{n_1-\gamma_1}\hat{T} \qquad (17)$$

$$\hat{L}_N = (\frac{h_1(n_2+\gamma_2)}{n_1-\gamma_1} - h_2)\hat{\pi} + \frac{h_1}{n_1-\gamma_1}\hat{J} + \frac{h_1\eta_N\phi_N}{n_1-\gamma_1}\hat{T} \qquad (18)$$

The liberalization reallocates labor from sector M into sector N.[43] The shortage lowers the employment in sector M and raises that in sector N, as labor is reallocated to meet the existing excess demand for N. It raises the real product wage in sector M and lowers that in sector N.[44] The rise in the material price has an ambiguous but secondary

[40] The expenditure share of good N is the proportion factor.

[41] It should be noted that the liberalization can be inflationary because it exerts upward pressure on the overall price level and the wage rate.

[42] As Bruno and Sachs (1982) demonstrates, an increase in the material input price shifts the factor price frontier inward in the W-R space and depresses the payment to labor and capital.

[43] Since labor was mostly immobile in the transition economies in the immediate years following the liberalization, the decline in their manufacturing entailed unemployment.

[44] Since capital is fixed and sector specific in our de-facto short-run analysis, its real product return in

impact on the employment in sectors M and N. It affects the employment in both sectors negatively by increasing their respective real product return to material. On the other hand, it affects the employment in both sectors positively by lowering their respective real product wage.[45] The employment in sector N rises and that in sector M falls as the employment effect of the shortage dominates the secondary ambiguous employment effect of the higher material price for both sectors.

The impact on the output in sectors M and N is given by:

$$\hat{M} = \left(\frac{-m_1 n_2 - m_1 \gamma_2}{n_1 - \gamma_1} - m_2\right)\hat{\pi} - \frac{m_1}{n_1 - \gamma_1}\hat{J} - \frac{m_1 \eta_N \phi_T}{n_1 - \gamma_1}\hat{T} \qquad (19)$$

$$\hat{N} = \frac{n_1 \gamma_2 + n_2 \gamma_1}{n_1 - \gamma_1}\hat{\pi} + \frac{n_1}{n_1 - \gamma_1}\hat{J} + \frac{n_1 \eta_N \phi_T}{n_1 - \gamma_1}\hat{T} \qquad (20)$$

The liberalization generates a structural shift from sector M to sector N. The manufacturing output falls while the non-traded output rises, given a significant shortage for N. The increase in the material input price induces firms to reduce the usage of material input and, hence, exerts a negative impact on output in both sectors. We call this impact the "material input effect". The shortage raises the price of N relative to that of M and, hence, reduces the real product wage in sector N relative to that in sector M. Thus, sector M loses labor to sector N. We call this impact the "employment effect". Sector M experiences a negative material input effect and a negative employment effect, and unambiguously contracts. Sector N experiences a negative material input effect but a positive employment effect. As the positive employment effect of the large inherited shortage dominates the secondary negative material input effect, sector N expands.

It should be noted that the domestic output of M is determined solely on the supply side, as M is a tradable good. By contrast, the demand for N plays an important

---

sector M (N) falls (rises) with the reallocation of labor from sector M to sector N. This would induce a divestment (investment) in sector M (N) when capital can expand/contract and is mobile in the long run, as evidenced in East European countries.

[45] Regarding sector N, this assumes that the impact of the higher material cost on W plausibly dominates that on P_N. For this to hold a sufficient but not necessary condition is that the direct positive impact of the higher material cost on P_N via the production cost channel dominates the indirect negative one via the national income channel.

role in determining its output. The inherited shortage for N raises its price and, hence, its production. However, the final increase in the output of N is smaller than the initial excess demand for it. The simultaneous rise in the prices of N and B eliminates part of the initial shortage.[46] The higher price for N discourages the demand for it through the own-price channel. The higher material input price depresses the demand for N through the national income channel, since it reduces economy-wide production/income.

3.3. The impact of foreign aid on the parametric results

The qualitative impacts of foreign aid on the above results are as follows. In general, it exacerbates the impact of the shortage.[47]

Regarding the prices and wages, foreign aid raises the demand for all goods via higher income. Part of the increase in spending falls on the non-tradable good and, hence, raises its price. This in turn increases the overall price level. The resulting expansion in the production of N exerts upward pressure on the wage rate. So foreign aid improves the real wage or the welfare of a representative worker if the shortage raises the real wage,[48] and vice versa.

