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002a. fax cover sheet	Name, Phone Number [partial] [CIA Act] (1 page)	01/22/1998	P3/b(3)
002b. memo	For the Global-Asia Working Group from Len Hawley and Jack Pritchard. Subject: Instructions for Submission of the Pol-Mil Staff Estimate. (5 pages)	02/07/1998	P1/b(1)

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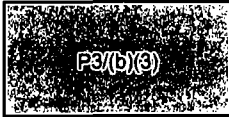
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Pitfalls and Prospects: An Economic Roadmap to Korean Reunification

Pending Publication in Asian Survey, Spring 1998.

Brian Barna



[001]

Introduction

The universe of "Soviet type" economies has now collapsed to one country—North Korea—that has yet to undertake fundamental reform.^{1 2} Although the North's economic system has endured the collapse of communism elsewhere, it is under severe stress. By its own admission, North Korea cannot produce enough food to feed its population—the most basic of economic failures—and observers report that industry is at a standstill. Once-generous Soviet aid is gone and assistance from China is limited.³ The P'yongyang regime also faces these challenges without its charismatic founder, Kim Il-song, who died in 1994. The possibility that these economic stresses will overcome even the North Korean regime's brutal system of totalitarian controls is growing. Whatever the mechanics of the end of the current North Korean regime--coup or political and economic collapse--the most likely end result is that South Korea would be left to reconstruct the North.

This outcome is likely enough that the mechanics of such a reunification are worth considering.⁴ If South Korea did inherit the North Korean economy, it would be faced with a problem of economic transition similar to that faced by Germany and reformers in other former communist nations. German unification has been more difficult and costly than expected; the Korean case would be worse. Korea would confront all the difficult issues that Germany faced but with fewer resources, a heavier relative burden, and a larger income gap. A particular problem would arise in applying South Korean institutions to North Korea. The South's economy contains distortions—such as dominance by large business groups and an underdeveloped financial sector—created by Seoul's past industrial policies. Indeed, some observers claim that South Korea developed rapidly by

¹ The official name of North Korea is the Democratic Peoples' Republic of Korea; South Korea is formally known as the Republic of Korea. For convenience, I use North and South Korea.

² Reforms in Cuba may or may not qualify as "fundamental," but they go far beyond policy changes in North Korea.

³ See Eberstadt, 1995.

⁴ Some have argued that the North could revive its economy through a gradual opening to the outside world and economic reform. I would argue that the current North Korean leadership could not survive the ideological challenges broad market reform would pose. The most likely alternative to South Korean takeover if the current regime ended would be a takeover by elements of the Party or military, who would probably opt for reform in cooperation with South Korea. This scenario would present similar challenges to those outlined here. Another distinct possibility is that South Korea would maintain the North as a "client state" of sorts for an extended period--10 years or more. The country would be theoretically reunified, but the DMZ would remain and the North might keep a separate currency and economy. This option is potentially attractive to South Korean leaders seeking to minimize the turmoil and cost of reunification.

getting prices “wrong”—a questionable legacy for a government seeking to reform a command economy.⁵

An additional complicating factor would be the active animosity that has characterized North-South interaction since the Korean war. A product of this hostility—and the North’s information controls—has been a virtually complete absence of contact between residents of North and South Korea, and lack of information on the part of North Koreans on true conditions in the South. The result would be greater suspicion of motives on both sides, making it more difficult to implement reforms.

Setting aside this animosity, reunification with the South would appear to present considerable advantages for North Korea over the difficulties of reforming without such support. The East German experience provides a warning, however:

...having a big brother has turned out to be not quite as beneficial as it first seemed to be. The big brother insisted on the restitution of his old property rights, he demanded the right to buy his little brother’s assets, and he effectively protected himself against his little brother’s low-wage competition. (Sinn and Sinn, Jumpstart, pg. 27.)

Literature Review

The reforms in the former East European states, Russia, China, and Vietnam have generated an extensive literature on the problems of transitioning from a planned to a market economy; German reunification has inspired work on the particular problems of repairing a national division. The literature is too extensive to summarize completely here, but examples on Eastern Europe include Patterson (development of the private sector in former command economies, examination of the private sector prior to transition); Blommestein and Marrese (property rights reform and macroeconomic stability); and Earle, Frydman, and Rapaczynski (privatization). Perhaps the best overall guide to the issues raised in economic transition (including information on China and, to a lesser extent, Vietnam) is the World Bank’s From Plan to Market (World Development Report, 1996), which covers all major phases of transition from a cross-country perspective. Sinn and Sinn provide a thorough analysis of the economic problems of German reunification, including summaries of other studies.

Most work to date on Korean reunification has focused on estimating the costs, typically with models of capital accumulation. Lee (1996, 1994), for example, uses a Harrod-Domar growth model to estimate the rise in North Korean income (and the fall in South Korean growth) resulting from various levels of capital transfer to North Korea. Lee distinguishes between the “accounting costs” of reunification—direct spending—and foregone income in South Korea; he concludes lost income in the South would be more than offset by income gains in the North. Noland (1996c) presents a number of scenarios contingent on different levels of capital transfers from South to North Korea, and takes

⁵ See Amsden.

the prize for the most frightening total cost figure—more than \$1 trillion over 10 years. Noland (1996d) models the gains from reform in the North with a computable general equilibrium model that uses a Chinese input-output matrix as a proxy for the North Korean economy.

A few authors have addressed the implications of the German experience for Korea, although for the most part they have devoted more effort to summarizing the German case than speculating about Korea. Examples include Noland (1996a), which briefly covers currency conversion, wage policy, and restitution for seized property, and Wegner, who deals almost exclusively with Germany. The South Korean government has also dispatched a number of officials to Germany to study reunification. There is also the broader issue of language; for this paper, I have reviewed only English-language publications, and there are certainly relevant works in other languages, particularly Korean.

The focus on unification costs is understandable given that the most obvious concern for South Korea is the enormous financial burden of reunification. There is a need, however, to examine the steps necessary to transform North Korea's economy, since the difficulties of this endeavor go far beyond the financial burden it would generate. The institutional environment in the former North Korea—and corresponding incentives to investors, savers, entrepreneurs, and labor market participants—would be perhaps even more important to a successful transition than financial transfers. Persistent underdevelopment in many third-world nations despite decades of aid illustrates that financial flows alone are not sufficient to ensure development, and the same would be true in North Korea. Moreover, a major influence on what sort of market institutions would arise in a reunified Korea would be those in South Korea, institutions that, although market oriented, reflect decades of interventionist industrial policy.

The North Korean Economy

Essential to any study of economic transition is an understanding of the economy to be transformed. This is particularly difficult in the North Korean case because the North's government has not released meaningful economic statistics for several decades; it treats economic data as state secrets, and severely restricts the activities of visitors. This is true even in comparison to other communist nations—the Soviet Union, for example, provided a wealth of data compared to North Korea. A partial opening to international aid workers in the past two years has allowed a bit more information out, however, and North Korean officials have recently made general statements about economic problems.⁶ The South Korean government has also long released estimates of North Korean

⁶ North Korean officials have also made sporadic claims about macroeconomic indicators, most recently when they reported to the United Nations that their GDP was \$5.2 billion, down from \$11.7 billion in 1993, or \$239 per capita, down from \$547. (According to a South Korean official quoted in the South Korean Yonhap news service, 23 July 1997.) There is little reason to believe that this figure represent anything but carefully targeted propaganda. The most recent disclosure, for example, was apparently an attempt by the North to cut its UN dues.

economic performance, presumably based on intelligence information.⁷ According to these estimates—published by the Bank of Korea—North Korean GNP in 1996 was \$21.4 billion, or \$910 per capita.

There is a consensus that economic performance in North Korea has deteriorated sharply in the 1990s as a result of the loss of Soviet aid; according to official South Korean estimates, the North's GNP has contracted by more than 25 percent in real terms since 1989; figures provided by P'yongyang to the United Nations in mid-1997 imply an even sharper drop of more than 75 percent.⁸ Reports from international aid workers and tales from defectors indicate that shortages of food and medicine are widespread, and even North Korean officials have admitted that their most recent harvest fell more than 1 million tons short of what is needed to feed the population at even modest levels.

There is also general agreement on the structure of the North Korean economy, including the fact that it is the world's most centrally planned.⁹ More notably, this is also a claim that could have been made 10 years ago. The state owns nearly all property; industry, particularly heavy industry, has been developed at the expense of light and service industries; and consumption has been suppressed. North Korean economic management depends heavily on moral exhortations and coercion to a degree equaled only in Maoist China and the Stalin-era Soviet Union; material incentives are weak at best.¹⁰ Other than very small garden plots, agriculture is completely collectivized. Most farms are organized as collectives—where workers receive a percentage of output—the rest as state farms, where workers are paid salaries. North Korea is also one of the world's most autarkic economies, with exports and imports together equal to roughly 10 percent of GNP.

