Can Korea Learn from German Unification?

Ulrich Blum

February 2011   No. 3

Can Korea Learn from German Unification?

Ulrich Blum

February 2011   No. 3

Author: *Prof Dr Dr h. c. Ulrich Blum*

              President, Halle Institute for Economic Research – IWH

              E-mail: praesident@iwh-halle.de

              Phone: +49 (0) 345 7753-700

Comments and suggestions on the methods and results presented are welcome.

IWH-Discussion Papers are indexed in RePEc-Econpapers and in ECONIS.

Can Korea Learn from German Unification?

Abstract

We first analyze pre-unification similarities and differences between the two Germanys and the two Koreas in terms of demographic, social, political and economic status. An important issue is the degree of international openness. "Stone-age" type communism of North Korea and the seclusion of the population prevented inner-Korean contacts and contacts with rest of the world. This may create enormous adjustment costs if institutions, especially informal institutions, change.

We go on by showing how transition and integration interact in a potential unification process based on the World Bank Revised Minimum Standard Model (RMSM) and on the Salter-Swan-Meade model. In doing so, we relate the macro and external impacts on an open economy to its macro-sectoral structural dynamics. The findings suggest that it is of utmost importance to relate microeconomic policies to the macroeconomic ties and side conditions for both parts of the country. Evidence from Germany suggests that the biggest general error in unification was neglecting these limits, especially limitations to policy instruments. Econometric analysis supports these findings.

In the empirical part, we consider unification as an "investment" and track down the (by-and-large immediate to medium-term) costs and the (by-and-large long-term) benefits of retooling a retarded communist economy. We conclude that, from a South-Korean perspective, the Korean unification will become relatively much more expensive than the German unification and, thus, not only economic, but to a much larger degree political considerations must include the tying of neighboring countries into the convergence process.

We finally provide, 62 years after Germany's division and 20 years after unification, an outlook on the strength of economic inertia in order to show that it may take much more than a generation to compensate the damage inflicted by the communist system.

Can Korea Learn from German Unification?

Zusammenfassung

Auch wenn die Ausgangsbedingungen der Deutschen Einheit und einer möglichen koreanischen Wiedervereinigung zunächst äußerst unterschiedlich erscheinen, ergeben sich aus ökonomischer Sicht einige Übereinstimmungen, gewissermaßen Muster, die es zu analysieren lohnt. Hierzu zählen die Interdependenzen zwischen weltwirtschaftlichen Integrationsprozessen, binnenwirtschaftlichen Anpassungen und den Aufgaben des Staats, den Einigungsprozess zu finanzieren und die Wirtschaft seinerzeit des Ostens, künftig des Nordens zu transformieren. Durch diese Interdependenzen ergeben sich Zwangspunkte, die im deutschen Einigungsprozess zum Teil negiert wurden und deshalb zu erhöhten Kosten führen mussten.

Der Beitrag beginnt daher, nach dem Darstellen der Ausgangsbedingungen entlang wesentlicher ökonomischer Zahlen, mit einer theoretischen Einordnung des Integrationsprozesses, der sich im Wesentlichen in den Veränderungen der Preisstrukturen ausdrückt, und der des Transformationsprozesses, der als Verschiebung der Transformationskurve der Wirtschaft gesehen wird. Dabei spielt die Mengen-Preis-Interaktion zwischen lokalen und international handelbaren Gütern eine herausragende Rolle. Im Anschluss werden die Beschränkungen des Transformationsprozesses in Bezug auf die Investitionsmöglichkeiten analysiert, die sich entlang eines Saldenmodells über die Ersparnisbildung und die Fähigkeit, auswärtiges Kapital zu mobilisieren, ergeben. Weiterhin wird verdeutlicht, in welch engem Maße die Notwendigkeit öffentlicher Transfers zum Unterstützen des Aufbauprozesses mit den Problemen, das Leistungsbilanzdefizit abzubauen, verbunden ist. Im koreanischen Fall werden diese Beschränkungen zu den wesentlichen Hemmnissen eines Aufbaus, wie dies bereits der deutsche Fall nahelegt.

Abschließend wird gezeigt, dass 62 Jahre nach Deutschlands Teilung und 20 Jahre nach der Vereinigung eine massive Pfadbindung der Entwicklung vorhanden ist. Sie zu überwinden ist eine Generationenaufgabe.

1   Introduction

Within a very short period the communist North Korea could become economically as unstable as it happened with East Germany twenty years ago. What has to be done in the case of unification? Germany just celebrated the 20th anniversary of unification. Sixty years ago, the Korean War started. If the stone-age-communist system in North Korea comes to an end, the Koreans can learn quite a lot from what has been done properly and what the errors were in the German unification process.

This learning has different dimensions:

- The starting conditions must be unveiled in a profound way in order to pave the way for proper policies. In the German case this implied that, in sharp contrast to the development in other reform countries of central Europe after the melting of the Iron Curtain, a large rich country was merged with a comparatively smaller and poorer economy. In order to maintain stability and limit large-scale inter-regional migrations, the economic retooling of East Germany had to be accelerated and minimum levels of welfare had to be publicly guaranteed.

- From a theoretical perspective the micro- and macro-economic implications must be analyzed. Transition from a centrally planned economy running on an outdated technology implies that the production potential of the economy falls – more for tradable goods than for non-tradables. International market integration implies that relative prices change; usually, this favors non-tradables. Finally, investments in the retarded unification areas increase demand above the level of supply. Whereas communist systems by-and-large tried to achieve some degree of autarky, at least in their economic cooperation structures, market systems tend to be globally open. Thus, output gaps emerge – often combined with gaps in public finances because of subsidies for the unification areas.[1] In fact, as the German case shows, the de-facto revaluation that results from a currency union implies the devaluation of physical and human capital. Thus, the options of other reform countries to accept an adaptation inflation to eliminate the monetary overhang and devaluate to gain competitiveness is not open.

- As a result, large private and public transfers are necessary and often intertwined, e.g. as investment opportunities are improved by granting considerable subsidies. In case of East Germany, most of these incentives were capital oriented. They increased productivity and provided for the rise in wages, but also led to large-scale labor shedding. The necessity to mobilize capital markets

---

[1]   We name the North Korea (and East Germany respectively) "unification area" or "unification twin" and South Korea (and West Germany respectively) "market area" or "market twin". Both parts taken together are the "unified country".

has led to increases in interest rates, made investments in Germany more attractive, revalued its currency and were part of the stimuli that led to a crisis of the European Monetary System in 1993 that preceded the Currency Union in 1999. The overwhelming share of transfers, however, was dedicated towards the stabilizing of the welfare and the social security system. Potentially adverse effects thus have to be included in any analysis of transition.

- By entering the Euro at a revalued level – contrary to the fact that Germany, on average, had become economically weaker (on a per-capita basis some 14%) and should have devalued, the whole economy underwent a productivity stress to reduce unit labor costs – which today is a source of export success but also tensions in the Euro area.

- From an empirical perspective, unification is a "business investment" making use of until then under-utilized human and capital (especially natural) resources. Not only private investments which function on a profit-oriented basis but also public deficits as a result of unification costs must be compensated by tax receipts in the long run. This may relate to the economy of the unification area itself, but also for the whole country.

- Finally, the initial economic conditions, the starting conditions given by the institutional framework of the transition process and the development hereafter define the development trajectory. All trajectories have points of no return in directing development, especially adverse lock-in effects.

This paper analyzes unification economics within the framework of transition effects – given by changes in the production and technology sphere – and the integration effects – described by changes in relative prices. These micro effects are complemented by macro-effects on public finances and the foreign exchange position. This approach was used by GREINER, MAAS and SELL (1994), BLUM and SCHARFE (2002) and BLUM (2009). Thus, we start in the second section with a brief overview over the two parts of pre-unification Germany and presently divided Korea. We further give a brief (comparative) historical overview of East Germany's pre-unification economic development in order to show the main problems of unification and roll out a reference structure. We propose reduced "minimum variable" economic transition and integration models in the third and the fourth section. The fifth section takes up the issue of unification economics in Germany. We provide evidence for the validity of the theoretical structure and identify the (short- to medium-term) costs and long-term opportunities. In the sixth section, we reference these results against the Korean reality. We end in the seventh section with an outlook in order to show, how important the strategic thinking in terms of trajectories – and lock-in effects – is.

2 Germany and Korea: Status and History

2.1 Brief Comparison

Historically North Korea was more industrialized than the South. With the opening of China under Zhou Enlai and Deng Xiaoping in the seventies of last century, and accelerated by the melting of the Iron Curtain, its unwillingness to follow a path of reform made the dependency on "socialist trade" and a high level of economic self reliance ("*Juche*") had become a first rate obstacle to development.[2] In fact, output declined over years only resumed recently, as Figure 2.1.1 shows.

Figure 2.1.1:
Development of Soth and North Korean Output
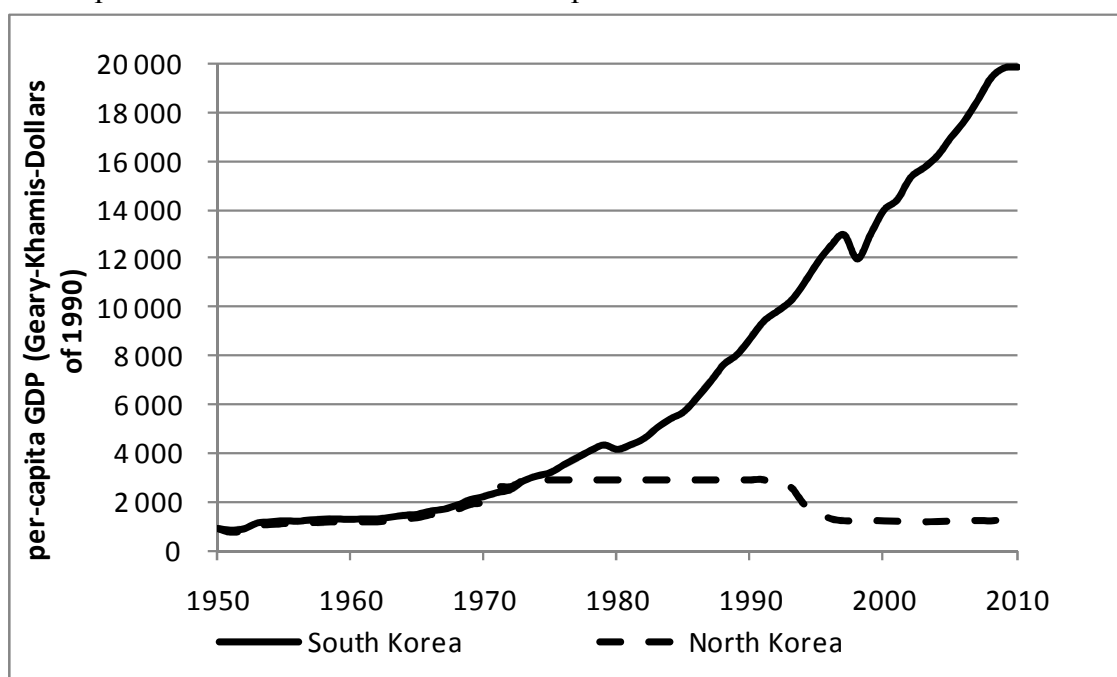
Sources: Values taken from Maddison, 2007, until 2003 prolongated with growth rates from CIA World Factbooks to 2010.

In Germany industrialization in the West and in the central part which today is East Germany was about equal. At the eve of unification, the East included about one fourth of the combined population, in North Korea this is presently about one third. Before unification, East Germans produced about one third of the per capita output of West Germans in terms of PPP, but only one fifth in terms of external value[3]; in North Korea the share is 6% if measure in PPP and in terms of external value. If we look into the age structure, North Korea is younger because of a higher birthrate and a higher mortality –

---

2 For an overview of economic developments until 2007, see *Wrobel* (2007).

3 The external value is measure by the "direction coefficient ("Richtungskoeffizient", RiKo; see Footnote 5 and *Schürer et al.* (1989)

similar to East Germany before unification. The most important difference is that East Germany at the eve of unification was considerably more included into international trade than present communist North Korea which organizes most of its trade via China and the special economic zones managed by South Korea. In addition North Korea is rather cut off from the world communication system. Kim Yong Il's people cannot watch southern radio or TV emissions for reasons of technological incompatibility. The North Korean data shown in Table 2.1.1 is rather vague in terms of credibility. Errors are programmed because of the use of Material Product System (MPS) as a means of aggregating economic performance indicators, as communist regimes tend to forge data and as markets are missing.[4]

Table 2.1.1:
Population and GDP Data for Germany (1989) and Korea (2009)

	East Germany	West Germany			North Korea	South Korea
Population (m)	17	65	Population (m)		24	49
per capita GDP (€, RiKo)	5 469		per capita GDP (US-$, exch. rate		1 167	20 129
GDP (m €, RiKo)	90 246		GDP (m US-$, exch. rate)		28 000	986 300
per capita GDP (€, PPP)	8 322	25 160	per capita GDP (US-$, PPP)		1 667	29 340
GDP (m €, PPP)	137 313	1 622 791	GDP (m US-$, PPP)		40 000	1 437 660

Source: BLUM, 2011;, MADDISON, 2007; CIA.