Regarding the sectoral employment and output, foreign aid raises the real product wage in sector M and lowers that in sector N by increasing the price of N. It reallocates labor from sector M to sector N and, hence, shifts the production from sector M to sector N. It expands sector N at the expense of sector M.[49]

4. The simulation analysis

We now provide quantitative values for the various impacts of the liberalization discussed in our theoretical analysis. The structural parameters of the economy are set at values presented in Table 2.[50] Despite a many simplifications and use of idealized markets

[46] As indicated by equation (B.10) in Appendix.

[47] Under certain/implausible parameter values it could mitigate the impact of the shortage, as part of foreign aid goes into consumption of M.

[48] This is more likely, the larger are the employment and output shares of sector N and the elasticity of substitution between L and K in this sector, and the smaller are the income elasticity of demand for N and the expenditure share of N.

[49] This is known in the Dutch Disease analysis as the "Spending Effect".

[50] These values are derived from the statistical data on the former centrally planned economies mainly Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, and former Soviet Union due to their availability, and in consultation with Berndt and Wood (1975), CIA (1989, 1990), Corbo et al. (1991), Desai (1987), Koropeckyi (1981), Kushnirsky (1993), Marer et al. (1992), UN (1990), Spencer and Amos

in our model and simulations, our qualitative results are all in line with the characteristics of their experiences, and our simulation results all overlap with the magnitudes of their experiences.[51]

In Table 3, we present a base-unit simulation results for the impact of a shortage of 10% for the non-tradable goods ($\hat{J}$=10%),[52] for the impact of a 10% misalignment in the price of the material input ($\hat{\pi}$=10%),[53] and for the impact of a foreign aid of 1% of GDP ($\hat{T}$=1%).[54] These three simulations allow us to assess the relative significance of the three factors at play. Except for the impact on real wages, the impact of the shortage for the non-tradable goods by far dominates the impact of an equal distortion (of 10%) in the price of material inputs. And a foreign aid of 1% of GDP has a small impact of less then 1% on each and every endogenous variable of our concern and a near zero impact on real wages.

In Table 4, we provide a quantitative range for various impacts that encompasses all the transition economies with different levels of inherited distortions. We consider a lower bound and an upper bound for the size of the inherited market disequilibria, labeled as low- and high-distortions benchmarks. For the low-distortions case we set the shortage for N at 20% and the price misalignment for material inputs at 30% ($\hat{J}$=20% and $\hat{\pi}$=30%) as an estimate for the situation in the least distorted transition economies in CETE-5 like Czech Republic. For the high-distortions case we set the shortage for N at 75% and the price misalignment for material inputs at 200% ($\hat{J}$=75% and $\hat{\pi}$=200%) as an estimate for the situation in the most distorted transition economies in CIS-12 like Moldova.[55] The simulation results are stable: varying the parameter values within plausible ranges does not alter them qualitatively.[56]

(1993), Walker (1989), and Weitzman (1970). For details, see Fardmanesh and Tan (2000). The sectoral shares in labor endowment are adjusted to reflect the two-sector structure of the model and the industry-services division of the data used in this study.

[51] Only our upper bound estimation for the change in the output of sector N falls significantly short of the actual experience of the transition economies.

[52] The simulation results for PN, P, and W are 7.5%, 3.7%, and 4.2%, respectively.

[53] The simulation results for PN, P, and W are -0.24%, -0.12%, and -2.36%, respectively.

[54] The simulation results for PN, P, and W are 0.9%, 0.44%, and 0.51%, respectively.

[55] In light of the post-2000 performance data of the transition economies we have revised upward the

The real wage (W/P) falls significantly by a 6-to-41%. The shortage increases wages (W) more than the average price level (P) and, hence, raises the real wage. The rise in the material price increases P and decreases W and, hence, lowers W/P. The negative effect of the rise in the material price on W/P dominates the positive effect of the shortage on W/P when the two distortions are of the same order of magnitude in our base-unit simulations. The real wage declines more where the material input price misalignment and the spending share of N are larger as in the former Soviet Republics.

Regarding the sectoral employment and output, they rise significantly in sector N (by 9-to-27% and 7-to-20% respectively) and fall even by much larger amounts in sector M (by 11-to-46% and 10-to-44% respectively). These changes are mostly due to the shortage because the effect of the material price misalignment is as small as 1-to-2% for the low distortions case, as revealed by the base-unit simulations in Table 2.