The North devotes considerable resources to its military. A commonly accepted figure is 25 percent of GNP; it is impossible to know the true number given the lack of macroeconomic data and the distortions in North Korean prices, but this is probably on the correct order of magnitude. ~~It may even understate the current burden, given that the North Korean economy has been shrinking since 1990 without a corresponding drop in size of its military.~~ At the very least, the military places a tremendous drain on labor supplies. Roughly 6 percent of the North Korean population is on active military duty—

⁷ South Korean estimates are available for North Korean overall GNP and some subsectors. There are basic problems using market measures of performance to assess a command economy, however. For example, North Korean goods must be valued by some proxy prices, which are unlikely to be equal to the prices the goods would received on an open market.

⁸ Eberstadt (*Policy and Performance...*) also makes a convincing case that growth in North Korea has been slowing since the 1970s as the country exhausted extensive growth opportunities, a decline masked by a jump in Soviet aid from 1984-1989.

⁹ The best overview of openly available literature is Noland (1996a); see also the CIA World Factbook. South Korean estimates are published by the Bank of Korea, and are quoted extensively in the literature, including in Lee (1996).

¹⁰ Scalapino and Lee present an excellent overview of North Korean economic management techniques, an overview that remains current despite the age of the book.

only slightly less than the percentage of the US population in service at the height of World War II, and this figure does not include many ten of thousands more devoted to internal security forces. Given the decline in the North's industrial output, the labor drain may be the largest current burden the military places on the economy. The accumulated capital stock in military industries represents a sunk cost, an important point in that the resources that could be freed up through demilitarization may be essentially limited to labor.

It is also apparent that North Korea spends quite a bit to support the Kim family personality cult and on prestige and showcase projects. The nation is littered with monuments, statues, and museums devoted to Kim Il-song and Kim Chong-il, his son and current North Korean leader; any place where either Kim has ever set foot immediately becomes a shrine of sorts. Many large construction projects—including a recently built tourist highway; private citizens in the North generally do not own cars—appear to have prestige rather than practical value. In one extreme example, North Korean officials claimed they spent over \$3 billion—more than 10 percent of GNP—on construction projects related to the 1989 World Youth Games in an attempt to match Seoul's Olympic success.¹¹

Stages of Economic Transition

The limits of prediction. The lack of information on North Korea's economy limits the detail with which the specifics of transition can be predicted. For example, attempts to formally model the North's economy—including Noland (1996d)—are at least somewhat unconvincing because the lack of data forces the use of improbable proxies. In Noland's model, for example, a Chinese input-output table is used to simulate North Korea's economy; this may capture the appropriate technological coefficients, but probably provides only rough approximations of dynamic changes. This lack of knowledge of the current state of the North Korean economy also makes any specific predictions about its transformation highly suspect. For this reason, estimates of the costs of reunification should be treated with great skepticism as well. They are most usefully interpreted as orders of magnitude. Costs will be strongly influenced by the manner in which the North Korean economy is reformed and integrated into that of the South; models of capital accumulation alone do not take this into account.

It is possible, however, to say something about the issues that would arise in transition and sketch out the environment that would condition Korean policy choices. The experiences of other transition economies, particularly the former East Germany, offer a roadmap to the issues a reunified Korea would confront. There are a number of stages common to all transitions from planned to market systems, such as price liberalization and privatization, and particular issues that arise in reunifying a divided nation, such as currency conversion and unification of factor markets. There is a natural order to only

¹¹ The North Koreans may have been converting domestic *won* expenditures to dollars at the official rate of 2.2 *won* per dollar. Black-market rates are much higher, reflecting the *won*'s lower real value, suggesting that actual expenditures, while still significant, were much lower.

some stages—currency conversion and price liberalization almost certainly come first, but privatization and other structural reforms have no definite order.

There are clear lessons for Korea from the German case, and the basic outlines of the process would be similar. That said, there are a number of key differences. Most obvious are the different relative population and wealth ratios. The residents of the former East Germany comprise only about one-fifth of the population of the unified country; former North Koreans would make up a third of a united Korea. The relatively higher ratio of North Koreans suggests a larger relative burden for South Korea, all other things being equal. And they are not. Per capita income in West Germany at the time of unification was perhaps two to three times that in East Germany, and East Germany was the most advanced economy of the Soviet bloc.¹² The income differential between South and North Korea is much higher—perhaps as high as 10 to 1—suggesting that the gap would take much longer to close, and that incentives for North Koreans to move southward and other social tensions would be that much greater.¹³

West Germany was also much better able to bear the burdens of unification than South Korea would be. West Germany was (and a united Germany still is) one of the world's preeminent developed economies, with considerable foreign assets, a long-standing trade surplus, and leading-edge industries. South Korea is a successful newly-industrialized country, with a significant trade deficit—nearly 5 percent of GDP in 1996--and net foreign debts of more than \$30 billion. South Korean political and legal institutions are also much less developed than those in Germany—the current South Korean President is the first to assume office without a military background since the 1960s, and only the second to be freely elected since the Korean war.

Institution building—property rights and the rule of law. Perhaps the most difficult issue faced by most transition economies is building the institutions and legal assurances of a market economy from scratch. For example, ensuring individual rights to use, receive income from, sell, or alter private property requires a legal framework. This requires contract law, police enforcement, and a broad societal acceptance of market principles. On an even more basic level, those who hold property must have assurances (explicit or implicit) that it will not be arbitrarily confiscated by the state. Without this framework, individuals have little incentive to acquire property, to improve properties they own, or make other long-term investments. For example, the owner of a firm must be certain that a contract to sell his output will be honored; that his property will be protected against theft; that his neighbors will not seek to punish him should he become successful; and that the state will not arbitrarily seize his profits. Without these assurances, few

¹² Noland, 1996e, pg. 14.

¹³ Estimating North Korean per capita income is a tricky business; the 10-1 ratio is drawn from the official South Korean estimate of North Korean per capita GNP of \$920 in 1996. Based on anecdotal reports of North Korean living conditions and the long tradition of overestimating GNP in communist countries, I suspect that this figure overstates North Korean welfare. However, Noland (1996e) calculates a much smaller ratio, on the order of 5-1 on a purchasing power parity basis.

owners will be willing to risk their money to produce and employ workers.¹⁴ Even more complex issues arise over competition policy and other issues.

Implementing all these things simultaneously has proved a tall order for many transition economies (see Rapaczynski, McFaul, and Pistor and Turkewitz for examples). The proper theoretical model is also a subject of intense debate, including the dilemma of building a government strong enough to ensure the institutions of a market economy, yet somehow constrained against using its strength to confiscate private resources. Or put another way, the question is how the government can credibly promise not to do this in future, in order to foster long-term private investments. In practice, this credibility appears to be something that is most often built up over time, as in the developed West and Japan; it is particularly difficult when the current government's immediate predecessor was explicitly devoted to state control over economic activity, as in Eastern Europe.

The counterpoint to building the proper government institutions is instilling popular belief in the market mechanism. This "mental transition" is particularly important in Eastern Europe and most of the successor states of the Soviet Union, where countries are attempting to move to a democratic government and market economy simultaneously. If citizens in a new democracy are unsure as to the rewards of a market economy, they may well use their new political powers to redistribute resources, rather than putting in place safeguards against such redistribution. Barro's results, for example, suggest that democracy is a "luxury good," and that poor democracies are more likely to engage in rent-seeking behavior that then undermines democratic freedoms and market incentives.

The German experience suggests that one way out of this dilemma is to be taken over by a state that has well-developed legal institutions and a long history of market-oriented behavior; the former East Germany faces few of the problems outlined above (compared to other transition economies). The Korean case would probably be closer to the German experience than that of transition economies, but shortcoming in the South Korean record would present complications not faced in Germany. The former North would inherit South Korea's market institutions including contract law, a court system, and a tradition of moderate state respect for private property. Even given that the South's institutions fall short of the ideal--particularly compared those of West Germany--they still form the essential institutional foundations of a market economy, and the former North Korea would probably avoid many of the problems of formal institution building that have plagued other transition economies. Of course, former North Koreans might not be so quick to trust South Korean officials and institutions.