The hard separation and the Korean War, a civil war, have estranged both parts considerably. However, the South knows that it cannot oppose unification if the system in the North changes – collapses in the worst case. Differently to the East German Politbureau system, the heritable leadership might be more volatile. But even the East German system broke down within weeks, caused by the misinterpretation of a press release by SCHABOWSKI on Nov. 9th, 1989, that accidently opened the wall.

2.2   A Short Economic Biography of East Germany

If we want to explain the development of the East German economy, the comparison of East German to West German output is one possible and widely accepted approach, if a reduction to one single indicator is wanted. This implies that a method must be found to convert socialist/communist accounting from the material product system (MPS) to the system of national accounts (SNA) of market systems. Different approaches are possible, for instance

- the revaluation of MPS or SNA quantities with market values: This, however, ignores all we know about price-quantity (-quality) interdependencies and leads to an overvaluation of highly subsidized local goods in markets in contrast to internationally tradable goods, especially with high technological content, which were underrepresented in the consumer basket because they were extremely

---

4   For North Korea see *Marumoto* (2008). Problems of translating East German output data into market data are discussed by *Blum* (20011) and referred to later in the text. *Ludwig and Stäglin* (1997) have done a formidable task in recalculating output of East Germany in its last years of existence.

costly or non-existent in communist countries. Such an approach with sets of deflators was used by RITSCHL and SPOERER (1997) or LUDWIG, STAHMER and STÄGLIN (1996).

- the correction of aggregates of output with the international value of goods: East Germany calculated for its products how many East German Marks were necessary to earn one West German Mark. This value was 1.86 in 1979 and rose to 4.6 in 1989. The latter value implies that East Germany had about one fifth of the external productivity of the West (SCHALCK-GOLODKOWSKI and KÖNIG 1988). The correction with the international value restricted to tradable goods implied an overall level of productivity of one third of the West (FILIP-KÖHN and LUDWIG 1990).

- the quality correction of products assuming that a strong decay in quality can be identified and, thus, output is exaggerated; in the nineties, this phenomenon was addressed by the US Senate with a view on the adaptation of pensions to inflation (BOSKIN *et al*. 1998).

In two previous papers BLUM and DUDLEY (1999, 2000) followed the last approach and addressed the problem of quality changes in the East German economy versus the West German economy. Quality may be measured by a comparison of the incremental output-capital ratio in the planned economy to that of a benchmark measure in a market economy, i.e. the West German economy. The fundamental idea is that East German output, if measured at world market prices, would deviate from local prices, and the difference should be the impact of quality. As the latter is not directly observable and assuming that the ability of an economy to reproduce itself depends on the quality of output and, thus, investment goods, a fall in the quality of the former will reduce growth of the latter in terms of a world market quality. By relating East German to West German IOCR, a measure of quality decay is obtained. This accounts for the well known facts that many products in the fifties were rather similar, as they often shared common ancestors, e.g. cars or radios. In the seventies, a Trabant and a Golf represented distinctly different products – and technologies. Using this ratio of functions of the incremental output-capital ratio, they have corrected East German output values. Further corrections were applied in order to include non-productive sectors such as services (BLUM 2011). If we compare the quality measure obtained from IOCR calculations to the external value of the East German output, the direction coefficient ("Richtungskoeffizient", RiKo), we see a common tendency – more continuous for the quality measure, more disruptive for the RiKo.[5] Figure 2.2.1 shows the two variables.[6]

---

[5] The 1970 numeric value of the RiKo was 1.86 which is taken as 100% to make in comparable to the ICOR in the chart; it rose, until 1989, to 4.6 . For calculations on East Germany see *Blum* (2011).

[6] Note that the IOCR is not to be confused with the AOCR – the average output capital ratio. This "confusion" has lead to fundamental misappraisals of East Germany's economic potential by the Treuhand.

Figure 2.2.1:
Quality Control and External Value of East German Output
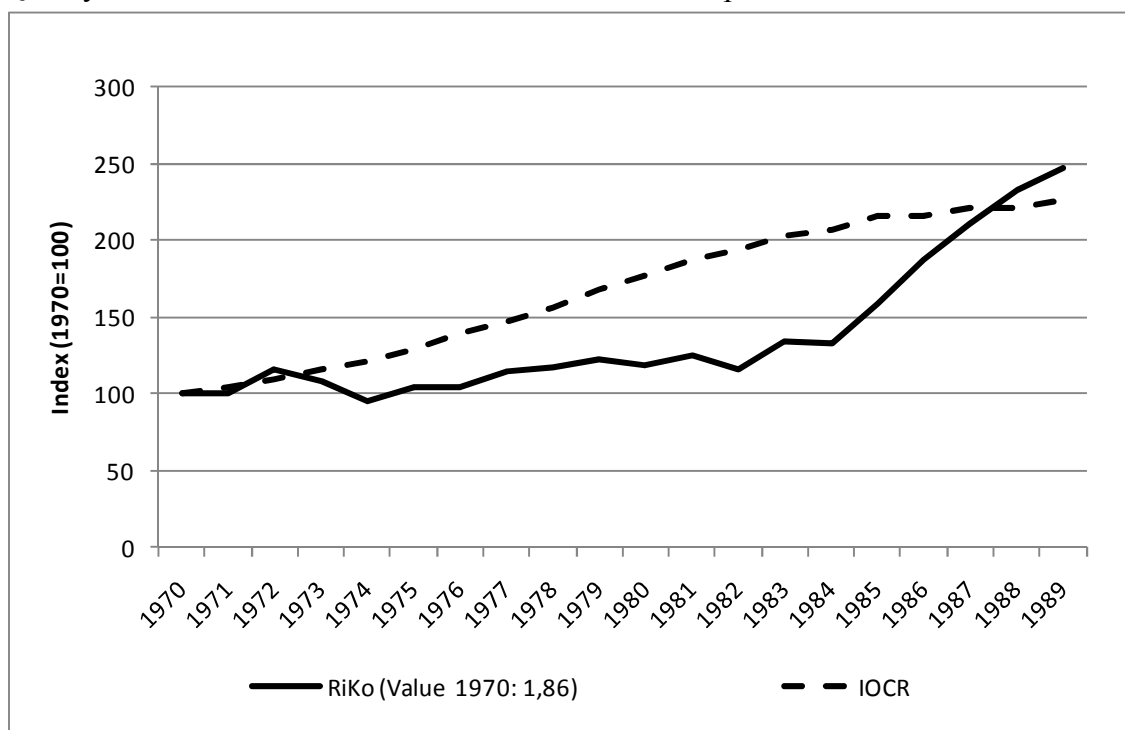
Source: BLUM, 2011.

East German output fell deeper after WW-II because of autarky policies, the adverse economic situation and reparations to the Soviets (SLEIFER 2006). It reached its highest value in the early seventies: In 1972, HONECKER took over from ULBRICHT, centralized the economy and expropriated the rest of middle-class industrial firms. The latter were about 50% more productive than the rest of the combines ("Kombinate") and responsible for a sizeable share of foreign cash earned in western markets, e.g. consumer goods in mail order houses. In addition, COMECON countries did not find an answer for coping with the fundamental changes in the resources' markets, beginning with the oil crisis of 1973. In 1981/82 East Germany was saved from a current accounts crisis by Bavarian Prime Minister STRAUß with a loan negotiated with East German director of commercial coordination, SCHALCK-GOLODKOWSKI.[7] In late summer of 1989, an East-German expert group (SCHÜRER et al. 1989) came to the conclusion that, to save East Germany, either exports must be vastly expanded, which was considered impossible given the products, or income must be lowered by one third, which was considered to produce public unrest, or the system should be given up – which, in fact, happened.

---

[7]   In fact, this saved East Germany from bankruptcy and was motivated by the will not to distort détente and the Helsinki process in Europe – until, in 1988, the same conditions as in 1982 led to the regime's collapse; see *Blum* (2011), *Schalck-Golodkowski* (2000), *Strauß* (1989). East German current accounts were recalculated by *Deutsche Bundesbank* (1999).

Figure 2.2.2 portrays per-capita income (GDP) developments of the Germany. It also shows that, from 1990 onwards, East German output exploded as an initial adaptation to market prices and from the huge investments, especially in the infrastructure. During the ten years after 1997, the distance to West German output did not close because internal changes in output and employment structure. The decline of construction activities was compensated by industrial expansion. Today, the gap is starting to close further; this will be a slow process because the main factor is a pronounced difference in headquarter structures that is responsible for some 15 % of the output gap (BLUM 2007). We will discuss the convergence issue in the next part and come back to these developments in the fifth section.

Figure 2.2.2:
Development of Per-Capita Income in Germany
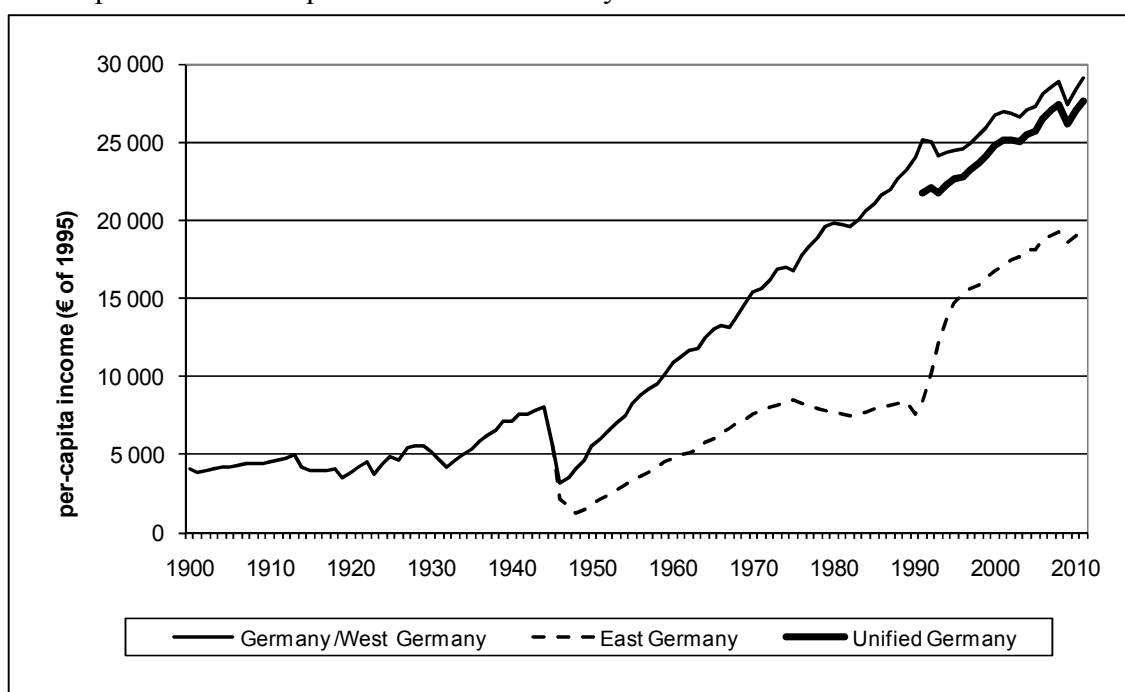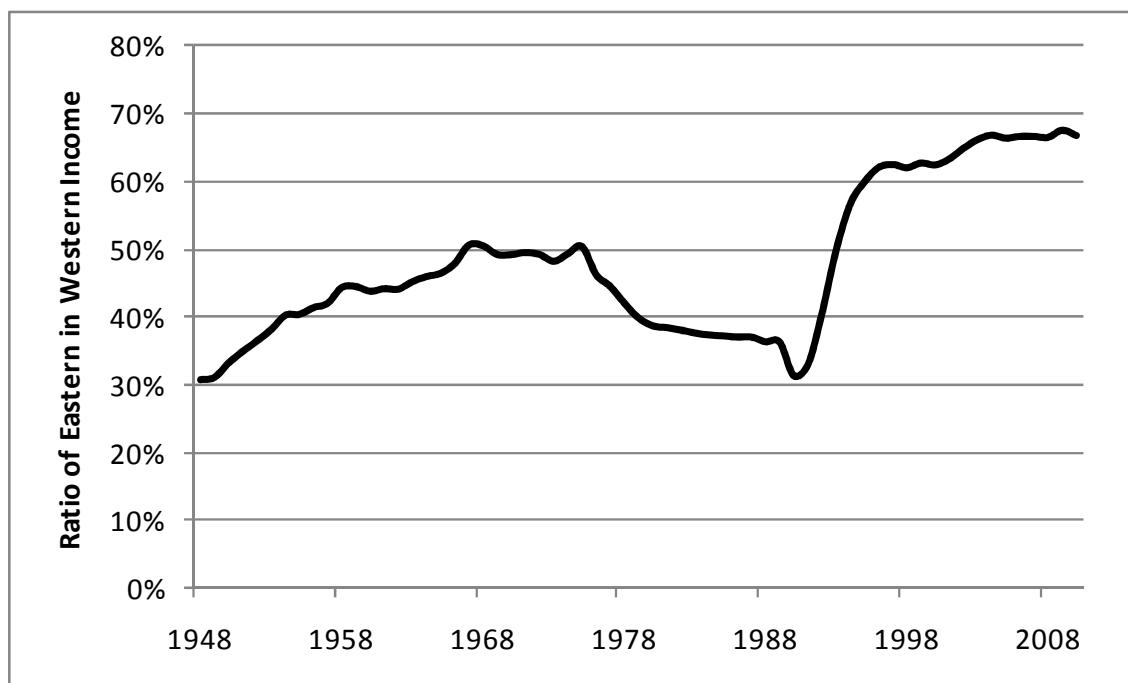

Source: BLUM, 2011.