As for the impact of foreign aid on the above results,[57] our simulation exercises show that the aid has to be large in order to have an effect. Foreign aid in the likely amounts of 1% of the GDP has no noticeable impact.[58] Even when it is raised to the unlikely amount of 5% of the GDP, for example, the production of N would rise by 3% more. More importantly, the real wage would increase by less than 0.5% at the cost of exacerbating the manufacturing decline by an additional 2.5%.

5. Conclusions

In this paper, we have addressed whether the initial declines in the manufacturing and real wages in transition economies were anything unexpected to justify policy

---

upper bound for the size of the inherited shortage and of the material input price distortion estimated in consultation with Calvo and Coricelli (1992), Commander (1992), and Lipton and Sachs (1990) for our earlier studies. Our upper bound of 75% for the shortage of the non-tradable goods is supported by the near total neglect of the demand for such goods in the former Soviet Republics on one hand, and by the longer run increase of 200% in the GDP share of services in members of this group like Moldova on the other hand. Our upper bound of 200% increase in the material input price is supported by the persistent shortage for them even after 2000 on one hand, and by the required change in the price of the non-tradable goods on the other hand. The two upper bound values used here imply an increase in the relative price of the non-tradable goods such as housing in the range of 50%, and that is well within the actual experience of transition economies.

[56] Only, and expectedly, the real wage shows some sensitivity but for all plausible parameter values it declines; for a detailed sensitivity analysis, see Fardmanesh and Tan (2000).

[57] Because of the rate-of-change form of our analysis the sizes of both the pre- and post-liberalization aid matter; the pre-liberalization aid is set at 1% of GDP.

[58] The sectoral employment and output impact is less than 1%.

reversal, and whether the "often-recommended" foreign aid would have helped them curb these macro declines in any significant way. We have answered these questions with the help of a two-sector three-factor small open economy model and simulation exercises.

We conclude that, given the relative price distortions and the market disequilibria that transition economies inherited from their planning era, the initial declines in their manufacturing and real wages were to be mostly expected. We further conclude that foreign aid, in the usual amounts would have had no noticeable impact on overall real wages and structural changes in these economies. If given an unlikely aid of 5% of GDP, it would have had an insignificant less than 0.5% positive impact on real wages at the cost of exacerbating the manufacturing decline by a bigger amount of 2.5%. This, along with a notion that in general foreign aid stymies reform policies in developing countries,[59] undermines the implicit panacea role implied by the calls for foreign aid for transition economies. This is not to negate that foreign aid can have a positive long-run impact on economic growth under special/idealized circumstances.[60] It is the impact and value of foreign aid for mitigating the decline in real wages and manufacturing at the start of transition with persistent distortions that is put under question.

While the importance of foreign aid for the specific individual recipients can and should never be doubted, its overall macro effects are once again established to be minimal and in conflict. While we may be disappointed at the non-materialization of the significant influx of foreign aid expected for the former centrally planned economies of Eastern Europe and Soviet Republics, we cannot but support the use of the limited aid that did arrive in these countries for targeting building the private sector through reforming the respective institutions and laws rather than for mitigating the decline in real wages and manufacturing.

[59] See, for example, Heckelman and Knack (2005).
[60] See, for example, Cungu and Swinnen (2003).

Appendix

A. The structural parameter definitions

The parameter Θ_{ij} denotes the share of factor i in the unit cost of producing commodity j where i=L,K,B and j=M,N for this and following definitions; λ_{ij} denotes the share of sector j in the total endowment of factor i; σ_{Jv} denotes the elasticity of substitution between L and K in value added in sector j; and σ_j denotes the elasticity of substitution between value added and material input in sector j (j= M, N).

The parameter Φ_j denotes the ratio of commodity j over national income; $\Phi_B{}^d$ denotes the ratio of total material demand/usage over national income; $\Phi_B{}^m$ denotes the ratio of the net import (export) of B over national income; and Φ_T denotes the ratio of foreign aid over national income.

The parameter η_j denotes the income elasticity of demand for final good j; and $e^j{}_N$ denotes the price elasticity of demand for final good j with respect to the change in the price of N and, where marked with a bar, it is the compensated elasticity.