Popular acceptance of the operations of a market economy might present even more problems, including raising social tensions and complicating the eventual transition to democracy in the former North. After the economic transition, some North Koreans would do much better than others, simply because a market economy rewards individuals

¹⁴ Certainly, the "rule of law" is a continuum rather than an absolute condition; China so far has grown with less than robust property rights. The lack of secure property rights is an increasing source of difficulty in China, however, as more complex businesses develop.

disproportionately (although typically in relation to effort and talent). Although there are income gaps now in the North—mainly due to political influence—such disparities would certainly become more widespread and visible. Some former Southerners would also likely lose from reunification, particularly low-skill workers who would have to compete with cheap labor in the former North and would face lower wages or unemployment as a result.¹⁵ There would be a natural tendency for politicians in a unified nation to exploit these feelings, building coalitions to redistribute income. This would cause tensions in the former South, and might lead to delays in extending voting rights to former Northerners, because these tendencies would certainly become apparent before political rights are extended.¹⁶

Currency conversion. In the Korean case, the first issue to be dealt with is currency conversion—what would the North Korean won be worth?¹⁷ There are two main theoretical issues in setting a conversion rate—the “traded-goods” exchange values of the two currencies, and the purchasing power equivalent. The traded-goods rate would be the rate that would prevail in the free exchange of goods across an international border, with a freely floating exchange rate. Such an exchange rate measures the price ratio of domestic to foreign goods; the higher the rate (the weaker the domestic currency), the more domestic goods it takes to buy a set quantity of foreign goods. In a transition to a market economy, a nation that produces uncompetitive goods will find that its currency is worth little on traded goods basis; it will take a relatively greater quantity of poor quality domestic goods to purchase a set quantity of foreign goods.

The other theoretical framework for currency conversion is purchasing power parity (PPP)—an attempt to account for the actual buying power of each currency in its home country. In international comparisons, PPP is a theoretically constructed exchange rate that takes into account the lower prices of nontraded goods in some countries; per capita GDP is then converted at this new rate, rather than at market exchange rates. A PPP exchange rate can imply lower or higher national wealth; national income in most developing countries appears much higher when measured in PPP terms because of their lower prices of services and land. By contrast, PPP measures reveal that some nations such as Japan and Switzerland, which have the highest per capita incomes based on

¹⁵ Changes in relative prices for some goods in a unified Korea—such as those produced by cheaper labor in the North—might raise real incomes in the former South, however, potentially offsetting some of this effect.

¹⁶ The entire question of when to extend voting rights to the former Northerners is greatly complicated by Article 4 of the Republic of Korea constitution, which says the ROK will “carry out a policy of peaceful unification based on the principle of freedom and democracy.” This strongly implies that efforts to delay granting voting rights in the North beyond some “emergency” period could face legal challenges, mounted perhaps by forward-looking Southern politicians.

¹⁷ Of course, South Korea could retain a separate currency for the North and declare a North-South free trade area with flexible exchange rates between North and South Korean currencies. According to Sinn and Sinn, this option was rejected in the German case out of fear that it might delay or prevent unification—a concern that would probably not be relevant if South Korea absorbed the North. Kwon makes a persuasive case for this option based on a comparative study of monetary unification in Germany, Yemen, and the European Union.

exchange rate conversions, are not as well off as they appear because of the higher prices they pay for nontraded goods.

The first question is: is there a traded-goods rate, or a reasonably proxy, between the North and South Korean *won*? The official fixed exchange rate is roughly 2.2 North Korea *won* per US dollar—or roughly 400 South Korean *won* per North Korean *won*—but there is no reason to believe this reflects anything other than an arbitrary value, perhaps based on the perceived prestige of having a currency near parity with the US dollar. In fact, there is very little information on which to decide, in advance, what a “correct” conversion rate would be for the currency held by former North Koreans.¹⁸ It is possible, however, to use the theoretical framework outlined above to consider the likely influences on a conversion rate, and point out a number of issues that would arise depending on that rate.

It may first be useful to summarize what Germany did.¹⁹ East Germans were allowed to convert *ostmarks* (East German currency) to *deutchmarks* at a 1-1 exchange rate up to a limited amount of money based on age, 6,000 marks at most, and at 2-1 after that amount. Wages, prices, and pensions were converted at 1-1, while debts and other financial claims were converted at 2-1. East German currency acquired for speculative reasons (in the year before unification) was converted at 3-1. The conversion rate was primarily a political decision; the head of Germany’s central bank publicly referred to it as a “disaster.”²⁰

Although it is possible that South Korean politicians would arbitrarily set a conversion rate, it is likely they will be more systematic, given the widespread perception that the German experience was indeed catastrophic. The first step in setting a conversion rate would be to discover what the traded-goods rate would be. Although there is no open market for North Korean currency, there are a number of indirect sources of information on what a free market rate might be. The most appealing on one level is the black-market rate, which does at least represent a market-determined rate of exchange. Although there is no direct exchange of North and South Korean currency, there is a black-market exchange rate between North Korean *won* and other hard currencies, including the US dollar. This rate could provide a proxy for an exchange rate with South Korean *won* (since the *won* and dollar are freely traded). Some recent press reports claim that the North is now allowing “free” exchange in the Najin-Sonbong Free Economic and Trade Zone at the rate of 200 *won* per dollar; this implies a rate of roughly 4 South Korean *won* per North Korean *won*.²¹

¹⁸ North Korea has a number of different types of currency, including “local use” *won* and foreign exchange *won*, a hard currency proxy. The North also uses “friendship” *won* for visitors from other socialist countries, although the importance of this currency has obviously declined.

¹⁹ See Sinn and Sinn, chapter 3, for a detailed discussion of German currency conversion.

²⁰ Ibid., pg. 51.

²¹ See Hoon, pg. 75.

A conversion rate based only on a black-market rate is likely to understate the value of North Korean currency, however. A black-market rate is one that prevails under a number of distortions, most obviously, a restricted supply of foreign currency. In socialist systems, there may also be an excess supply of domestic currency—a “monetary overhang”—if citizens have been forced to hold cash because desired goods are rationed. There is also a risk premium associated with a black-market rate—since such exchange is illegal—that would further distort such transactions. This risk premium is a function of the probability of being caught and the severity of the punishment; given the North Korean state’s pervasive security apparatus and reputation for severe punishments for minor offenses, this risk premium could be quite high. The direction of this distortion is uncertain, however, since it is illegal both to sell and to buy foreign currency.

Despite these complicating factors, it is still possible to say something in general about what a traded-goods conversion rate for the North Korean *won* might be. Recalling that such a rate is determined by the attractiveness of domestic goods relative to foreign products, the North Korean *won* is likely to be worth very little. The shadow exchange rate that prevailed in trade between the two Germanys, for example, was roughly 4 *ostmarks* per *deutchmark*, reflecting low East German productivity in export goods. Judging by the relatively higher quality of East German goods compared to North Korean products, the North Korean rate will reflect an even lower relative value. The most important indicator here is that North Korea manages to export very little to market economies. Also, the prices the North receives for the few goods it does sell on international markets—such as cement and steel—probably fail to cover their true costs, particularly if energy and other inputs are also at market prices. In fact, North Korean output may actually reflect negative value added at market prices (a final output value of a good less than the value of inputs used to produce it; steel that would sell for less in an open market than the iron ore and energy used to produce it), although this would be very difficult to calculate in that it would require knowledge of market-equivalent capital costs, wages, and input prices.

The other major factor Korean authorities would want to take into account in setting a conversion rate is relative purchasing power. In a unified nation, many nontraded goods would suddenly become tradable, and a conversion rate based only on the traded-goods exchange rate may shortchange one side. Sinn and Sinn (chapter 3), for example, argue that in the German case, the purchasing power of the *ostmark* and the *deutchmark* may well have been equal because of the lower price of nontraded goods in the East. As evidence for parity, they argue that if a 1-1 rate undervalued the *ostmark* (as many at the time held), then the currency conversion should have resulted in a huge increase in East German wealth and a subsequent economic boom. In fact, a severe recession followed.²²

The implications of a relative purchasing power argument for Korea are unclear, if only because of the extreme distortions of the North Korean economy. In theory, services in lower-wage North Korea should be cheaper, but in practice, North Korea has so thoroughly suppressed the service sector that this might not be the case, at least initially.

²² There were of course many other reasons for this economic contraction.

Land should be cheaper as well—but there is no way to tell under current prices, since land is all owned by the state. The relevant measure then would probably not be prevailing prices, but prices that emerged after a market economy began to develop—presenting a serious problem if currency conversion is one of the first post-reunification tasks. The only solution would be for South Korean policymakers to assume that lower wages and incomes in the North would leave the prices of non-traded goods lower, and accordingly set a conversion rate higher than that implied by traded goods alone.