2.3 The Convergence Issue

The standard framework to deal with the ability to and the speed of closing the income (or more generally: the development) gap is the neoclassical convergence model. Shortly after unification, first estimations showed that the speed was much above the level of 2% proposed by many authors such as BARRO and SALA-I-MARTIN (1995).

For instance BLUM and DUDLEY (1998, p. 135) pointed to a speed, in the first years, of around 15 %. However, this slowed rapidly and fell to a rate below 2% for the last years of the nineties until much into the new millennium, as Figure 2.3.1 shows. In fact, given the transition problems, many interregional trade patterns[8] observed between "normal" economic regions that constitute the usual modeling framework were hardly applicable; especially price systems were still distorted from pre-unification times (BLUM 1997). The most interesting prices, costs of capital, interest rates and, included herein, risk premiums, were hardly credible given the huge incentive systems. This sets limits to neoclassical growth and convergence analyses as proposed by FUNKE and STRULIK for Germany (2004) and for Korea (2005). They see an 80% convergence for Germany until 2010 to 2020 depending on the level of public infrastructure investment and, for Korea, given that no foreign borrowing constraint exists, about one generation. LEE (1993) foresees a period of 40 years until North Korea catches up with the south if the total additional GDP generated by growth in the south – some 6% per year – is invested in the north. In fact, based on the development over the last 20 years, SCHEUFELE and LUDWIG (2009) see 50 years until East Germany has economically fully converged to West German levels. An annual investment of 12% of South Korean GDP is necessary, according to WOLF (2006) only to double North Korea's GDP over a period of 4 to 5 years.

Figure 2.3.1:
Divergence and Convergence of East Germany, 1948 – 2010

---

8   See *Blum* (2003) for a discussion of the different approaches.

3. The Revised Minimum Standard Model (RMSM) of the World Bank and its Adaptation to Transition and Integration: a Macro View on North Korea

3.1 Historical Background

Dornbusch has traced the origins of general equilibrium, macroeconomic modeling to publications during the early 1950s by Harberger (1950), Laursen and Metzler (1950) and Meade (1951): "The main point to emerge was the recognition that the balance of trade equals the excess of income over spending. Accordingly, the analysis of various disturbances in their trade-balance effects could not bypass an explanation of the aggregate income-expenditure balance." (Dornbusch 1980, p. 4)

This set the path for the quantitative policy analysis by the International Monetary Fund (Polak 1957) and the Revised Minimum Standard Model (RMSM) by the World Bank (1980). The former links the financial sector with the balance of payments in the monetary approach to the balance of trade. Balance of payments problems are caused by an excess of nominal demand over nominal domestic production. The model has since become the standard tool of analysis for IMF-directed stabilization and adjustment programs (Khan et al. 1990). The RMSM focuses on real variables in the medium-term by linking, within a national accounting framework, the balance of payments to components of domestic demand and supply (Addison 1989). It is based on the two-gap growth models in the Harrod-Domar tradition originally proposed by Chenery and Bruno (1962) and Chenery and Strout (1966). They stress that investment (and thus growth) are short-term constrained by internal savings and the ability to attract foreign capital – which corresponds to import capacity. The latter, again, depends on consumption levels and the productivity of investment. It was extended further into three-gap models by Bacha (1984, 1990), Chisari and Fanelli (1990), and Taylor (1993), where the third gap is a fiscal one, i.e. the level to which taxes collected exceed public consumption. The model has ever since mostly been used for analyzing poverty issues (Reimer 2002; Ranaweer 2003; Kraev, Akolgo 2005). The growth of an economy thus depends on the constraints or gaps: private savings, foreign borrowing and public savings.

Frequent failures in the application of these models when implementing stabilization and liberalization programs have often been attributed to the apparent lack of realism (Lächler 1988; Dell 1982). But this weakness is an important strength in the context of transition economics and policies as only the large macroeconomic aggregates can be properly observed. In the case of North Korea (and historically East Germany), the patchiness of data and the fact that much of the data is derived from a period of transition and pre-transition, would render an analysis based on econometrically estimated parameters unreliable. Although the model has well-identified weaknesses that will be dis-

cussed in subsequent sections, "no other model of aid and growth has arisen to take its place." (EASTERLY 2003, p. 33).

3.2 Adaptation to Transition Economies

The following exposition of the RMSM largely relies on a seminal discussion by the IMF staff members KHAN, MONTIEL and HAQUE (1990). The model rests on five core propositions. Firstly output, Y, is a linear function of the level of investment (change in capital stock) through a historically or technologically given incremental capital-output ratio (ICOR), ρ, which may include elements from the pre-unification and elements from a "latest" technology, and thus change over time:

$$\Delta Y = \rho^{-1} \cdot \Delta K \tag{1}$$

Secondly, exports, X, are exogenously given:

$$X = \overline{X}, \tag{2}$$

where the bar over the variable indicates that its value is autonomously given and beyond the reach of policy makers. Thirdly, import demand, M, is a linear function of production via a constant marginal propensity to import, m. This yields the import demand function:

$$M = m \cdot Y \tag{3}$$

Private sector savings, S, are a linear function of real disposable income, $Y - \hat{T}$, via a stable historically given savings rate, s. This provides the implicit function for private consumption, C_P:

$$C_P = (1 - s) \cdot (Y - \hat{T}), \tag{4}$$

where the hat over a variable indicates its amenability to policy measures. Finally, the standard national accounting identity for an open economy is assumed with C_G as public consumption:

$$Y - C_P - \Delta K - \hat{C}_G = \overline{X} - M . \tag{5}$$

Re-arranging and introducing the tax wedge, $\hat{T}$, and assuming that public consumption can be steered by politics, the balance of payments constraint in (5) can be written as the condition that domestic investment is the sum of private savings, public savings and the inflows of foreign savings:

$$\Delta K = \left(Y - \hat{T} - C_P\right) + \left(\hat{T} - \hat{C}_G\right) + \left(M - \overline{X}\right). \tag{6}$$

Substituting for private consumption and import demand and collecting output terms, Y, gives the investment function:

$$\Delta K = (s + m) \cdot Y + (1 - s) \cdot \hat{T} - \hat{C}_G - \overline{X}. \tag{7}$$

This demand-oriented representation of the balance of payments constraint provides for a positive relationship between domestic investment and output. This is because higher output increases domestic savings via s and leads to an increased inflow of foreign savings via the marginal propensity to import, m. Domestic investment is also a positive function of taxes, $\hat{T}$, since for a given level of government consumption, $\hat{C}_G$, higher taxes increase public savings. The reverse applies to the relationship between domestic investment and government consumption for a given level of tax revenue. Finally, higher exports, $\overline{X}$, i.e. foreign demand, reduce domestic investment[9].

Re-arranging the output equation in (1) yields a supply-oriented representation of investment, once again as a positive function of output:

$$\Delta K = \rho \cdot Y_t - \rho \cdot Y_{t-1}. \tag{8}$$

For given parameters, ρ, s and m, the equilibrium combinations of domestic investment and domestic output depend on the two policy variables government consumption, $\hat{C}_G$, and taxes, $\hat{T}$. Moreover, the monetary counter-part to the inflow of foreign savings are changes in net foreign debt, ΔB:

$$\Delta B = M - \overline{X}. \tag{9}$$

Figure 3.2.1 taken from KHAN, MONTIEL and HAQUE (1990) illustrates the system. In the output-investment space the supply-oriented investment relation in (8) is represented by the aggregate supply curve (AS) while the demand-oriented investment relation in (7) is represented by the aggregate demand curve (AD_0). Because ICOR values, ρ, in international comparisons range between 4 and 7 (KHAN et al.1990) and the parameters s and m are strictly positive fractions of one, the AS curve is much steeper than the AD curve.

---

9   This apparently counter-intuitive notion is the exact counterpart to the positive dependence of domestic investment on imports via the marginal propensity to import, m. It derives from the national accounting identity in 5 that can be re-written as setting domestic savings equal to domestic investment plus the inflow of foreign savings, i.e. Y-(CP + CG) = ΔK + (X-M). Then the negative impact of higher exports on domestic savings can be interpreted in ex post fashion as the result of constant domestic savings, i.e. constant left-hand side of the equation, and a compensating negative variation in ΔK on the right-hand side of the equation to ensure equality.

Figure 3.2.1:
Policy Options in the RMS Model
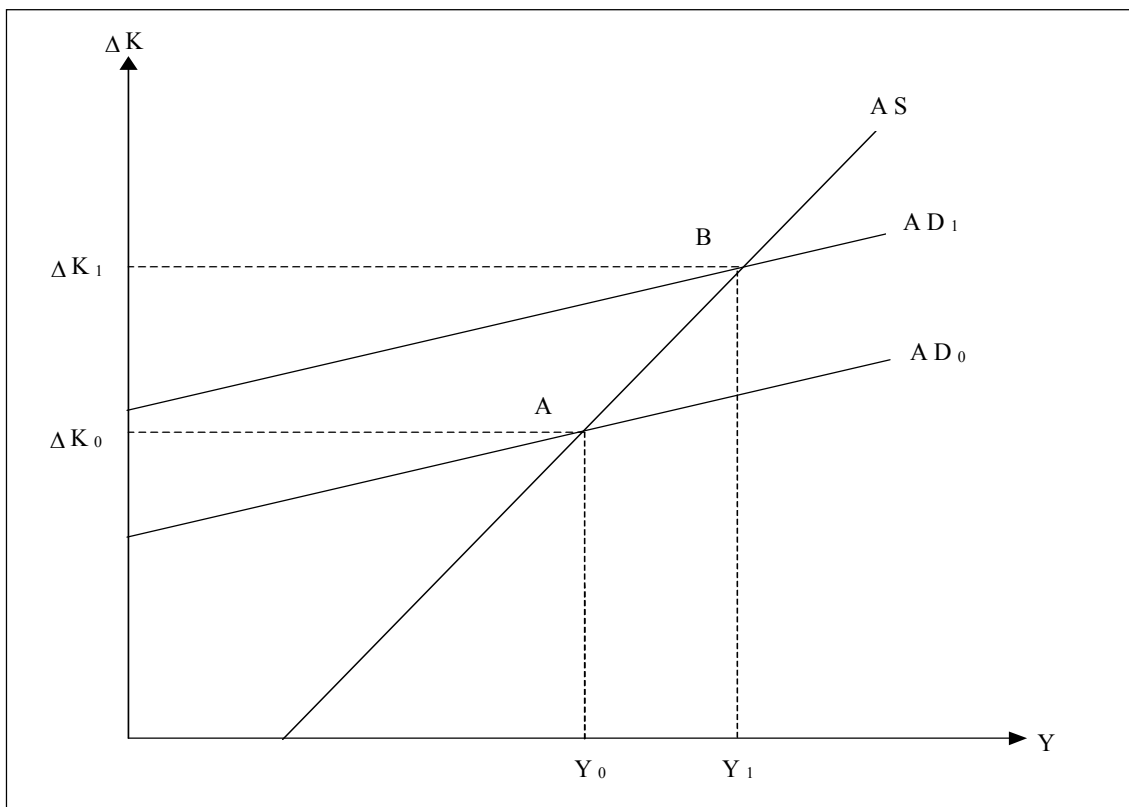
Source: KHAN, MONTIEL and HAQUE, 1990.