B. The parametric derivations

Consider the production side first.[61] The change in the wage rate ($\hat{W}$) can be expressed by:

$$\hat{w} = b_1 \hat{p}_N - b_2 \hat{\pi} \qquad (B.1)$$

where

$$b_1 = \frac{1}{\Delta}\lambda_{LN}\frac{\sigma_{NV}}{\theta_{KN}} > 0, \quad b_2 = \frac{1}{\Delta}\left(\lambda_{LM}\theta_{BM}\frac{\sigma_{MV}}{\theta_{KM}} + \lambda_{LN}\theta_{BN}\frac{\sigma_{NV}}{\theta_{KN}}\right) > 0,$$

$$\Delta = \lambda_{LM}\frac{\sigma_{MV}}{\theta_{KM}}(1-\theta_{BM}) + \lambda_{LN}\frac{\sigma_{NV}}{\theta_{KN}}(1-\theta_{BN}) > 0$$

The changes in labor demand in sectors M and N are given by:

$$\hat{L}_M = -(1-\theta_{BM})\frac{\sigma_{MV}}{\theta_{KM}}\hat{W} - \theta_{BM}\frac{\sigma_{MV}}{\theta_{KM}}\hat{\pi} \qquad (B.2)$$

$$\hat{L}_N = \frac{\sigma_{NV}}{\theta_{KN}}\hat{P}_N - (1-\theta_{BN})\frac{\sigma_{NV}}{\theta_{KN}}\hat{W} - \theta_{BN}\frac{\sigma_{NV}}{\theta_{KN}}\hat{\pi} \qquad (B.3)$$

where $\lambda_{LM} * \hat{L}_M + \lambda_{LN} * \hat{L}_N = 0$.

The output changes in sectors M and N are described by:

$$\hat{M} = -d_2\hat{W} - d_3\hat{\pi} \qquad (B.4)$$

$$\hat{N} = a_1\hat{P}_N - a_2\hat{W} - a_3\hat{\pi} \qquad (B.5)$$

where

$$d_2 = \theta_{LM}\frac{\sigma_{MV}}{\theta_{KM}} > 0, \qquad d_3 = \frac{1}{1-\theta_{BM}}(\theta_{LM}\,\theta_{BM}\frac{\sigma_{MV}}{\theta_{KM}} + \theta_{BM}\,\sigma_M) > 0,$$

$$a_1 = \frac{\theta_{\mathrm{LN}}}{1-\theta_{BN}}(\frac{\sigma_{NV}}{\theta_{KN}} + \frac{\theta_{BN}}{\theta_{\mathrm{LN}}}\sigma_N) > 0, \quad a_2 = \theta_{\mathrm{LN}}\frac{\sigma_{NV}}{\theta_{KN}} > 0, \quad a_3 = \frac{\theta_{BN}}{1-\theta_{BN}}(\theta_{\mathrm{LN}}\frac{\sigma_{NV}}{\theta_{KN}} + \sigma_N) > 0.$$

By substituting for $\hat{W}$ from above, the changes in labor demand and output in sectors M and N are expressed in terms of $\hat{P}_{\mathrm{N}}$ and $\hat{\pi}$:

$$\hat{L_M} = -f_1\hat{P}_N - f_2\hat{\pi} \qquad (B.6)$$

$$\hat{L_N} = h_1\hat{P}_N - h_2\hat{\pi} \qquad (B.7)$$

$$\hat{M} = -m_1\hat{P}_N - m_2\hat{\pi} \qquad (B.8)$$

$$\hat{N} = n_1\hat{P}_N - n_2\hat{\pi} \qquad (B.9)$$

where

$$f_1 = \frac{1}{\Delta}(1-\theta_{BM})\frac{\sigma_{MV}}{\theta_{KM}}\lambda_{\mathrm{LN}}\frac{\sigma_{NV}}{\theta_{KN}}, \qquad f_2 = \frac{1}{\Delta}(\theta_{BM}-\theta_{BN})\frac{\sigma_{NV}}{\theta_{KN}}\lambda_{\mathrm{LN}}\frac{\sigma_{MV}}{\theta_{KM}},$$

$$h_1 = \frac{1}{\Delta}(1-\theta_{BM})\frac{\sigma_{NV}}{\theta_{KN}}\lambda_{LM}\frac{\sigma_{MV}}{\theta_{KM}}, \qquad h_2 = \frac{1}{\Delta}(\theta_{BM}-\theta_{BN})\frac{\sigma_{NV}}{\theta_{KN}}\lambda_{LM}\frac{\sigma_{MV}}{\theta_{KM}},$$

$$m_1 = \frac{\theta_{LM}}{1-\theta_{BM}}f_1, \quad m_2 = \frac{\theta_{LM}}{1-\theta_{BM}}(f_2 + \frac{\theta_{BM}}{\theta_{LM}}\sigma_M),$$

$$n_1 = \frac{\theta_{\mathrm{LN}}}{1-\theta_{BN}}(h_1 + \frac{\theta_{BN}}{\theta_{\mathrm{LN}}}\sigma_N), \quad n_2 = \frac{\theta_{\mathrm{LN}}}{1-\theta_{BN}}(h_2 + \frac{\theta_{BN}}{\theta_{\mathrm{LN}}}\sigma_N).$$