There are a number of practical effects that would flow from the conversion rate. The first is the wealth effect. The more even the rate of exchange, the more wealth the former North Koreans would bring to a unified Korea. In East Germany, for example, demand deposits turned out to be the only wealth many households had, since they were largely forbidden to accumulate property or financial assets, and consumption was suppressed. The possibility exists, however, that North Koreans do not hold large amounts of even their own currency—because of periodic (1972, 1992 at least) official currency swaps, apparently designed to flush out illegally earned cash—and conversion policies designed to provide wealth may not do so.

The currency exchange rate would also help determine the initial competitiveness of (former) North Korean goods in the unified market by determining how high North Korean nominal wages were relative to those in South Korea. The more even the exchange rate, the lower the competitiveness of North Korean goods, both in competing in the South, and against imported South Korean goods in the North. In Germany, the 1-1 conversion rate for wages left Eastern nominal wages at about one-third of those in West Germany. German officials thought this would keep many Eastern firms competitive, since labor productivity in East Germany was estimated at one-third to one-half of West German levels. Severe problems arose in export industries, where East German productivity was much lower and wages in terms of export goods were far too high to compete with West German products. (Even worse, nominal wages also rose rapidly—see below). Even where productivity was in line with wages, East German capital had long been devoted to producing goods for which there was no market, at almost any price. For example, almost nobody was willing to purchase a new Trabant at a price anywhere close to covering manufacturing costs when used Volkswagens were readily available. (For more detail on this point, see below in the discussion on privatization).

North Korean workers would certainly be willing to work for low wages, but North Korean productivity remains a bit of a mystery. The “highly skilled, low wage North Korean worker” is a popular image in the South Korean press, fueled no doubt by hopeful South Korean business leaders who have weathered rapid wage increases in the South. Compared to workers in still-rural China or Vietnam, North Koreans certainly have more experience in industrial settings, and are by all accounts more literate. They may work harder simply out of relief at being rid of the constant ideological hectoring that pervades North Korean factories. The counterpoint is the question of what sort of work habits have developed under decades of socialism (and accompanying lack of material

incentives). Coercive management methods may have minimized gross shirking, at least in comparison to the former Soviet Union and Eastern Europe, but poor habits have probably taken root in the years that North Korean factories have been running at small fractions of capacity. It remains uncertain how North Korean workers will respond once these methods end.

Price liberalization. Once the medium of exchange is settled, the next question concerns what it would be used to purchase, or price liberalization. Price signals are the most fundamental market mechanism. Rising real prices induce producers to produce more and lead consumers to consume less; the lack of price signals is one of the fundamental problems of command economies. Clearly, liberalization is needed, since currently all North Korean prices are controlled and queuing—rather than the price mechanism—is the rationing system for most goods. Lessons from other transition economies in this case are mostly negative; there has been a marked tendency to retain controls on the prices of a number of goods on equity grounds. The former Soviet Union, many countries in Eastern Europe, and China continue to subsidize items such as household energy, rents, and public transportation.²³ Even in East Germany, rents were frozen for a time. Although there are valid concerns about the affordability of basic necessities in transition economies, continued price controls retain the same inefficiencies that crippled overall economic performance in the past. For example, consumers will certainly overuse subsidized energy, and controlled rents will result in underinvestment in real estate. These issues are also often entwined with difficult privatization questions, such as for monopoly energy producers.

The disastrous state of the North Korean economy might actually make price liberalization easier. In other transition economies, authorities have been reluctant to lift existing controls because consumers were actually obtaining some quantity of the goods in question at the subsidized prices. Consumers who are forced to trade subsidized food and electricity for high market prices are sure to complain, but the relevant choice in the North Korean case is between no food or electricity, and market pricing. The magnitude of North Korean humanitarian needs would make it easy for assistance to be delivered in a transparent fashion, with direct grants rather than subsidies. The one subsidized benefit North Koreans apparently still enjoy is housing, and rents as a result may be difficult to liberalize.

Internal factor movements. A reunified Korean government would also need to make immediate choices about internal movements of goods and factors of production. The theoretical basis for this is relatively simple. The argument for free movement of goods is that a larger market supports larger scale production and specialization. Free movement of factors of production—labor and capital—allows them to move to their highest valued uses, or where returns are greatest. All these arguments would apply doubly to the former North Korean economy, where decades of central planning have misallocated resources.

²³ See World Bank, pg. 24 (boxes 2.1 and 2.2).

The least controversial is probably movement of goods. North Korea's economy is such a small fraction of that of the South's that, from the standpoint of most South Korean firms, a unified market will essentially still be South Korea. To be sure, Northern firms (whenever they come into existence), will benefit greatly from the existence of the South Korean market—which has been largely closed to them to date. In the short run, however, North Korean factories would be unlikely to produce much in demand in the South, and aid programs would account for most Northern consumption of Southern products. Even with greater North Korean initial wealth—for example, from a generous currency conversion program—North Korean factories do not exist to produce the consumer goods that would probably be in highest demand as a result of decades of suppressed consumption.

Free movement of capital also seems to present few problems; the obvious direction is from South Korea to North Korea. Since most of North Korea's capital stock is essentially worthless, the former North would be labor abundant and capital scarce, suggesting high marginal returns to capital. There are also obvious advantages to the South Korean government of private firms investing in North Korea.

The only potential policy concern here is that to the extent South Korean firms do invest in North Korea, they would do so at the expense of investing in the South—with potential consequences for employment and output there. Gross fixed capital formation in South Korea in 1996 topped \$140 billion; diversion of even a fraction of this to North Korea would represent a substantial sum of investment by North Korean standards.²⁴ It is also reasonable to assume that South Korean companies would shift some portion of their overseas investments to the North. Total South Korean outbound foreign direct investment (FDI) is relatively modest as compared with Japan or even Taiwan, \$3 billion in 1995, but even this amount could have a substantial positive effect on the North. South Korean investment is not vitally important to any FDI recipient; the most severe effect would probably be in northeastern China, where South Korean firms have been the leading investors.

Labor movement—internal migration—however, would present serious complications. The model here is uncomplicated—the tremendous gap between Northern and Southern wages is an obvious inducement for Northerners to migrate to South Korea. As in Germany, there would be no language barrier, and some Northerners have relatives in South Korea who might assist them. There would be demand for North Korean labor in the South. The South Korean labor market is very tight, with one of the world's lowest unemployment rates and shortages of low-skill labor have already led to inflows of perhaps 200,000 foreign workers. Noland and others have estimated potential flows from North Korea at several million. Such a migration would strain South Korean social services (which are rudimentary in any case) and undermine wages in the South.

There are two possible ways South Korean authorities could limit North Korean migration. The first is to maintain existing controls on internal migration and keep the

²⁴ Economic Statistics Yearbook, pg. 275.

Demilitarized Zone as a barrier. This could be combined with a guest worker program to ease South Korean labor shortages, and other limited movements, such as for family reunification. This strategy, however, would probably spur protests from many South Koreans as well as South Korean allies including the United States, not to mention international human rights groups. It would put South Korean officials in the difficult position of using deadly force to restrain the movements of their own citizens. Any attempt to confer “junior” status on former Northerners would also clash with Article 4 of the ROK constitution, which implies that even present North Korean residents are citizens of the Republic of Korea.

The other solution is to make it economically unattractive for North Koreans to migrate. A short-term strategy would be to distribute aid only in the former North Korea, and only to individuals in their original places of residence—the North Korean government has detailed records. This raises practical questions, however, since it is likely that only some members of North Korean families will move; a typical pattern could be a younger son or daughter going South, while the parents stayed in the former North to collect assistance. The only check on this would be some system that requires that beneficiaries physically present themselves to receive aid, inevitably raising costs.²⁵ The only viable long-term strategy is to raise income levels in the North sufficiently high to keep at least most North Koreans home. It is important to note that income equality is not necessary to achieve this. As Noland (1996e) notes, a per capita income gap of 100 percent between the poorest and richest US states has persisted for decades; similar gaps persist in South Korea and the former West Germany.

In the German case, the 1-1 conversion rate for wages was supposed to result in incomes sufficiently high to choke off migration, yet keep East German industries competitive.²⁶ Whether this policy alone would have worked is unknown. East German workers, urged on by West German unions, demanded and received rapid wage increases following unification. Sinn and Sinn (pp. 164-168) also argue that the wage increases resulted from a principal-agent problem; the negotiations were conducted between the East German workers and the *Treuhand* (privatization agency), which represented the interests of business owners in that it “owned” all the firms. The *Treuhand*, however, as a government agency did not feel it was its place to resist wage demands; it failed as the “agent” of future owners of East German enterprises, now made uncompetitive by unrealistically high wages.