An upward shift of the *AD₀* curve to *AD₁* yields higher equilibrium values for invest-ment and output and can be achieved through a *ceteris paribus* reduction in government consumption or a *ceteris paribus* increase in taxes. But this also implies a faster increase in the level of net foreign debt.

The more output can be generated with investment, the flatter would be the AS-line. The inability to borrow abroad may then constrain the economy. If increased investment reduces marginal productivities (IOCRs) under conditions of constant technologies, the AS-line will become steeper and increase the costs of further expansion.

This system of equations gives rise to the two-gap model if there are limits to foreign borrowing. This did not pose problems in the German context – although borrowing drove up interest rates and had domestic price effects. Then the increase in net foreign debt $\Delta \overline{B}$ (the foreign exchange gap) is determined autonomously and in addition to the savings gap. The savings gap is derived from an excess of domestic investment, ΔK, over domestic savings, $Y - \left(C_P + \hat{C}_G \right)$. An over-determinacy of the model results as there is no reason to assume that in general the domestic savings gap, $Y - \left(C_P + \hat{C}_G \right) - \Delta K = \left(\overline{X} - M \right) = \Delta B$, equals the maximum possible level of foreign borrowing, $\Delta \overline{B}$, i.e. that the condition in (9) holds exactly. Therefore,

- if the increase of foreign debt exceeds the trade deficit, $\Delta \overline{B} > m \cdot Y - \overline{X}$, then the savings gap constrains the economy; this situation may be valid for countries with an extremely attractive economic environment for investments;

- if the increase of foreign debt falls below the trade deficit, $\Delta \overline{B} < m \cdot Y - \overline{X}$, then even savings cannot balance the (ex ante) equilibrium condition; then the foreign debt gap constrains the economy.

Note that these arguments are valid *ex ante* for programming purposes as condition (7) will always hold *ex post*.

For programming purposes the World Bank removes the over-determinacy by endogenizing some of the variables. In KHAN, MONTIEL and HAQUE (1990) imports and exports are made dependent on the nominal exchange rate, $\hat{E}$. Then (2) and (3) become

$$X = c \cdot \hat{E}, \tag{10}$$

$$M = m \cdot Y - b \cdot \hat{E}, \tag{11}$$

where c and b are parameters that translate changes of nominal exchange rate changes into export and imports.

In order to use the RMSM for an analysis of Korea's economy, this extension should be modified because North Korea's exchange rate will be fixed vis-à-vis South Korea.

Thus the export potential of North Korea with respect to South Korea is determined by its internal price level vis-à-vis that of South Korea, and its international export potential vis-à-vis the rest of the world. HARBERGER (1950) defines the real exchange rate as the ratio of tradable to non-tradable prices:[10]

$$e = \frac{p_T}{p_{NT}}. \tag{12}$$

Finally, endogenously determined exports as given in (10) and (12) are split into two parts, intra-Korean, X_K, and international exports, X_I, and substituted for exogenous exports in (7). The same is exercised with imports, M_I and M_K.[11] Assuming

$$X = X_K + X_I = \gamma \cdot e_K + \gamma \cdot e_I = \gamma \cdot (e_K + e_I) = \gamma \cdot e, \ \gamma > 0, \tag{13}$$

$$\begin{aligned} M = M_K + M_I &= m \cdot Y - \beta \cdot e_K + \beta \cdot e_I \\ &= m \cdot Y - \beta \cdot (e_K + e_I) = m \cdot Y - \beta \cdot e, \ \beta > 0, \end{aligned} \tag{14}$$

---

10 Note that prices for tradables should be internationally uniform, only varying because of transaction cost that cannot be eroded by competition, i.e. transport costs.

11 In fact, the composition of exports could change over time as eI should vary more than eK.

the extended equilibrium condition is obtained:

$$I = \Delta K = (s + m) \cdot Y + (1 - s) \cdot \hat{T} - C_G - (\gamma - \beta) \cdot e \,. \tag{15}$$

Investments in North Korea are thus positively determined by income as higher savings and imports yield investment capital (domestic and foreign savings), and by the surplus of taxes collected over public consumption (especially important for infrastructure investment). This restriction may ex-ante be eased by public transfers, but (14) will always hold ex-post; at the limit, price levels in North Korea would increase and crowd out private capital imports via the term $(\gamma - \beta) \cdot e$, or through allocation inefficiency[12]. Imports will be the most important driver of investments as a large savings rate cannot be expected. Exports as equivalent to capital outflow reduce internal investment. Given a revaluation tendency for the whole country under monetary union, this restriction should become weaker as international import shares increase and international export shares fall, i.e. $(\gamma - \beta) \cdot e$ might even become negative for Korea as a whole, thus running a current accounts deficit.

3.3 Adverse Effects of Economic Policies Enhancing the Transition Speed

The framework of the extended RMSM given in formula (15) provides interesting arguments on the effects of economic policies meant to speed up the transition process; it relates to the relationship between the slope of the supply function, AS, given by incremental capital-output ratio (ICOR), ρ, and the slope of the demand function AD, given by *(s+m)*. There are conditions under which equilibrium is not possible.

- If transfers rushed in are not able to finance investments, *(m+s)* can exceed the value of unity because in the first years of reconstruction total demand will exceed production considerably. In East Germany, the initial savings rate was 12,2% in 1993 (DEUTSCHER BUNDESTAG, 2001, p. 2); the share of import in GDP of this year was about 35% and the export share was some 15%. Most of the financing came from transfers – about 50% of East German GDP. In this year implied that total demand exceeded production by 65%.[13] The role of transfers thus needs to be assessed.

- It is not entirely clear how to measure the ICOR in a transition economy, especially if its capital stock is collapsing because of a three- to fivefold revaluation of the currency with monetary union. ICOR could fall below unity and make equilibrium, as proposed in Figure 3.2.1, impossible. In East Germany, investments where, in the first years, around 50% of output, but annual output growth was highest between 1993 and 1994 – some 15% – and fell hereafter. Thus low

---

12 Note that transfers from the outside are not yet included in this approach; see Section 5.

13 Values calculated from *Blum, Scharfe* (2002) and *Blum et al.* (2009).

ICOR values should not pose a problem if the country is not economically collapsing.

- The link between formulae (7) – or (15) respectively – and the three gaps could be vague, as EASTERLY (1999, 2003) shows. It is only guaranteed under conditions of full capacity utilization (ROBINSON 1978). Otherwise, a programming could become impossible. Finally, volatile coefficients (which would then not be parameters but variables) could also pose a problem as would artificially reduced estimates of the stock of capital that suggest a lower level of investment than the one really needed for expansion (GABRISCH 1994). In fact, one of the major empirical questions to analyze is whether the relationships established under the RMSM also hold for unifications such as Germany's – and potentially Korea's. Large-scale public transfers from the outside could play a decisive role. Thus, the next sections also deals with the role of transfers in the transition process.

4 Transition and Integration in the Salter-Swan-Meade Context: a Micro View on North Korea

4.1 Phases of Adaptation in Transition

In the preceding section the macro-economic constraints of a transition process were modeled. Among the major findings were that the potentials to retool the economy of the unification twin strongly rely on investment in the capital stock and in the infrastructure. At the limit, this implies that – as in the case of Germany – a trade surplus turns into a deficit to generate the necessary commodity flows into the (Eastern) country and, simultaneously, the mobilization of transfers or direct investments to finance them. If a debt constraint holds because of an unsound fiscal policy or if the task to be accomplished is viewed as too ambitious, then the investment process will be slowed down. Finally, monetary policy, i.e. revaluation in the face of inflation risk because of public spending programs that address unification costs, could ease the foreign exchange constraint.

In the following, the changes in output, separated into tradables and non-tradables, and relative price changes that direct the real exchange rate (see Formula 12) are analyzed for the unification area. Microeconomic adaptation processes from a unification shock tend to follow distinct phases and exert distinct macroeconomic restrictions:

- The revaluation of the currency: For political reasons, exchange rates with the rest of the world will rise within the institutional framework of a monetary union as huge deficit spending necessities will force the central bank to increase interest rates to limit inflation. This will generate sufficient capital transfer and imports. This again serves as an attraction for inward capital flows.

- The emergence of a current accounts deficit: Between the unification twin and the market twin a transfer economy will develop because of large public subsidies to the social security and the welfare system that reduce out-migration pressure. They are complemented by private capital flows for investments and by public payments to stabilize the bureaucracy and retool the infrastructure.

- The infection with "Dutch disease": As transfers and capital imports make demand rise above the production potential and lead to rises in the prices of local goods and the underlying wage. This finally contaminates the whole labor market; especially construction activities where most of the value added cannot be imported are critical, as they will expand for sheer necessity and as a way to stabilize the collapsing labor market in the manufacturing sector. Firms producing tradable goods may find it hard to hold on against the wage pressure. Their

competition position comes under pressure, an endogenous de-industrialization on and above the normal "transition adaptation" emerges.[14]

- The stabilization crisis: It starts with the bursting of the construction bubble once infrastructure and housing investment ends have been achieved. The price level of non-tradables will fall and give way to the normalization of the economy, i.e. the final expansion of tradable industries.

4.2   The Initial Transition Shock

Let us start by assuming that North Korea is close to equilibrium because of its "*Juche*" policies of self reliance.[15] This is reasonable to assume because of restrictions to foreign borrowing (i.e. $\Delta B = 0$). In the SALTER-SWAN-MEADE diagram[16], the situation is depicted as shown in Figure 4.2.1: Two goods are produced by the economy, tradables and non-tradables. The loci of production and demand ($D_0=P_0$) are given by the tangential point of the absorption-production line ($A_0=S_0$), whose slope is defined by the relative prices of tradables and non-tradables, and the production frontier. Assuming homothetic utility in the economy, the income-consumption function which is also known as expenditure function (Y_0) is a straight line from the origin that intersects at $D_0=P_0$.

Generally speaking, resources, industrial products and agricultural products are "tradables" as are some services; in the case of transition countries such as East German and, potentially, North Korea, a large share of the industrial products is not tradable for quite some time as these products would not have an outside market. Resources will be attractive for export – and for international investors. With unification, currency must be re-valued in terms of labor costs by the factor that represents the welfare level – some 60 % of the average earnings of the market economy twin. In case of East Germany, the factor was about 5, in case of Korea, it would be at least 15.[17] As a consequence of revaluation, the production frontier[18] shrinks and the relative price of tradables falls. The expenditure function moves counterclockwise to account for cheaper tradables. The consumption-absorption line moves clockwise as the relative price of tradables falls and separates from the production frontier to account for an excess demand generated by the

---

14   See *Greiner, Maass, Sell* (1994) for a first analysis on Germany, or *Blum and Scharfe* (2002) for the calculation of current account deficits.

15   Exports were some 2 b $ and imports some 3 b $ in 2009 (CIA).

16   See *Greiner, Maas, Sell* (1994) for an application for East Germany

17   Note that public expenditures in communist countries are mostly financed by surplus from the economy, not by taxes. Especially social security contributions do not exist. Thus, the "tax and contribution wedge" must be added to the net revaluation to obtain cost increase levels for the industry.

18   Note that the production frontier is assumed to be concave which is crucial to the argument. In a recent analysis, *Blum and Dudley* (2000) have estimated production functions for East Germany for 1949-1988 and have found that they are homogenous of degree less than unity; the sum of elasticities of the best equation is 0.58 (investments, capital and labor) and 0.67 if structural variables (subsidies and industry concentration index) are included. Estimations of production functions of 1994 show a degree of homogeneity below unity (*Blum* 1997)

first round of transfers. The price of tradables – especially imports – may fall even further if the subsidies for the unification twin are financed by public debt taken up by the market twin and countered by an increase of interest rates by the central bank to fight inflationary pressure. This leads to the absurd situation that a country that should devalue because, on average, it has become economically weaker, in fact revalues. This is compatible with the necessity to import capital for investment in the unification twin and a reduction of exports reoriented to the internal markets.