Consider the demand side now. Totally differentiating the demand for N, substituting first for the changes in Y while invoking the Slutsky decomposition of uncompensated price elasticity of demand for N, then for the changes in Bd, and finally for the changes in M and N yields:

$$\hat{N}^d = \gamma_1\hat{P}_N + \gamma_2\hat{\pi} + \gamma_3\hat{T} \qquad (B.10)$$

where

$$\gamma_1 = \bar{e}_N^N - \eta_N m_1(\phi_M - \lambda_{BM}\phi_B^d) + \eta_N n_1(\phi_N - \lambda_{BN}\phi_B^d) - \eta_N\phi_B^d\,\lambda_{BN}\sigma_N,$$

$$\gamma_2 = \eta_N[\phi_B^d(\lambda_{BM}\sigma_M + \lambda_{BN}\sigma_N) - \phi_B^M - m_2(\phi_M - \phi_B^d\,\lambda_{BM}) - n_2(\phi_N - \lambda_{BN}\phi_B^d)].$$

$$\gamma_3 = \eta_N\phi_T.$$

The parameter γ_1 captures the total effect of a change in P_N on N^d. It consists of a direct effect via own price of N and an indirect effect via national income. As for the indirect effect, a change in P_N alters production of M and N, and, hence, national income. The

[61] For the derivation steps taken, see Jones (1971).

parameter γ_2 captures the effect of a change in π on N^d via national income. A rise in π decreases production of M and N and increases (or decreases) material imports bill, and, hence, alters national income. An increase in national income raises the demand for N, and vice versa. The parameter γ_3 captures the effect of a change in T (foreign aid) on N^d via national income. An increase in T raises the national income and, hence, the demand for N without any ambiguity.

Considering the production and demand sides simultaneously--deriving the impact on P_N from setting (B.9) equal to (B10) and then substituting for it in (B.1) and (B.6)-(B.9)--the final parametric results are obtained.

Table 1: Initial Experience of Transition Economies

Δ% in	CETE-5	SETE-3	BALT-3	CIS-12	ALL
W/P	-14	-17	-28	-40	-28
L_M	-15	-23	-21	-30	-25
L_N	+20	+13	+14	+17	+17
M	-19	-35	-33	-35	-31
N	+14	+23	----	+30	+25

Table 2: The Parameter Values Used in Simulations[62]

Production side:

Sectoral shares in factor endowments:
λ_{LM} =.52
λ_{LN} =.48
λ_{KM} =.39
λ_{KN} =.61
λ_{BM} =.60
λ_{BN} =.40

Production technology:
σ_{MV} =.2 (L & K in V of M)
σ_{M} =.1 (V & B in M)
σ_{NV} =.2 (L & K in V of N)
σ_{N} =.1 (V & B in N)

Factor shares in unit costs:
θ_{LM} =.66 θ_{LN} =.71
θ_{KM} =.13 θ_{KN} =.14
θ_{BM} =.21 θ_{BN} =.15

Demand side:

Sectoral shares in GDP:
Φ_{M} =.56 Φ^{M}_{B} =.05
Φ_{N} =.49 Φ_{B} =.19

Price and income elasticities:
$\bar{e}_{N}^{N}$ = –0.7
η_{N} = 1.2 η_{M} = 0.9

[62] These representative parameter values are mostly derived from the statistical data of Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, and Soviet Union due to their availability.

Table 3: The Base-unit Simulation Results

	1	2	3
Δ% in	$\hat{J}$ =10%	$\hat{\pi}$ =10%	T=1% of GNP
W/P	0.56	-2.25	0.07
L_M	-5.14	-0.36	-0.62
L_N	5.57	-0.74	0.67
M	-4.30	-0.56	-0.52
N	4.79	-0.80	0.59

Table 4: The Simulation Results For Low- and High-Distortions Cases

	Low Distortions	High Distortions
	$\hat{J}$ =20%	$\hat{J}$ =75%
Δ% in	$\hat{\pi}$ =30%	$\hat{\pi}$ =200%
W/P	-6	-41
L_M	-11	-46
L_N	+9	+27
M	-10	-44
N	+7	+20

References

Berndt, E.R. and Wood, D.O., 1975, "Technology, Prices and the Derived Demand for Energy," Review of Economics and Statistics, Vol. 57, pp. 259-68.