All this presents a seemingly simple lesson for South Korea; keep North Korean wages in line with productivity. This will be an easier task than it was in Germany, if only because the German policy has so clearly been disastrous. Also, the relative bargaining position of unions in South Korea remains much weaker than those in Germany, and thus they would probably lack the political clout to push for high wages in North Korea. North Korean productivity and wages are likely to be very low at first, if only because

²⁵ Most costs would probably be in the form of time of former North Koreans who would be forced to take time off work, etc.

²⁶ See Sinn and Sinn, chapter 3.

South Korean workers have much more capital to work with. There is a natural tension, however, between low wages for North Koreans and a desire to head off migration. The only solution seems to be a long-term system of direct income transfers, which would minimize distortions (relative to forced wage increases or goods subsidies).

Privatization. The most fundamental aspect of communism is state ownership of the means of production, so arguably the most fundamental issues of economic transition is privatization, the transfer of state assets into private hands. It is difficult, however, to construct a single theoretical model of privatization, since the issues raised depend greatly on the overall environment of privatization—one firm in an otherwise private economy presents far different problems from an attempt to privatize large portions of an economy at once. The privatization of firms in the United Kingdom, such as British Airways, represents one limiting case—the issues raised concern only the firm. At the other end of the spectrum are the efforts in Eastern Europe to privatize large parts of the economy, including the entire industrial sector. The reforms in Latin American in the 1980s represent the middle ground—the privatization of hundreds of state firms at one time in an otherwise market economy.

All these models, however, present complex trade-offs on issues including fairness; speed; access to new technology, capital, and management skills; and government revenue.²⁷ The pace of privatization is also important; moving too swiftly risks exhausting the stock of potential investors and their financing, while moving too slowly requires continued subsidies for unproductive enterprises, and risks missing a political window of opportunity for difficult reforms.

Perhaps the simplest model for disposing of businesses is cash sale of intact enterprises, to either local residents or outside parties. This was the method chosen by Germany; it has also been used in other advanced countries, such as the United Kingdom. In theory, investors in the privatized firm will pay the present discounted value of the company's expected future income stream. When firms are actually sold, this method results in better management, access to capital and new technology, and immediate government revenue, so long as the firm's liabilities are low enough. This method appears to work best in developed countries privatizing a limited number of firms; there are plenty of investors (with management skills) relative to the number of firms being offered, and well-developed financial markets to support sales. This method foundered in Germany, however, mostly because the *Treuhand* attempted to sell off essentially an entire economy over a limited time period.²⁸ This overwhelmed potential investors; there was not enough capital or management talent to absorb such a large number of companies at once on a cash sale basis. The result was a dramatic fall in prices received for firms; the *Treuhand* realized just 10 percent of the revenue it initially expected.²⁹

²⁷ See World Bank, chapter 3, for a succinct overview.

²⁸ The reasons listed here are a very short summary of a detailed discussion in Sinn and Sinn, pp. 81-132.

²⁹ Ibid.

Another major form of privatization is to transfer ownership of a firm to its employees and management, either through a management/employee buyout, or a legal version of “spontaneous privatization” where current users of a property claim ownership, essentially a buyout without the formalities. The advantages of this method are that it transfers firms quickly to private ownership, and it may put them in the hands of those with some knowledge of the business. There are numerous difficulties, however. Current managers know how to operate only under a planned system, and are almost certainly ill-prepared to compete in the market. There are no resources available for the new investments almost certainly needed to make firms competitive. Workers may vote themselves wage increases, and manager “owners” may loot assets. This method is also confers smaller gains on those who happen to work for less valuable firms—their stake in the privatized economy is reduced compared to those who happen to work for more viable concerns.

A number of countries, most notably the Czech Republic, have tried some sort of voucher program, where all citizens are given a set number of coupons that can be used to purchase shares of private corporations.³⁰ These vouchers can also be used to buy shares in investment funds that then purchase companies. This method scores high on fairness—citizens share equally in the value of former state firms, and given sufficient secondary markets for vouchers, they can convert this wealth into cash. It also divorces ownership from management, and may make it easier for foreign firms—with management skills—to buy into privatized firms.

The main problem with privatizing North Korean firms is that most of them are likely to be worthless. For one, a large fraction of the North’s industry is devoted to military production; a reunified Korea would have no need for a such a large defense complex, and these facilities produce obsolete equipment in any case. Large parts of the North’s capital stock are devoted to producing other goods with no possible market, such as black and white televisions that receive only one channel. Also, the North’s factories are based on obsolete Soviet technology, with the exception of a few turnkey factories imported from the west in the 1970s that have been probably been poorly maintained. A few enterprises—such as hydroelectric power plants—still operate Japanese equipment from the colonial period. More generally, North Korean industries are organized around factor proportions that would not be efficient at world input prices (for example, a factory constructed under the assumption that subsidized Soviet oil will be available may be hopelessly inefficient at world market oil prices), and much of this capital must be scrapped. This is an example of the “putty-clay” theory of capital—before investment, it can be devoted to any number of projects (like putty), but after, it is fixed to a specific use not easily changed (like clay).³¹ North Korean industrial capital is thus fixed in inefficient combinations.

³⁰ For the details of the Czech program, see Jan Mladek “The Different Paths to Privatization in Czechoslovakia, 1990-?” in Earle, Frydman, and Rapaczynski, pp. 121-146.

³¹ See Ibid., 221-224 for a detailed application to the German case.

As a result, cash sales are likely to find few takers, and management/employee buyouts simply shift the problem—firms will be no more viable under private management than they were in state hands. This lack of value would obviously undermine any privatization method for North Korean enterprises—the state may need to pay potential buyers to take over firms, leaving no wealth to distribute to former North Koreans.

If nearly all North Korean enterprises would not be viable, then the question shifts to how they should be closed down—immediately, or with some delay? This would be a difficult issue. There would be considerable temptation to subsidize North Korean industries, if only to avoid social upheaval, since private investment would take quite some time to provide jobs for displaced workers. There would also be a temporary need for the products of some North Korean basic industries. For example, reconstruction in the North would temporarily boost demand for steel and cement; there is ample production capacity for both in the North. South Korean steelmaking capacity is already insufficient to meet demand there, so the alternative to purchasing North Korean steel is imports.

The problem arises when the temporary increase in demand is over, and these factories must be shut down. The problem in other countries is typically that subsidies, once started, are politically difficult to stop. This is one area where the interventionist legacy of South Korean industrial policy may actually be a plus—South Korean officials have a long and credible record of disciplining firms independent of the potential political consequences that would serve them well in eventually cutting loose temporarily subsidized North Korea enterprises.³²

Competition policy is a necessary complement to privatization. The *Treuhand* took care to ensure that East German enterprises were not sold to West German competitors, who might have simply closed them down (although there is debate on the degree to which this has actually been accomplished). Also, another key facet of the transition to a market economy is the entrance of new firms into the market. How privatization is handled has serious implication for this. South Korea's economy is characterized by significant industrial concentration, with a few top-tier international firms such as Hyundai, and many technologically backward small companies. The privatization of North Korean enterprises presents either a chance to introduce more competition, or strengthen the hand of current market leaders (also see *Building financial institutions* below).

Other categories of former North Korean assets may present fewer problems; unlike industrial capital, land and residential and commercial property will retain value in a market economy. First is agricultural land. Privatization here could be relatively easy—land could simply be allotted to current workers on collective farms. A near-universal response to breaking up collectives has been increased output, as those who work land now have greater incentive to invest time and inputs since they receive the full benefits of such efforts. If agricultural land is truly a “national” asset, then this would shortchange urban residents—some 75 percent of the population—but this would need to be balanced

³² See Amsden, pp. 14-18.

against the speed and simplicity offered by this method. Farmers could also claim that their effort over the years had given them particular claim to the land.

Another difficult issue would be the extension of current South Korean agricultural policies to the North. South Korean agriculture is highly protected and inefficient. After unification, South Korean farmers would certainly press for some sort of protection from Northern agriculture, which could compete on the basis of lower wages, if nothing else. The most costly, albeit likely, alternative is the intact extension of the South Korean system. For example, the South Korean government buys the entire rice crop at prices far above world market levels, and sells it to consumers for less than it pays farmers, resulting in substantial costs. This could simply be extended to North Korean farms. A more courageous South Korean government could seize on unification as an opportunity to push through much-needed reforms in the South.

Privatization of commercial property presents modest, but not insurmountable challenges. Most important, such property, particularly in urban areas, will almost certainly increase in value under a market system as retail and other services develop. As a result, there will be buyers, and such sales should reap substantial revenue. The simplest solution would be for the government to sell it off at auction, perhaps with some reservation for former Northerners (who would otherwise be out-spent by Southerners). The North's massive array of monuments and public buildings, however, might not be so easy to dispose of, although they might serve as tourist attractions.