Comparing the new loci D_1 and P_1 to D_0 and P_0 in Figure 4.2.1, it is obvious that production in the unification twin falls and – relatively – shifts towards non-tradables, and that demand shifts towards tradables which favors imports. As a consequence, a normal reaction develops internally: a trade deficit between the unification twin and the market twin opens and labor shedding in industries for local and for tradable products occurs. Investments must, to a large degree, be nurtured through imports.

Figure 4.2.1:
Adaptation Crisis of Transition and Integration in the Unification Area
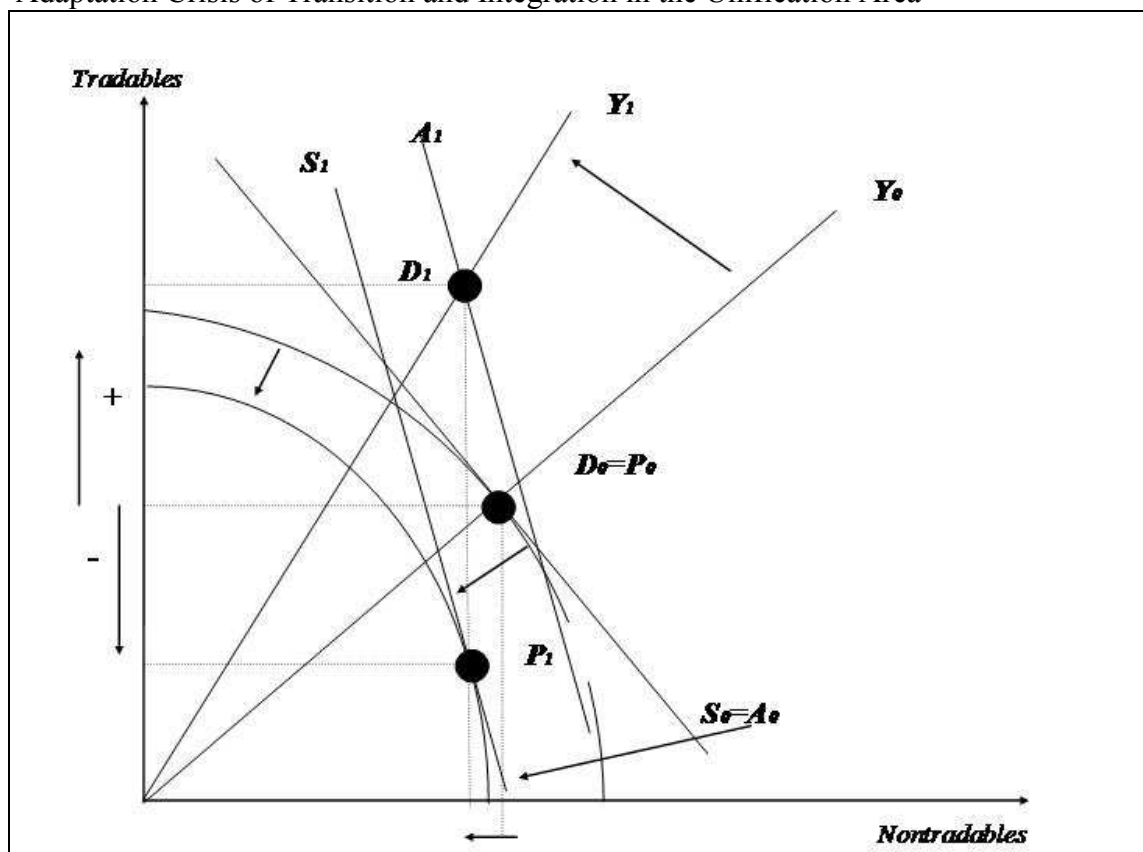
Source: Own design.

4.3 The Expansion of Transfers, Investment and Wages

The trade deficit that opens shortly after unification stems from the import of consumption goods because of stabilizing transfer payments for public institutions and private households. Much more important, however, is the import of capital goods necessary to trigger a long-term expansion of the production frontier. Short-term, however, this excessive demand will lead to a Dutch-disease type situation. Producers of local goods can increase prices faster because of reduced competition in local markets than producers of tradables, leading to wage increases and, because of wage competition, to a less dynamic expansion of the production frontier of the tradable sector. The situation is depicted in Figure 4.3.1. However, the expansion of the demand for local goods, especially in construction, provides a chance to considerably reduce unemployment in this part of the economy (from P_1 to P_2). The increase of transfers leads to an outwards shift of the absorption line (from A_1 to A_2), the effect of investments produces a shift in the supply line (from S_1 to S_2).

Figure 4.3.1:
Adaptation to Transfer Payments and Inward Investments in the Unification
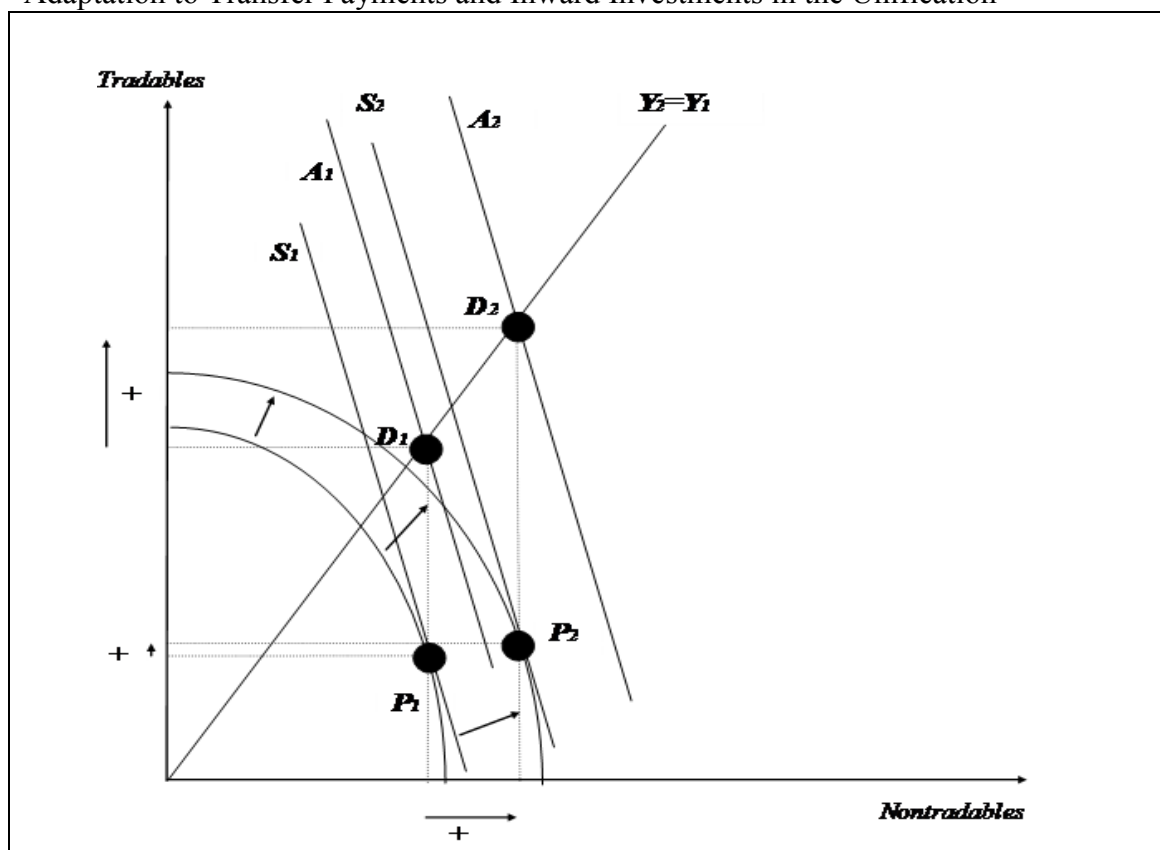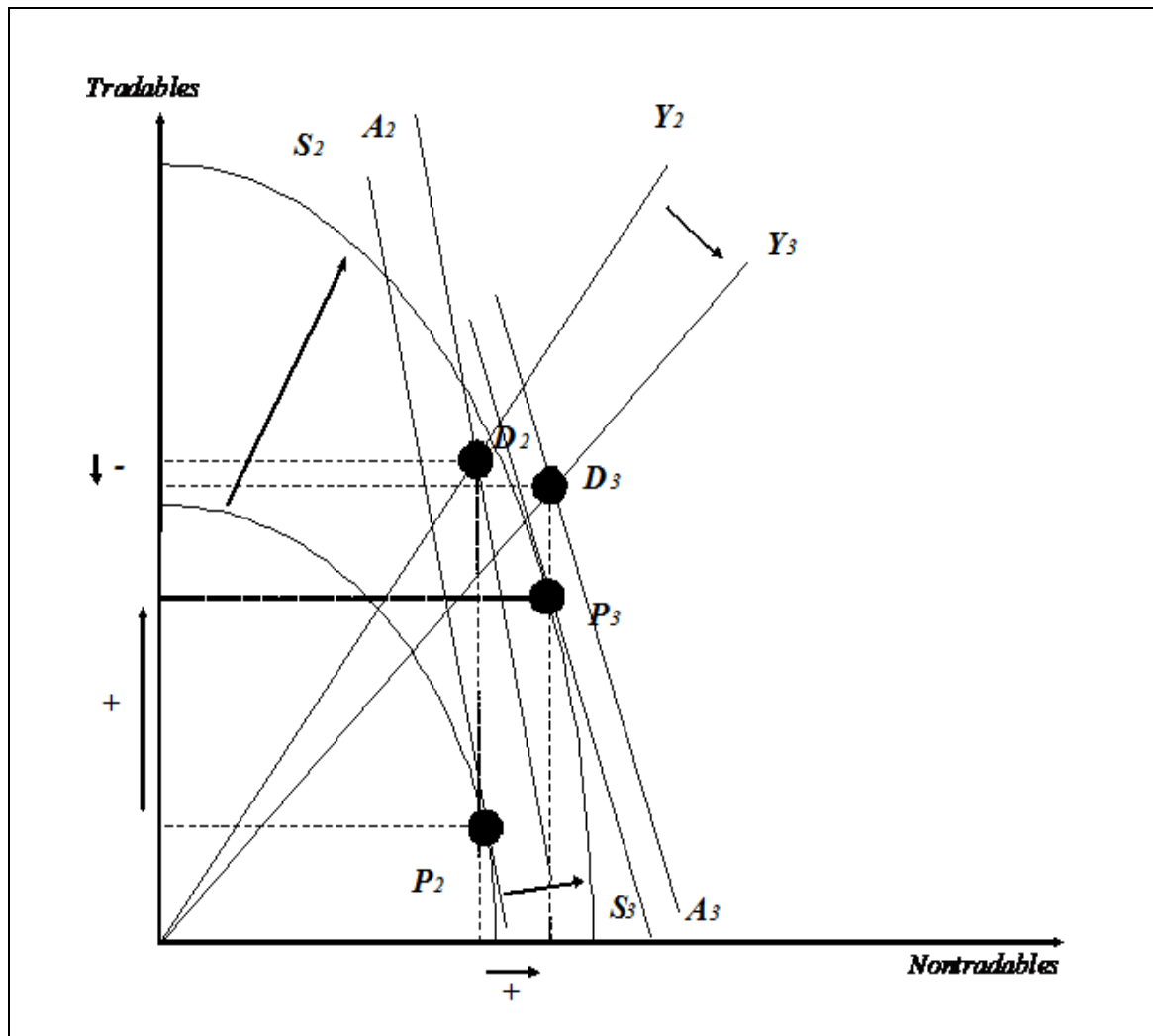

Source: Own design.

4.4 The Adaptation Crisis and Normalization

Once infrastructure deficits are compensated, construction activities will fall and Dutch-disease type problems will become less important, leading to a fall in local prices. The production frontier would mostly expand in tradable goods' industries. Given a certain relative decline in the prices local industries, the supply-absorption lines turns counter-clockwise (from A_2 to A_3 and from S_2 to S_3 respectively in Figure 4.4.1) and the expenditure line moved clockwise (from Y_2 to Y_3). This makes production and absorption converge to a certain extent, i.e. current account deficits fall and the export position of the unification part is improving.

Figure 4.4.1:
Economic Normalization and the Expansion of the Tradable Sector in the Unification Area

Source: Own design.