Bruno, M. and Sachs, J., 1982, "Input Price Shocks and the Slowdown in Economic Growth: The Case of U.K. Manufacturing," Review of Economic Studies, Vol. 49, pp. 679-705.

Calvo, C.A. and Coricelli, F., 1992, "Stagflationary Effects of Stabilization Programs in Reforming Socialist Countries: Enterprise-side and Household-side factors," The World Bank Economic Review, Vol. 6, pp. 71-90.

CIA, 1989, Handbook of Economics Statistics, 1989, Washington, D.C.: Library of Congress.

CIA, 1990, The World Factbook, 1990, Washington, D.C.: Library of Congress.

Commander, S., 1992, "Inflation and the Transition to a Market Economy: An Overview," The World Bank Economic Review, Vol. 6, pp. 3-12.

Corbo, V., Coricelli, F., & Bossak, J., ed., 1991, Reforming Central and Eastern European Economies: Initial Results and Challenges, Washington, D.C.: The World Bank.

Corden, W.M. and Neary, J.P., 1982, "Booming Sector and Deindustrialization in a small open economy," The Economic Journal, Vol. 92, pp. 825-848.

Cungu, A. and Swinnen, J., 2003, “The Impact of Aid on Economic Growth in Transition Economies: An Empirical Study,” LICOS Centre for Transition Economics, Discussion Paper 128.

Desai, P., 1987, The Soviet Economy: Problems and Prospects, Oxford: Basil Blackwell.

Fardmanesh, M. and L. Tan, 2000, Structural impact of perfect competition and free trade in centrally planned economies: A sensitivity analysis, Papers and Proceedings of the Third Annual Conference of the Academy of Management in Lodz, Poland.

Fardmanesh, M. and L. Tan, 2003, Wage and price control policies in transition economies, Journal of Development Economics, Vol. 70, pp. 173-200.

Fischer, Stanly, 1991, “Economic Reform in the USS and the Role of Aid,” Brookings Papers on Economic Activity, Vol. 1991, No. 2, pp. 289-301.

Goldstein, M. and Officer, L., 1979, "New Measures of Prices and Productivity for Tradable and Nontradable Goods," Review of Income and Wealth, Vol 25, pp. 413-27.

Heckelman, J. and Knack, S., 2005, “Foreign Aid and Market-Liberalizing Reform,” World Bank Policy Research Working Paper 3557.

Jones, R.W., 1971, "A Three-Factor Model in Theory, Trade and History," In Trade, balance of Payments and Growth: Essays in Honor of C.P. Kindleberger, ed., Bhagwati, J.N., Amsterdam: North Holland, pp. 3-21.

Koropeckyi, S., 1981, Economics of Soviet Regions, Praeger Publishers, Praeger.

Kushnirsky, F.I., 1993, Achievements, Problems, Challenges, the Harvard Ukrainian Research Institute, Harvard University Press.

Lipton, D. and Sachs, J., 1990, "Creating a Market Economy in Eastern Europe: The case of Poland," Brookings Papers on Economic Activity, (1).

Marer, P., Arvay, J., O'Connor, J., Schrenk, M. & Swanson, D., 1992, Historically Planned Economies: A Guide to the Data, Washington, D.C.: The world Bank.

Spencer, M. H. and Amos, O. A., 1993, Contemporary Microeconomics, New York: Worth Publishers.

United Nation, 1990, National Accounting, New York.

United Nations, 1994-1995, and 2000, 2002, Economic Survey of Europe, Economic Commission for Europe (United Nations, New York and Geneva).

United Nations, 1995, 1996/97, 1998/99, 2001, Trends in Europe and North America, Economic Commission for Europe (United Nations, New York and Geneva).

Walker, J., 1989, "Microeconometric Modelling and Microeconomic Policy Analysis," in Current Issues in Microeconomics, ed., Hey, J.D., Current Issues in Economics Series, Vol. 1, pp. 209-35, New York: St. Martin's Press.

Weitzman, M.L., 1970, "Soviet Postwar Economic Growth & Capital-Labor Substitution," American Economic Review, Vol 60, PP. 676-92.

Zeuli, K.A. and Ruttan, V.W., 1996, “U.S. Assistance to the Former Soviet Empire: Toward a Rationale for Foreign Aid,” Journal of Developing Areas, Vol. 30, No. 4, pp. 493-524.