The final category of assets is housing. This may well be the easiest of all—housing could simply be given to current residents. North Koreans, even in rural areas, tend to live in apartments rather than individual houses; this would present some problems of indivisible common property, but no more than those that affect a condominium development in the United States.

Restitution. Regardless of the privatization method chosen, a major complicating factor in privatization is the issue of restitution for property seized by the North Korean government. Of course, most claims would be made by North Korean residents for properties seized by the former North Korean state. Most politically difficult, however, would be claims by former North Koreans who fled southward before and during the Korean war, particularly if current North Korean residents are occupying such properties.

Restitution was a major issue in Germany. The German government opted for “natural restitution” where claimants were compensated with the return of the seized property.³³ Difficulties arise when there are a number of claims to a property—as was common in Germany—and investment in privatized firms has been reduced. Investors were never certain that a former owner would not emerge—one who has first claim on the property. The main alternative German policymakers considered was for the government to pay monetary compensation, which allows privatization to proceed regardless of the

³³ Sinn and Sinn., chapter 4.

speed of settlement for restitution claims. This was rejected because of the expense; it is unclear how expensive this would be in the Korean case.

Some other former communist nations, such as Estonia, have tried restitution in kind. This appears to work well when small enterprises are returned to their former owners, who often put the firm back into operation far more quickly than if the state had to sell it; claims also appear to be less complex than the German case.³⁴ By contrast, Hungary compensated former owners with privatization vouchers. As a result, some assets have been held out of production longer, but investors are freed of the possibility that their claim to a property might be disputed.

There are a number of reasons why claims in the Korean case are likely to be more limited than in Germany. Before partition, Germany had a well-developed private sector, with tens of thousands of firms, and widespread private ownership of land. Thousands of East Germans fled west during the years of division. By contrast, Korea before division was a Japanese colony, and nearly all major firms and a majority of agricultural land were in Japanese hands.³⁵ Although millions fled south between 1945 and 1950--abandoning significant amounts of property--there has been almost no migration between the two countries since the war. Also, the devastation of the Korean war—and subsequent construction—have ensured that few buildings once owned by Northerners who fled south still survive, except possibly in small towns. Still, the main lesson remains that compensation—rather than in-kind restitution—would result in more investment because potential investors need not worry about restitution claims muddying property rights.

Building financial institutions. The good news in North Korea is that, unlike most other transition economies, it would not face the major task of building a market system of financial intermediation from scratch. A system that encourages savings, and then channels those funds to investment projects is one of the fundamentals of a market economy. Institutions such as stock and bond markets allow companies to finance larger investments than they could with cash flow alone. Building such institutions is difficult for a number of reasons, including the problems of finding skilled regulators and of building appropriate legal structures and informal market understandings.

The bad news is that the North would be saddled with South Korea's distorted financial sector. South Korean banks were long used as tools of industrial policy, and the rest of the financial sector is similarly underdeveloped, a legacy of heavy-handed control

³⁴ See World Bank, pg. 59, box 3.7.

³⁵ Japanese claims will not be forthcoming—in fact, the Japanese government has acknowledged its obligation to pay reparations for its colonial rule to North Korea, although the lack of diplomatic relations between Japan and North Korea has stalled payment. Japan paid \$600 million in reparations to South Korea when the two countries normalized ties in 1963. An equivalent amount today would be between \$1 billion and \$8 billion, ~~depending on assumptions about inflation and accumulated interest.~~ Lower estimates assume only accumulated inflation on the original dollar amount; higher estimates add interest and exchange rate changes; the original amount was in yen, and the yen is now worth three times as much in dollar terms as it was in 1963.

by the Ministry of Finance.³⁶ South Korean interest rates remain higher than world levels, and smaller companies often cannot obtain loans even at these rates since banks lack loan evaluation skills and often demand collateral rather than performing cash flow analyses. The recent Hanbo scandal and Kia bankruptcy and associated banking problems have only highlighted the weaknesses of the South's financial sector.

One of the main effects of the distorted South Korean financial system is to perpetuate a two-tier economy, with a few world-class large enterprises (Samsung, Hyundai, Daewoo) and many small, weak, firms. This has important transition implications, because the emergence of new companies in a transition economy is at least as important as privatizing former state enterprises. This would be particularly important in North Korea, because there are huge gaps in North Korea's industrial structure, including light industrial and service industries, and few existing firms are likely to be viable in any case.

If South Korean financial institutions are transferred intact to North Korea, new North Korean firms will probably find it nearly impossible to obtain bank financing, making it even less likely that significant numbers of indigenous North Korean firms would arise. As a result, most of the economy would be under South Korean control. More specifically, if the pattern that exists in South Korea is perpetuated in the North, the former North Korean economy will be dominated by large South Korean conglomerates.

External economic policies. Transition economies also must make decisions on trade and inward foreign direct investment (FDI) policies. There are of course the standard benefits of free trade—including static income gains through reallocation of resources to take advantage of comparative advantages and the more dynamic gains from exposing firms to the pressures of international competition, forcing innovation. FDI flows also present possible benefits, including an increased capital stock (and higher wages), transfers of technology and management techniques, and potential linkages with domestic firms.

It seems likely that the former North Korea might have to forego many of these advantages. The trade policies of a unified Korea would be strongly influenced by South Korea's still-restrictive trade and foreign investment regime. As a result of these protections, many sectors of the South Korean economy, including retail and other services, are highly inefficient. Export oriented companies became competitive only because of government-mandated export targets which forced them to compete on world markets.³⁷ The economy of the former North Korea might develop in a similar fashion, or even worse if similar export performance standards are not imposed.

³⁶ See Amsden, chapter 3, which focuses on the success of the South's industrial policies, but pays less attention to the resulting distortions.

³⁷ See Ibid., and Eberstadt (*Policy and Performance*), who argues that export orientation was the "one big thing" South Korean authorities got right that overwhelmed the negative effects of other distortions.

There is also the issue of current South Korean commitments to multilateral organizations, including the WTO and the OECD. For example, South Korea acceded to the WTO as a developed country—with attendant requirements for faster liberalization—only with great reluctance; a unified Korea would suddenly be a much less developed nation, and have some justification in demanding less stringent terms than those applied to South Korea alone. The trade interests of a united Korea would also change. South Korea's largest export is electronics, followed by autos, chemicals, and other heavy manufactures. The former North Korea's comparative advantage would certainly be in low-wage, labor-intensive products such as textiles and footwear, but the North is currently locked out of at least the US market. ~~most major markets since it has not joined multilateral trade agreements on the subject.~~ A unified Korean government might demand new textile quotas, and perhaps other trade benefits from the United States and other developed nations.

South Korea also presents a questionable legacy on FDI, which after all, could ease the burden of reunification by providing outside capital to aid in the reconstruction of the North. South Korean economic officials have long limited foreign investment, and the South met most of its foreign capital needs through extensive borrowing. South Korea's gross foreign debt is now more than \$100 billion, although growing South Korean assets overseas reduce the net total to just more than \$30 billion in mid-1997. Many South Korean officials have also expressed concern that Japanese and US companies would exploit opportunities in North Korea at the expense of South Korean firms. All these factors make it likely that a reunified Korea will restrict FDI into the former North; the only question may be to what degree.

The counterpart to FDI policy is regulation of capital flows, important here in the context of external financing of unification. The situation would be very different from that faced by Germany, which was a capital exporter before reunification (and thus had a substantial current account surplus). South Korea has a perennial current account deficit (other than a short period in the late 1980s) and the current account gap in 1996 was nearly 5 percent of GDP. Also the 1996 gap represents in part short-term events such as a fall in semiconductor prices and rise in oil import costs; deficits of anywhere near that size would certainly be unsustainable under the pressures of reunification, suggesting that austerity policies of some flavor might be necessary. Perhaps the good news here is that South Korea is not big enough to move world interest rates; tight German monetary policy following reunification and the resulting high interest rates posed major problems for other EU nations.

Looking Ahead

It is possible to draw some tentative conclusions about what sort of economy might emerge in North Korea. Noland (1996b) has constructed estimates of potential North Korean comparative advantages based on an examination of areas where South Korea and Japan are losing comparative advantage; unsurprisingly, he finds the former North Korea would have a comparative advantage in light, labor-intensive

manufactures. He also used a gravity model to predict a reformed North's likely trade structure, predicting North Korea would trade mostly with South Korea, Japan, and the United States. China would occupy a relatively less important position than it does now as the North's current largest trading partner, a position that apparently depends largely on political, rather than economic causes.