5. What Can Korea Learn from Germany: Fundamental Structures

5.1 The Output Gap of East Germany and Transfers: an Empirical Analysis

As mentioned in Section 3, the output gap that opens with unification and transition is directly linked to a level of domestic private and public savings and the ability to attract foreign capital – foreign meaning "from outside the unification area", i.e. international capital or capital from the market twin. These may be complemented by transfers from the market twin if other savings and inflows of capital are too low to shoulder the stabilizing and retooling the post-communist economy. We have learnt from section 4 that transfers from the market twin have strong effects for the real economy of the unification twin, potentially loosening the constraint of the RMSM as shown by mentioned at the end of Section 3 with reference to GABRISCH (1994), EASTERLY (1999, 2003) and ROBINSON (1978). Let us thus depart from formula (6) in Section 3 that contains, on its right side, the three gap elements that could potentially constrain the unification twin: private savings, public savings, and capital inflow.

$$\Delta K = \left(Y - \hat{T} - C_P\right) + \left(\hat{T} - \hat{C}_G\right) + \left(M - \overline{X}\right). \tag{16}$$

To this equation we add a variable of unification transfers amenable to economic policies from the market twin, $\hat{U}$, that promotes capital formation but may also have adverse effects, i.e. generate allocation inefficiency, A. Note that A is unobservable.

$$\Delta K + A = \left(Y - \hat{T} - C_P\right) + \left(\hat{T} - \hat{C}_G\right) + \hat{U} + \left(M - \overline{X}\right), \tag{17}$$

$$\Delta K = \left(Y - \hat{T} - C_P\right) + \left(\hat{T} - \hat{C}_G\right) + \left(\hat{U} - A\right) + \left(M - \overline{X}\right). \tag{18}$$

The formal structure would run as follows assuming that the first term is private savings depending on income, size of the economy, wage levels etc., the second term is public savings being driven by basically the same arguments, the third is transfers reduced by allocation inefficacy and the last one current accounts deficits. In a general form, the structure would read as follows, either focusing on savings (center) or absorption (right). We show the probable signs based on the savings interporetation.

$$D = \left(M - \overline{X}\right) = \Delta K + A - \left(Y - \hat{T} - C_P\right) - \left(\hat{T} - \hat{C}_G\right) - \hat{U} = I + A + C - Y - \hat{U}. \tag{19}$$

$$D \quad = f(\Delta K, \quad S(Y, P, w), \quad \hat{U}(A), A). \tag{20}$$

$$(+) \qquad (-)(-)(-) \qquad (-) \ (+)$$

Note that, as *A* is not observable, the coefficient estimated for $\hat{U}$ is crucial; a negative value suggests that, at the margin, all additional transfers are efficiently used and decrease savings and public budget constraints. A positive value suggests the contrary, for instance Dutch disease problems. Most politicians argue that these transfer inflows were a strong driver of the rebuilding of East Germany and thus helped to lower the current accounts deficit. But Figure 5.1.1 shows a by and large negative correlation supporting the argument of inefficiency and slack, for instance because it does not increase investment but consumption due to the overwhelmingly high share of social security contributions: Only about 10% of expenditures in relation to net transfers are truly growth-oriented (BLUM, RAGNITZ et al. 2009). If multiplier effects of consumption are included, this value might double. Thus, their effect is low and transfers remained stubbornly high whereas income more than doubled and the current accounts deficit fell from some 50 % of GDP to presently some 10% (BLUM, SCHARFE 2002; BLUM, RAGNITZ et al. 2009). Net transfers into the new Lander have increased from the mid nineties on and only have started to decrease after 2003. Gross transfers, however, have fallen more significantly because of improvements in the East German tax base. The share of public revenues in gross transfers was initially only some 48 % and has risen to some 55%.

Figure 5.1.1:
Current Account Deficit and Net Transfers
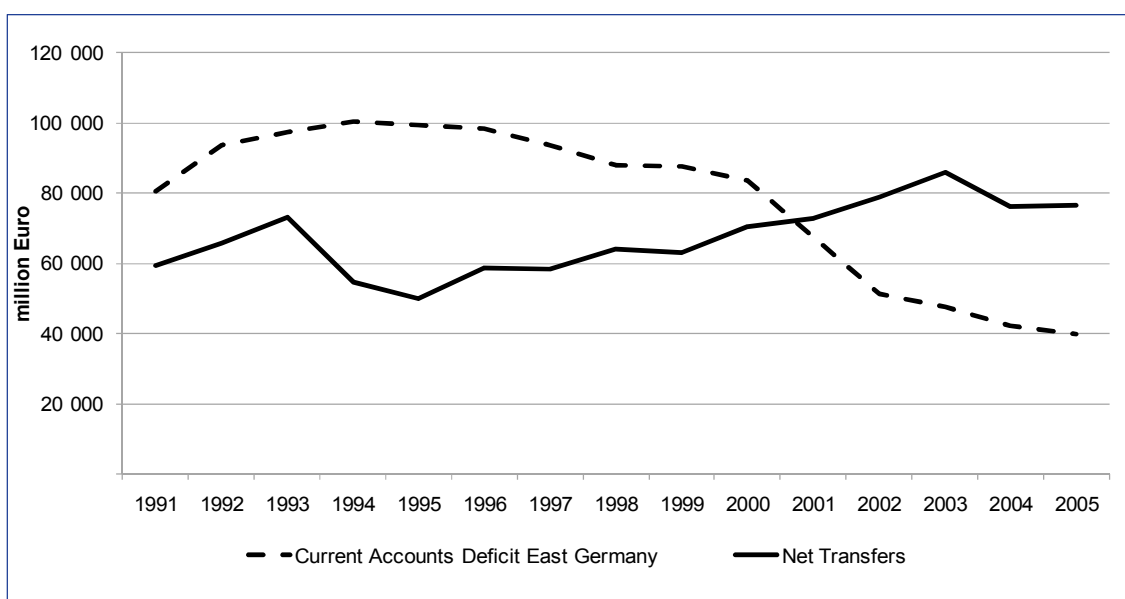
Source: Own design, data from, BLUM, RAGNITZ et. al., 2009 and BLUM, BUSCHER et al., 2009.

The function of transfers is formulated in an analogue way with the expected signs below.

$$\hat{U} \quad = f(\Delta K^+, \quad S(Y, P, w), \quad D(A), A). \quad\quad (21)$$

$$(+) \quad\quad (-)(-)(-) \quad\quad (-)\ (+)$$

For the analysis of the Korean case, it is thus interesting to look into the drivers of current accounts deficits and transfers and assess the efficiency issue. In two simple model derived from the above considerations, the per capita current accounts deficit of East Germany, *D*, depends on German GDP, *Y*, as indicator of the size of the economy, and the ratio of East to West German population, *P*, and the relative wage level, *W*, of East Germany. In addition, again following what was said above, the factors driving per-capita transfers ($\hat{U}$) were analyzed too.

$$D = f(Y, P, W, \hat{U}).\tag{22}$$

$$\hat{U} = g(Y, P, W, D).\tag{23}$$

The equations were first estimated without the endogenous term of the other equation using OLS and SUR procedures. Given the assumed endogeneity problem, a three stages least square estimation was applied where the instruments were chosen as follows: the exchange rate in US-Dollar per Euro (€) was used as an instrument for the current accounts deficit and a logarithmic trend for transfers. All other exogenous variables had their own variable lagged by one period as instruments.

Transfer and current account data was taken from BLUM, BUSCHER et al. (2009). All other data was taken from German Statistical Office and the Federal Central Bank. The annual time series covered the period from 1991 to 2005 (n = 15). Estimations were conducted in logs, i.e. a multiplicative function was chosen and parameters are elasticities.

From a statistical perspective, models (1) and (2) are very similar. Their main difference is the increased significance of the estimated parameters. Treating the endogeneity problem, we see that the elasticities estimated for the current accounts deficit in the first equation (0,335) is consistent with that for transfers in the second equation (2,985) – they both multiply up to unity. In addition, the wage level variable only is statistically significant in the third equation and turns sign. Model 3 is chosen as refence model

Looking into the current accounts equation, exogenous variables do not have the expected signs: The constant (which could be seen as a fixed per-capita investment level) is negative. Income has a positive level effect; larger economies may have, all other things equal, larger deficits. If the eastern population share rises, this relates to higher deficits as do increasing wages – as the demand side, i.e. the absorption argument dominates. An expansion of transfers raises the current accounts deficit.

The latter is not what should be expected. Seemingly, at the margin, transfers produce adverse effects, i.e. Dutch disease problems that lead to endogenous desindustrialization because of an increased demand beyond the local absorption capacity. Additional income does not induce sufficient savings to offset this effect but drives demand.

Table 5.1.1:

Result of Estimations of Current Account Deficit and Net Transfers

	Model 1	SUR-Model 2	3SLS-Model 3
Variable	D	D	D
Constant	-48.973**	-48.973**	-56.031**
	(4.03)	(4.71)	(5.01)
Income Y	6.010**	6.010**	6.880**
	(5.50)	(6.43)	(6.96)
Population share P	27.548**	27.548**	31.975**
	(9.53)	11.13)	(12.65)
Wage level W	2.166**	2.166**	2.980**
	(9.53)	(9.93)	(6.58)
Transfers $\hat{U}$			0.335**
			(4.71)
Adj. R2	0.98	0.98	0.98
Variable	$\hat{U}$	$\hat{U}$	$\hat{U}$
Constant	41.485	41.486*	167.269**
	(1.70)	(1.99)	(3.17)
Income Y	-4.238*	-4.238*	-20.54**
	(1.93)	(2.26)	(3.62)
Population share P	-16.13**	-16.13**	-95.45**
	(2.78)	(3.24)	(4.25)
Wage level W	0.454	0.454	-8.90**
	(0.89)	(1.04)	(4.55)
Current Accounts Deficit D			2.985**
			(4.16)
Adj. R^2	0.68	0.68	0.50

Source: Own calculations; 5% **; 10% *.

The transfer equation is consistent with model predictions, with the exception of the current account variable because of the identified problem of economic slack: the constant, i.e. the given investment level, is positive. Rising incomes, population shares and wages reduce transfers. Current account deficits, i.e. capital inflow, drive transfers because of the efficiency issue mentioned above.

5.2 Migration Processes in East Germany and their Economic Effect

Between 1989 and 2010 an estimated 4.3 m persons have left East Germany because of the reduced employment opportunities in the area. Some 2.5 m from the West migrated in the opposite direction, leading to a net loss of some 1.8 m persons. This has, on the one hand, reduced pressure in East Germany; on the other hand, often the youngest and most talented employees left, reducing potentials for accelerated economic and social change (HALL, LUDWIG 2009).

The contribution of this net gain of nearly 3% of the population to West German growth is considerable, as shown in Figure 5.2.1. Assuming a standard labor-market participation rate and a standard per-capita GDP contribution, we see that generated output in the West by East Germans is continuously rising whereas net transfers fall following the

model structure given above.[19] When in 2019 the public solidarity pact that finances the rebuilding of the East ends, the taxes generated by this additional growth should about equal the last net transfers. If we include the multiplier effects of East German demand on West German production, then the break-even point will be reached in the next years.[20]

Figure 5.2.1 also includes the net transfers; values from 2006 onwards are estimates based on the 3SLS model in Table 5.1.1 to which the additional help from the stabilization effort following the world financial crisis were added.

Figure 5.2.1:
Economic Gain from Migration in West Germany

Source: Own design, data from BLUM, RAGNITZ et. al., 2009 and BLUM, BUSCHER et al., 2009.

In sharp contrast to other reform countries from which talented young people out-migrated, i.e. from Poland to the UK, Germany was able to mostly keep its human capital and, thus, generate a growth effect that eased the financing of unification. This becomes very apparent if the increase of national debt is analyzed. In spite of huge unifi-

---

19 We assume that the exchange rate to the Dollar remains on the 2010 level and that the share of East Germans in the total population remains constant. Furthermore, GDP rises by 2.2 % per year and the wage gap falls to 10% by 2020.

20 East Germany, on average, was able to turn about 39% of net transfers into value added in 1991 and about 48% in 2005. If we deduct from the remaining percentage import shares and apply the tax rate in value added of about 45%, we obtain some 15 b € to 20 b € of annual additional receipts; see *Blum, Ragnitz et. al.* (2009), p. 13.

cation costs, it increased much less than in neighboring countries that did not have to incur these costs. This is an important policy message to use strategically.

5.3 Industry Structure in East Germany and its Effects on Public Revenues

As mentioned before, transition is paralleled by enormous changes in the employment structure. In the case of East Germany, about 2 m jobs were lost, which is reflected in the out-migration balance and high levels of unemployment which just begin to disappear for demographic reasons – a baby bust that started 1990 – and an improved general economic condition. Productivity effects were strongest in energy, mining and manufacturing which about quadrupled over the period covered. Today, this sector employs some 20% of the workforce and has nearly caught up to the West German level. We clearly see the expansion of construction shortly after unification and the later collapse of the construction bubble in the late 1990s.