Reunification would probably be initially welcomed by most Northerners, as it would provide an immediate relief from pressing food shortages. It is likely, however, that considerable resentment would develop over time. Under unification, North Korean residents would see two points of pride—heavy industry and the military—disappear. North Korean workers who once built and operated steel mills and hydroelectric dams would make cheap textiles and athletic shoes, and work for South Korean or foreign firms. Economic improvements in the North could also result in a crisis of rising expectations, particularly given that the large income gap between North and South would persist for decades under the most favorable assumptions.³⁸

There also would inevitably be “donor fatigue” on the part of former South Koreans—once again, a lesson drawn from the German experience. This would probably manifest in growing political opposition to the taxes needed to finance unification, labor actions against North Korean competition, or calls for restrictions on North Korean products. North Korean workers would be obvious targets for organization by South Korean unions. There also probably develop social tensions between former Northerners and Southerners. South Korea currently has significant regional tensions, with the residents of the southwestern *Cholla* provinces looked down upon by the rest of the nation, a role North Koreans would undoubtedly step into.³⁹

The Good News

Unification would bring economic gains, although these would be concentrated in the North until quite some time after. In the long term, a unified Korea would be a more significant world player, if only because of its larger population—65 million—and resultant larger internal market for its companies. It would be a nation with a much lower defense burden, and one with the 50-year-old threat of military conflict removed.

A unified Korea would also quickly become the region's most sought-after ally, as the largest, richest, and most powerful nation without “historical baggage” of territorial ambitions. China would no doubt be eager to ensure that a unified nation was at least not hostile to Chinese interests; Japan and the United States could not afford a Korea that was

³⁸ This is simply a mathematical exercise; the speed of convergence depends on the relative difference in growth rates. Lee (1994) predicts income equality in 32 years under the most optimistic assumptions. Another set of reasonable assumptions—based on gradually slowing growth in both the North and South, and a narrowing growth gap as they converge to world technological frontiers—leaves the North behind for nearly 100 years.

³⁹ I am indebted to a senior colleague at the Central Intelligence Agency for these thoughts on social tensions in a united Korea.

... tied too closely to China. A new Korea would thus be in an historically unprecedented position of strength in foreign affairs.

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NORTH KOREA: PRESENT STATUS AND PROSPECTS FOR SURVIVAL TO THE YEAR 2000

Statement of

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HEARINGS ON NORTH KOREA: PRESENT STATUS AND PROSPECTS FOR SURVIVAL TO THE YEAR 2000
Subcommittee on East Asian and Pacific Affairs United States Senate

July 8, 1997

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The views expressed in this statement are those of the author and do not necessarily reflect the views of individual members of the Institute's Board of Directors or Advisory Committee.

It is an honor to appear again before this Subcommittee. As former Vice President Mondale once observed, anyone who calls themselves an expert on North Korea is either a liar or a fool. Since I try to avoid both appellations, I will not claim to be an expert on North Korea. Rather I am simply a conventionally trained economist who has spent some time analyzing the North Korean situation. Today I intend to discuss the difficulties facing the North Korean economy, including its immediate problem with respect to food, and then speculate as to possible developments over the next several years. Throughout my presentation you should keep Vice President Mondale's wise words in mind.

THE NORTH KOREAN ECONOMY

The North Korean economy is organized along lines similar to other centrally planned economies (CPEs). The distinguishing feature of the North Korean case has been the extremes to which central planning has been taken under the *juche* ideology of self-reliance of founder Kim Il-Sung. Indeed, North Korea's successive central plans were timed so as to frustrate economic linkage even with its socialist allies.

Foreign observers (including those from fraternally allied socialist states) had concluded that the North Korean economy was already experiencing serious problems by the late 1970s when its ability to grow "extensively" through the mobilization of resources began to reach its limits. These difficulties were exacerbated by a series of macroeconomic shocks in the late 1980s including the withdrawal of Soviet aid, economic disengagement with its former socialist allies in the East Bloc, and bad weather which intensified the secular crisis in North Korean agriculture.

Assessing the degree of economic distress in North Korea with any precision is difficult. Virtually all economic and social data are regarded as state secrets. A number of individuals and organizations have attempted to estimate North Korean national income, but figures invariably cited in public discussions are the official South Korean estimates of North Korea's economy produced by the Bank of Korea (BOK). These figures are apparently derived by taking classified data on physical output generated by South Korean intelligence agencies and then applying South Korean prices and value-added weights to indices of physical production. Because the original estimates of physical output are classified, there is little opportunity to check their plausibility, nor is it obvious that South Korean prices and value-added weights are the most appropriate ones available. Furthermore, the ultimate growth rate figure is

weights are the most appropriate ones available. Furthermore, the ultimate growth rate figure is reportedly subject to interagency bargaining within the South Korean government.

With these caveats in mind, the BOK data indicate that the North Korean economy shrunk by roughly 30 percent between 1991-1996, certainly a significant amount, but not unprecedented in the experiences of other transitional economies. (Interestingly, an estimate of a similar magnitude has been publicly affirmed by high-ranking North Korean officials, though it is unclear whether the North Koreans truly believed this, or were simply parroting the familiar South Korean line to establish credibility with a foreign audience.) However, the estimated fall in national income may well overstate the reduction in household welfare, since it is unlikely that services (housing services and education to give two examples), which are undercounted in the socialist accounting system and are not amenable to physical measurement, have declined as much as manufactured output. These considerations would appear to caution against interpreting the national income estimates as indices of hardship or political discontent.

Somewhat less uncertainty surrounds North Korea's external economic relationships. In principle one can obtain estimates of trade and capital flows by aggregating the data reported by North Korea's trade partners after adjusting for misreporting, transportation costs, etc. Three conclusions stand out: North Korea runs chronic trade deficits in the hundreds of millions of dollars, trade is concentrated with a few partners, and most tellingly, trade volumes are falling. If the deficits that North Korea runs with China, obtaining imports on concessional terms, and the surpluses that it runs with South Korea, generating export revenues, are considered in effect to be politically determined, China and South Korea together implicitly support most of North Korea's trade deficits.

Still, North Korea appears to confront a financing gap on the order of hundreds of millions of dollars. Aside from exports, the largest source of hard currency earnings are probably remittances, principally from ethnic Koreans residing in Japan. Again, the amounts of these remittances are hard to pin down with any degree of precision. They have been variously estimated by the amount of currency that visitors from Japan could legally carry on their person, profits from the pachinko industry (a form of gambling popular in Japan in which ethnic Koreans play an important role), and as a residual of the balance of payments accounting constraint. Not surprisingly given these varied approaches, estimates of the annual amount of remittances vary enormously from \$2 billion to the low millions, with estimates typically running in the hundreds of millions of dollars (again consistent with private comments of North Korean officials), though recent scholarship tends toward lower figures, perhaps less than \$100 million.

In response to its current predicament the regime has begun some modest and hesitant reforms, most notably the establishment of a special economic zone, modeled after China's, in the extreme northeast of the country. But such tinkering, however politically contentious it might be within North Korea, is unlikely to be sufficient to reverse the secular decline of the economy. The bottomline is that the economy is in bad shape, but for almost all economic aggregates of interest, the margin of error in the estimates is on the order of hundreds of millions of dollars.

MINIMUM SURVIVAL REQUIREMENTS

An alternative approach to this problem would be to ask what would be the level of external assistance required to maintain the North Korean population biologically. It is important to keep in mind that the problems of North Korea's agriculture are primarily systemic in nature: while the flooding of the past two years has exacerbated the problem, North Korea had already appealed for, and was receiving, food assistance from South Korea and Japan before the floods. The bureaucratic collectivist nature of North Korean agriculture contributes to inefficiency, and the single-minded maximization of short-run output has meant the adoption of unsustainable practices. Continuous cropping and the overuse of chemical fertilizers has led to soil acidification, while soil erosion and silting due to the denudation of hillsides has contributed to flooding. This environmental damage will take decades to repair. In any event, North Korea should be exporting mineral products and manufactures and importing food -- not trying to achieve self-sufficiency.

A variety of organizations and individuals have analyzed the food situation in North Korea, and the rough consensus is that North Korea is experiencing an annual grain shortfall of roughly 2 million tonnes. (Again, these estimates are constructed in a variety of ways based on little systematic observation of conditions on the ground and may be subject to substantial error.) The shortfall is partly

observation of conditions on the ground and may be subject to substantial error.) The shortfall is partly due to bad weather and flooding, but at base it is structural in character, and provision of food aid is only a short-run palliative in the absence of more fundamental economic reforms.