Figure 5.3.1:
Industry Structure of East Germany
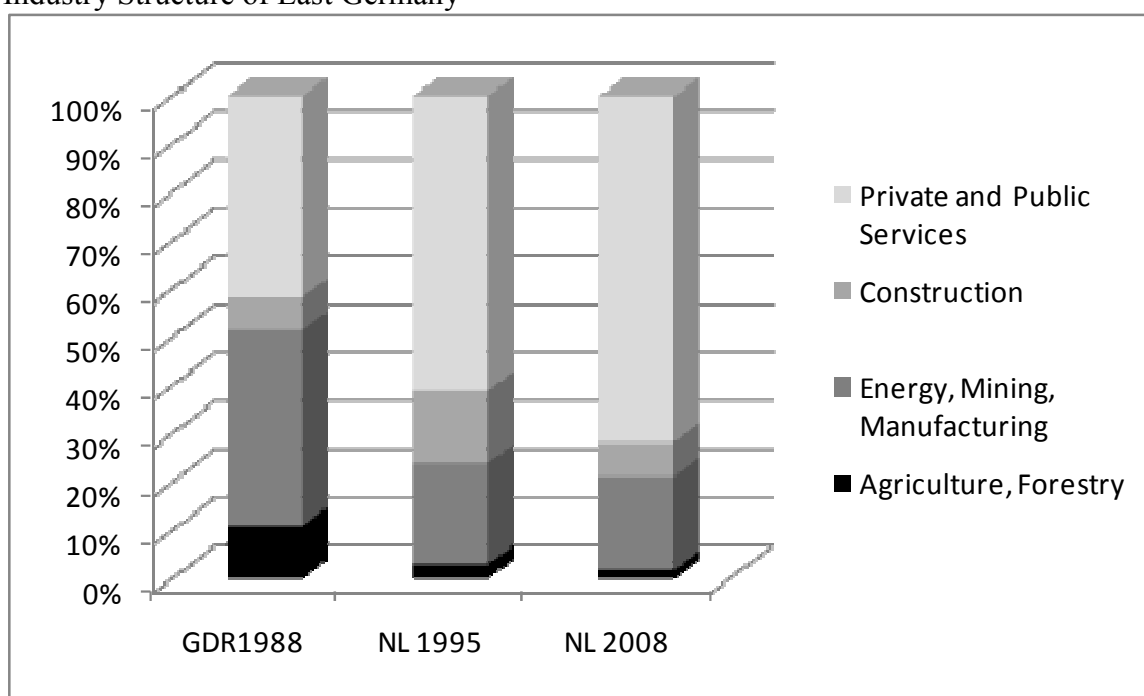
Source: Own design, data from IWH and Federal Statistical Office.

The dynamics of structural change imply – on and above what has been said about the dynamics of transition in Section 5 – that investments and transfers will have rather different effects on income and growth over time, and thus on tax revenues. Thus multiplier effects will vary over time according to the composition of industry.

Based on regional input-output matrices for Germany for the year 2006 (BLUM 2008) and regional economic capacity indices (FREYE, VAN DEUVERDEN 2010), we have analyzed their values for Germany and the determinants of their values. Out of a selection of more than seventy industries that reflects the structure monitored by German and European statistics, the impact of expenditures for private consumption, for construction and manufacturing were analyzed.[21] The equation estimated was

$$M = h(PD, YE, Cap) \,. \tag{24}$$

where M is the income multiplier of a certain category, i.e. the value added generated by a given expenditure, PD is population density as a measure of the closeness of regional interaction, YE is per employee income as a variable of the "completeness" of the economy, assuming proportionality with the value added captured in the regional because of a dense network of commodity flows in the supply chain, and Cap the capacity utilization of the region following the assumption by KEYNES that multiplier values tend to zero if the economy fully exploits its potential. The latter was included in the regression as (1-capacity) use, i.e. the free capacity reserve.

For East Germany, an average multiplier of 0.8 can be derived because for the large region and, initially the large construction effort that was later exchanged against a rise of manufacturing, and because of private expenditures (for Germany as a whole, the input-output-system yields a value of about 0.9). From the regressions, we calculate a multiplier of about 0.35 for North Korea because of its lower income position and its very reduced industry density. The model calculated is linear and estimated with SUR as we assumed an interdependent error distribution along the sectors of the input-output-matrix. Mechanical engineering estimations is shown as one of the most important sectors in manufacturing industries.

Table 5.3.1:
SUR-Estimations of Multiplier Functions in Germany

| Variable	Households	Mechan.Eng	Construction
Constant, C	0.331**	0.817**	-0.603**
Population density (inh. per sq km), PD	0.019**	0.113**	0.052**
GDP income per employee (€), YE	0.002**	-0.003	0.017**
Free capacity of economy (share)	-1188.0*	-7953.5**	407.89
Adj. R^2	0.62	0.38	0.77

Source: Own calculations; 5% **; 10% *.

By plugging the values for north Korea, values for multipliers can be obtained in order to calculate the income and taxation effects of transfers, i.e. calculate the public revenue that flows back.

---

21   Values for electrical engineering and vehicle manufacturing are rather similar.

Figure 5.3.2:
Multiplier Dynamics: German Länder 2006
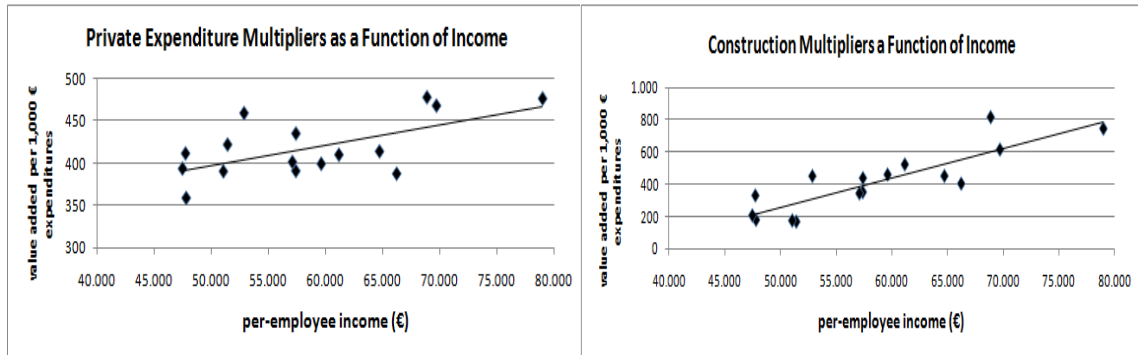
Source: Own design.

We find population density and income to be important drivers of the multiplier levels. Note that excess production capacity has a positive influence on multiplier effects, which contradicts the KEYNES-type reasoning. But values in the sample never reached full capacity. It may be considered as an additional factor describing the "completeness" of the economy.

6.   An Estimate of Korean Unification Costs

6.1   Integration and Currency Union

Transition implies openness and integration into the global economy, liberalization and privatization, a redefinition of government, of the bureaucracy and tasks which public institutions have to fulfill. Integration, in a first step realized by a currency union, acts like a catalytic system and accelerates the transition process because of the global opening of markets. The economy of united Korea will reposition itself. Public macro and micro policies have to be equilibrated – the most important lesson to learn from German unification.

The national currency and the current account balance would run into turbulences in case of a Korean unification: by introducing a joint currency Won and an investment offensive in the North, the export surplus of South Korea of about 5 percent of income would melt and change into a deficit in order to finance the reconstruction with the incoming capital. However, the deficit would generate inflation pressures and the reaction of the central bank, an increase in interest rates, would imply that the currency will not devaluate against its major international trading partners as a sign of an on average less performing economy, but revaluate. Firms exporting tradable goods could come under severe pressure, a large current account deficit may emerge. A bubble economy in the North, especially in the building and infrastructure sector, is very lightly to develop: Wages rising in the construction industry could infect industry and put it under additional pressure. However, an infrastructure investment strategy is without alternative to accommodate for a certain period the skyrocketing unemployment until industry has been restructured.

6.2   Public Budgets

Unification implies an incredible challenge for public budgets. In order to prevent a large scale exodus from the Northern united part, income expectations have to be stabilized there – as it was done with East Germany. To guarantee a per capita endowment of about 60 percent of the southern income, the amount to be transferred would be much larger because of the difference in population shares and missing economic performance of the North compared to Germany. Let us briefly make a rough estimate of the costs based on the German experience. The fundamental data is taken from the Table 2.1.1. We compute, based on the share of per-capita GDP of the unification twin in that of the market twin the per-capita gap to be bridged. If the initial share is 5%, then 55% have to be compensated to reach the stabilizing 60% level. This implies multiplying the market twins per-capita GDP with 0.55 to obtain an initial transfer amount of 265 b. US-$, which is 27% of the market twin's output. Given an average expenditure multiplier[22] of 0.35 and a public share in the economy of 30%, the level of South Korea, only 12% of these expenditures can be expected to be captured by taxes, 88% remain to be financed, which results in a net transfer of 24%.

---

22   The values were taken from East German experience – 0.8 is the value of a very weak region.

Table 6.2.1:
Calculation of Public Support Expenditures

	Korea	Germany
Population Share North / East in Total (%)	33	20
Share of Per Capita GDP (%)	5	20
Gap against 60% Income (%)	55	40
Initial Transfer Amount (1,000 US-$ / €)	265.697	166.053
Gross Transfer Share (%)	27	10
Average Multiplier (%)	35	80
Tax Share in GDP (%)	30	50
Net Transfer Share (%)	24	6

Source: Own calculations.

As the German example shows, the first expansion in output will relate to construction – and preventing large-scale Dutch disease problems and, finally, the bursting of a bubble against pressing labor shedding in industry will be hard political work. With re-industrialization taking up the pace, more sustainable growth will be established. However, the deficit will remain, due to these internal structural adaptations, stubbornly high for quite some time.[23] The size of transfers and the length of the transition period clearly show that unification must be internationalized to make costs bearable for Korea and that clear budget priorities must be set – on the taxation side as well as on the expenditure side. In preparing for unification, both should be addressed in not too distant a future.

6.3   Privatization, Phase in and Phase over

There are some economic sectors in North Korea international investors are already interested in. Primary this relates to the access to the metallurgy resources and the related industries, which implies a full reconstruction of facilities. In addition, the military-atomic industry complex is interesting for conversion because of its technology and innovation capacity if it is possible to retain the existing human capital. As the case of the new Lander in Germany shows, this is an important challenge.

The special economic zone Kaesong with a large selection of by and large medium-sized enterprises from South Korea is a successful case how a continued penetration and renovation of the North could be organized. Parts of the local industries surely have a value because of the access to local markets not because of their capital stock which is much more run down than anything that East Germany knew, and thus, without a chance of survival. As a privatization will come under huge pressure in order to prevent a long term subsidizing of uneconomical structures, the making of a master plan is suggested. An important lesson to be learned is that privatized entities may compete against those still under public regime and may not have any chance of survival – a type of zombie transition should be prevented.

---

23   *Choi* (2008) uses the German example for the discussion of priorities in the case of a future Korean priority setting:

7   Perspectives

Our analysis provides two important lessons for Korean unification: The first relates to the process itself: Macro- and micro-effects will interact strongly and the economic system will itself be subject to political influence, especially strategic considerations. The two most important are (i), the level of social accommodation granted to the north, which determines the flow of transfers necessary for social and income stabilization policies and, (ii), the level of investment – public and private – to retool the economy, which is set by the medium to long-term perspectives taken.

The second important lesson to be learnt is that stemming from Figure 2.2.2: West Germany is until today on an exponential growth path, East Germany follows the growth path left in the seventies when HONECKER took power. This is the result of an industry structure that forgot to promote the establishment of headquarters once the socialist combines where dissolved. This implies that the openness of the economy necessary is complemented by a sustainable political interest for investment, especially in headquarter structures. Thus, privatization effort should be viewed under the perspective of not organizing "extended workbenches". Innovation and cluster nuclei should be related to existing technological profiles, especially in the context of raw materials and the conversion of nuclear and military technology.

Viewing at the investment, the income and the social stabilization balance, the load to be shouldered exceeds that of South Korea. Thus, the most important aim will be to recognize that Korean unification will be a challenge to the security policy as it is intertwined with economic stability that is at risk if help for the North is not properly organized – and consequently an important factor for the future of the Asian neighborly regions. Thus it should be internationalized. 2+4 could be an important path and aim to be followed by including China, Japan, Russia and US as important signatory powers.

References

Addison, D. (1989), The World Bank Revised Minimum Standard Model. *World Bank Working Papers*. The World Bank: Washington, D.C.

Bacha, E. L. (1984), Growth and Limited Supplies of Foreign Exchange: A Reappraisal of the Two-Gap Model, in: M. Syrquin, L. Taylor, L. Westphal (eds), *Economic Structure and Performance: Essays in Honour of Hollis Chenerey*. Academic Press: New York.

Bacha, E. L. (1990): A Three-Gap Model of Foreign Transfers and the GDP Growth Rate in Developing Countries, in: *Journalof Development Economics*, 32, pp. 279-296.

Barro, R.; Sala-I-Martin, X. (1995), *Economic Growth*, McGraw-Hill, New York

Blum, U. (1997), Greed and Grief in East Germany - the Socialist System's Crisis, Collapse and Transformation, *Beihefte zur Konjunkturpolitik – Applied Economics Quarterly*, Vol. 45, Duncker und Humblot, Berlin, 11 – 33.

Blum, U. and L. Dudley, 1998, Fast Convergence: Institutions and Economic Growth in New East Germany, *Jahrbuch für Wirtschaftswissenschaften - Review of Economics*, Vol. 49, No. 2, 124 – 143 .

Blum, U., and S. Scharfe, 2002, Die Transformation in Ostdeutschland als entwicklungsökonomisches Phänomen, *List Forum für Wirtschafts- und Finanzpolitik*, Vol. 28, 4 (348 – 369).

Blum, U. and Dudley, L. (1999), The Two Germanys: Information Technology and Economic Divergence, 1949-1989, *Journal of Institutional and Theoretical Economics*. 155, 4: 710-737.

Blum, U. and Dudley, L. (2000), Blood, Sweat, Tears: Rise and Decline of the East German Economy, 1949 – 1988, *Zeitschrift für Nationalökonomie und Statistik – Journal of Economics and Statistics*. 220/4: 438-452.

Blum, U., Scharfe, S. (2002), Die Transformation in Ostdeutschland als entwicklungsökonomisches Phänomen, *List Forum für Wirtschafts- und Finanzpolitik*. 28, 4: 348-369.

Blum, U. (2003), Borders Matter! - Regional Integration in Europe and North America, *Zeitschrift für Nationalökonomie und Statistik (Journal of Economics and Statistics)* 223/5 (513 – 531).

Blum, U. (2007), Der Einfluß von Führungsfunktionen auf das Regionaleinkommen: Eine ökonometrische Analyse deutscher Regionen, *Wirtschaft im Wandel*, Vol. 13, No. 6 (187 – 194).

Blum, U. (2008), Ökonomische Effekte von Forschungsinstituten – eine Analyse am Beispiel des IWH, *Wirtschaft im Wandel*, Vol. 14, No. 10, 398 – 404.

Blum; U. (2009), Are there Free Lunches in East Germany? in: *Empirische Makroökonomik für Deutschland: Analysen, Prognosen, Politikberatung, Festschrift zum 65. Geburtstag von Udo Ludwig* (U. Blum, D. Dietrich, A. Lindner eds), Institute for Economic Research Series No. 28, Nomos Verlag, Baden-Baden (61 – 83).

Blum, U., Buscher, H., Gabrisch, H., Günther, J., Heimpold, G., Lang, C., Ludwig, U., Rosenfeld, M., Schneider, L. (2009), *Ostdeutschlands Transformation seit 1990 im Spiegel wirtschaftlicher und sozialer Indikatoren.* Institut für Wirtschaftsforschung Halle Sonderheft 1/2009, Halle (Saale).

Blum, U.; Ragnitz, J.; Freye, S.; Scharfe, S.; Schneider, L. (2009), *Regionalisierung öffentlicher Ausgaben und Einnahmen – Eine Untersuchung am Beispiel der Neuen Länder –* Halle Sonderheft 2/2009.

Blum, U. (2011), An Economic Life in Vain, mimeo.

Boskin, M.J., Dulberger, E.R., Gordon, R.H., Groliches, Z. and. Jorgenson, D. W. (1998), Consumer Prices, the Consumer Price Index, and the Cost of Living, *Journal of Economic Perspectives.* 12: 3-26.

Chenery, H.; Bruno, M. (1962), Development Alternatives in an Open Economy: The Case of Israel, in: *Economic Journal*, 57, pp. 79-103.

Chenery, H.; Strout, A. M. (1966), Foreign Assistance and Economic Development, in: *American Economic Review*, 56, pp. 679-734.

Chisari, O. O.; Fanelli, J. M. (1990), Three-Gap Models, Optimal Growth and the Economic Dynamics of Highly Indebted Countries, in: *Quaderni del Dipartimento de Economia Politica, 101. Università degli Studi di Siena*: Siena.

Choi, S.O. (2008), Establishing *Priority Settings and Budget Allocation Strategies for Korean Integration: Lessons from Germany*, Virgina Tech, Blackburg, mimeo.

CIA, World Factbook, diff years.

Dell, S. (1982), Stabilization – The Political-Economy of Overkill, in: *World Development*, 10, pp. 597-612.

Deutsche Bundesbank (1999), *Die Zahlungsbilanz der ehemaligen DDR 1975 bis 1989.* Frankfurt.

Deutscher Bundestag, 2001, Antwort der Bundesregierung auf die Kleine Anfrage der Abgeordneten Christine Ostrowski und der Fraktion der PDS – Drucksache 14/5026 –, Berlin.

Dornbusch, R. (1980), *Open Economy Macroeconomics*. Basic Books Inc.

Easterly, W. (1999), The Ghost of Financing Gap: Testing the Growth Model Used in the International Financial Institutions, *Journal of Development Economics*, Vol. 60, No. 2, 423 – 438.

Easterly, W. (2003), Can Foreign Aid Buy Growth, *Journal of Economic Perspectives*, Vol. 17, No. 3, 23 – 48.

Filip-Köhn, R., Ludwig U. (1990), Dimensionen eines Ausgleichs des Wirtschaftsgefälles zur DDR; DIW Diskussionspapier No. 3, DIW Berlin.

Freye, S., van Deuverden, C. (2010), Schuldenbremse: Bisherige Beschlüsse stellen Gelingen auf Länderebene infrage, Wirtschaft im Wandel 9, 428 – 447.

Funke, M.; Strulik, H. (2004), Growth and Convergence in a Two-Region Model of Unified Germany, *German Economic Review*, 1, 1., pp. 363 – 384.

Funke, M.; Strulik, H. (2005), Growth and Convergence in a Two-Region Model: trhe Hypotheical Case of Korean Unification, *Journal of Asian Economics* 16, 255 – 279.

Gabrisch, H. (1994), Kapitalbedarf und Kapitaltransfer: der Fall Osteuropa, in: *Integration und Desintegration der Weltwirtschaft*, W. File and C. Köhler ed., Duncker und Humblot, Berlin, 1251 – 146.

Greiner, U.; Maass, H.; Sell, F. (1994), The East German Disease: Volkswirtschaftliche Anpassungsprozesse nach der Deutschen Einheit, *Zeitschrift für Wirtschaftspolitik.* 3, 3: 271-299.

Hall, J.; Ludwig, U. (2009), Gunnar Myrdal and the Persistence of Germany's Regional Inequality, *Journal of Economic Issues* Vol. 18, No. 2, 345 – 352.

Harberger, A. (1950), Currency Depreciation, Income and the Balance of Trade, in: *Journal of Political Economy*, 58, pp. 47-60.

Khan, M. S.; Montiel, P.; Haque, N. U. (1990), Adjustment with Growth: Relating the Analytical Approaches of the IMF and the World Bank, in: *Journal of Development Economics*, 32, pp. 155-179.

Kraev, E.; Akolgo, B. (2005), Assessing Policy Approaches to the Distributional Effects of Macroeconomic Policies, Development Policy Review (special issue: Analysing macro poverty linkages), Vol. 23, 3, 299- 312.

Lächler, U. (1988), Credibility and the Dynamics of Disinflation in Open Economies, A Note on the Southern Cone Experiments, in: *Journal of Development Economics*, 28, pp. 285-307.

Laursen, S.; Metzler, L. (1950), Flexible Exchange Rates and the Theory of Employment, in: *Review of Economics and Statistics*, 32, pp. 281-299.

Lee, Y. S. (1993), Cost of Unification on the Korean Peninsula: A Scenario Approach, in: The Disintegration of the Soviet Union and Its Impact on Korea and Germany, Kim, D.; Gumpel, W.; Kindermann, G.-K.; Jung, K.-H., ed., Institute of East and West Studies Yonsei University, pp. 193-204.

Ludwig U., Stahmer C., Stäglin R. (1996), Verflechtungsanalysen für die Volkswirtschaft der DDR am Vorabend der deutschen Vereinigung. In: *DIW Beiträge zur Strukturforschung*, Vol. 163

Ludwig, U., Stäglin, R. (1997), Die gesamtwirtschaftliche Leistung der DDR in den letzten Jahren ihrer Existenz – Zur Neuberechnung von Sozialprodukten für die ehemalige DDR*, Jahrbuch für Wirtschaftsgeschichte No. 2*: Volkswirtschaftliche Gesamtrechnungen im internationalen Vergleich, Berlin: Akademie-Verlag, 55-81.

Maddison, A., 2007, Historical Statistics for the World Economy: 1-2003 AD www.ggdc.net/maddison/Historical_Statistics/horizontal-file_03-2007.xls, accessed, January 28th, 2011.

Marumoto, M. (2008), *Democratic People's Republic of Korea Statistics Project*, Johns Hopkins University, Washington DC, mimeo.

Meade, J. E. (1951), *The Balance of Payments*. Oxford University Press: Oxford.

Polak, J. (1957), Monetary Analysis of Income Information and Payments Problems, in: *IMF Staff Papers*, 64, pp. 1-50.

Ranaweera, T. (2003), *Foreign Aid, Conditionality and the Ghost of the Financing Gap: A Forgotten Aspect of the Aid Debate*; Policy Research Working Paper 3019, World Bank, Washington DC

Reimer, J. (2002), *Estimating the Poverty Impacts of Trade Liberalization*; Policy Research Working Paper 2790, World Bank, Washington DC

Ritschl, A., Spoerer, M. (1997), Das Bruttosozialprodukt in Deutschland nach amtlichen Volkseinkommens- und Sozialproduktstatistiken 1901 – 1995, *Jahrbuch für Wirtschaftsgeschichte No. 2*: Volkswirtschaftliche Gesamtrechnungen im internationalen Vergleich, Berlin: Akademie-Verlag, 27-54.

Robinson, J., 1978, Pre-Keynesian theory after Keynes, (reprinted), in: Robinson J., *Contributions to Modern Economics*, Oxford, Basil Blackwell.

Schabowski,G. (1989), press conference, http://de.wikipedia.org/wiki/G%C3%BCnter_Schabowski, 14. 1. 2011.

Schalck-Golodkowski A., König, H. (1988), *Zur Entwicklung des Kurses der Mark der DDR zu kapitalistischen Währungen seit 1949*. Berlin: German Democratic Republic, mimeo.

Schalck-Golodkowski, A. (2000), *Deutsch-deutsche Erinnerungen*. Reinbek bei Hamburg: rororo.

Scheufele, R., Ludwig, U. (2009), Der lange Weg der Konvergenz, *Wirtschaft im Wandel,* 10, 400 – 407.

Schürer, G., Beil, G., Schalck, A., Höfner, E. and Donda, A. (1989), *Analyse der ökonomischen Lage der DDR mit Schlußfolgerungen*. Berlin: German Democratic Republic, mimeo.

Sleifer, J. (2006), Planning Ahead and Falling Behind, The East German Economy im Comparison with West Germany, *Jahrbuch für Wirtschaftsgeschichte*. Beiheft 8, Berlin: Akademie Verlag.

Strauß, F.-J. (1989), *Die Erinnerungen*. Berlin: Siedler.

Taylor, L. (1993), A Three-Gap Analysis of Foreign Resource Flows and Developing Countries Growth, in: L. Taylor (ed.), *The Rocky Road to Reform*. MIT-Press: Cambridge Mass., Ch. 2.

Wolf, C. (2006), Korean Unification: How it might come about and at what cost, *Defence and Peace Economics*, Vol. 17(6), pp. 681-690

World Bank (1980): *The Revised Minimum Standard Model*. Washington, D.C.