Like agriculture, the situation with regard to energy is clouded by a lack of information. North Korea is reliant on imported oil to generate fuels and fertilizer for use in transportation and agriculture. Oil imports have been squeezed by foreign exchange shortages and the reduction in subsidized supplies from Russia and China (though reports continue to crop up of arms for oil swaps.) Electricity is mainly generated using coal and hydropower. Electricity generation is hampered by difficulties extracting increasingly inaccessible and low quality domestic coal reserves. Beyond the problem of lack of energy inputs, the power grid (largely underground for security purposes) is said to suffer from extraordinarily large transmission losses.

Energy problems will be partly addressed through the U.S.-North Korea Agreed Framework which provides for provision of fuel oil during the construction of light-water nuclear reactors and the rehabilitation of the electrical grid. Nevertheless, North Korea will need additional energy inputs beyond those specified in the Framework Agreement if it is to reattain its peak level of electrical consumption.

If these estimates are correct and the Framework Agreement is implemented, the actual cost of purchasing the estimated shortfalls in grain and energy inputs would not be very large, on the order of hundreds of millions of dollars. There is anecdotal evidence that both the central planning mechanism as well as public food distribution system is fraying under stress of this ongoing crisis, but this should not be overstated. The impression that one gets is that the central government continues to act with a relatively high degree of coherence (and a relatively high degree of acquiescence by the population). It may well be that hunger is a relatively localized phenomenon falling disproportionately on certain socio-economic groups (in particular non-farm workers in the rural areas) and that this reflects conscious decision-making by the political elite.

Indeed, the sums of money required to maintain population survival appear to be within the margin of error of what we think we know about the North Korean economy. It is in the realm of possibility that North Korea can survive (in a biological sense) with only modest external assistance. In the short-run China, Japan, or South Korea could keep North Korea afloat (in this narrow sense). Indeed, both the Japan and China at present appear to have surplus government grain stocks that could be used to make up the North Korean shortfall with minimal expenditures.

At the same time, it should be reiterated that this analysis is based on highly fragmentary information. It is quite possible that a "silent famine" similar to what took place in China during the Great Leap Forward is unfolding in North Korea. Among the worst (and least understood) famines in this century took place in socialist countries in which governments were to a greater or lesser extent successfully able to restrict the flows of information and people both internally and externally. North Koreans have been conditioned by nearly two generations of extreme regimentation. It is not implausible, given the terrain and the instruments of social control at the disposal of the current regime, that it could prevent the mass population movements observed during famines in Africa or the Indian subcontinent. If a famine were to occur in North Korea, the killers would be tuberculosis and spontaneous abortions, not kwashiorkor, and we would probably learn its full magnitude a decade hence reading a graduate student dissertation, not watching CNN. If such a famine does materialize, its roots will be in political decisions made in Pyongyang, not material resource constraints.

REGIME STABILITY

The obvious question then is what are the capabilities and interests of the North Korean regime? Neither question can be answered definitively. Since the death of Kim Il-Sung the state has appeared to be on a kind of extraconstitutional autopilot: as of this writing political (and biological) heir Kim Jong-Il has not formally assumed his late father's offices, the national assembly has not met and the terms of the sitting members lapsed, and the government budget, the sole piece of economic information that the government regularly announced has not been released for several years.

At the same time, the regime has managed to pull off some achievements. The Agreed Framework was successfully concluded with the US, a trade and investment conference in the special economic zone of

successfully concluded with the US, a trade and investment conference in the special economic zone of Rajin-Sonbong attracted hundreds of foreign participants, and critical institutions such as the public food distribution system appear to be functioning. While there have been indications of system fraying (the defection of Hwang Yang Jop, economic exchange outside the central plan as local political and military leaders attempt to satisfy the needs of their constituencies) the overall impression one gets is that the government is performing at a reasonably high level of coherency and efficiency given the strains the current crisis.

The question then becomes what are the interests of the regime? Here the analysis of the situation must by its nature be highly speculative, and frankly outside my area of comparative advantage. Nevertheless, one can imagine a variety of generic strategies that the government might pursue in addressing its economic problems.

Reform

First, the government might pursue policies of fundamental economic reform. This would involve decisively liberalizing and marketizing the economy. In this regard, the experiences of China and Vietnam may be misleading. At the time of their reforms, these economies were far more agrarian than North Korea and their ability to shift extremely low productivity labor out of agriculture and into the emerging non-state-owned light industrial sector has been a key to their success thus far. Successful reform of a more industrialized economy such as North Korea is likely to be far more difficult for purely technical reasons, and would imply tremendous change for the North Korean economy. The economy is so distorted that North Korea could increase its output by more than half its pre-decline level under favorable conditions. The share of international trade in national income could rise five-fold, and much of this trade would be with Japan and South Korea -- two states with which North Korea has highly problematical relations. Moreover this transformation would involve hundreds of thousands of people moving from the countryside to the cities, and literally millions of people changing jobs. Reform, therefore, would be a high-risk, big-payoff strategy. Change on this scale would likely unleash political changes that the regime would find destabilizing and it is highly doubtful whether the current regime has either the skill or the guts to go this route.

Moreover, policymakers in China and Vietnam were able to undertake reform under conditions of relatively secure political and military conditions. The existence of a prosperous and democratic South Korea poses enormous ideological challenge for the North -- while reformers in China and Vietnam were able to construct tortured rationalizations for why marketization really was what Marx had in mind, reform in North Korea could call into question the regime's whole *raison d'être*: why be a second-rate transitional economy when you can join South Korea?

Indeed, it is hard to imagine North Korea undertaking significant reform without a more secure external environment. Although it is possible that the military, probably the most coherent institution in the society, with privileged access to economic assets, could be a prime beneficiary of reform, it may well oppose reform if it believes that this will endanger the nation's military security. This suggests that economic reform is unlikely to occur before some rapprochement with South Korea. And taken together these considerations suggest that North Korea is unlikely to undertake wide-ranging reforms of its own volition.

Collapse and Unification

Alternatively, the regime could stand pat and do nothing. This holds the promise of short-run political stability, though if economic distress is not currently putting a significant share of the population at peril, if current trends continue, it eventually will. Moreover, North Korea differs in some significant ways from other socialist regimes which were able to survive self-inflicted famines earlier in this century. First, unlike the others, the Kim Jong-Il government is not a revolutionary regime, but the dynastic continuation of one which has now held power for nearly 50 years. Surely neither this government (nor the governed) have the same capacity for enduring hardship that would exist in a period of revolutionary fervor. Second, North Korea is a relatively industrialized, urbanized society, and this reduces both its government's ability to squeeze resources out of the agricultural sector and the populace's coping mechanisms. Third, previous socialist famines have largely been precipitated by the

introduction of counterproductive policies, and could be solved relatively straightforwardly by the removal of those policies. Less a function of bad weather or the introduction of misguided policies, North Korea's current agricultural problems appear to be the culmination of policies undertaken for two generations. //

Economic collapse (presumably precipitating a significant alteration in or disappearance of the current political regime) would be disastrous in human terms and pose great risks to international political stability, especially if it were accompanied by civil war and military intervention by external powers.

The most obvious point of comparison in this regard is with the German experience, which has proved more protracted and costly than analysts anticipated at the time of unification. Transfers have been larger and have gone on longer than expected. And even with this largesse, East Germany has gone through a truly wrenching transformation: the immediate effect of unification and the depression that ensued was a collapse in the birth rate and a rise in the mortality rate completely unprecedented in German history (including the inter-war years and the period of military defeat) and comparable only to disasters such as China's Great Leap Forward. And though some of the declines in marriages and births presumably represent time-shifting, and not permanent reduction, the same cannot be said for the increases in mortality rates.

In some ways the Korean case presents a gloomier picture than the German case: North Korea's population is relatively larger (about half as large as South Korea, compared to an East Germany which was one quarter as large as West Germany), and poorer (per capita in North Korea is only around one seventh that of the South, compared to East German incomes around one third to one half those of West Germany); North Korea's economy is probably more distorted than East Germany's was, and South Korea is not as rich as West Germany. On the other hand, demographically the combined Korea is younger than the combined Germany, and North Korea has a younger demographic profile than East Germany, which should facilitate adjustment with lower social expenditures than in the German case.

Still, if South Korea were to absorb North Korea as West Germany absorbed East Germany, the cost of unification, defined as the capital investment needed in North Korea to choke off the incentive for mass migration, would be on the order of \$1 trillion - a figure so large as to be improbably attained. As a consequence, even under optimistic scenarios, there will be enormous economic incentives for North Koreans to move South, and the potential for such migration is enormous: assuming that a person carrying some belongings could travel 20 miles a day, 40 percent of the population of North Korea lives within in a 5 day walk of the DMZ, and computer simulations indicate that as much as three-quarters of the population might head south before stability was reattained.

"Muddling Through"

Between the two polar extremes of reform and collapse lies "muddling through". In this regard, the experience of Romania may be instructive. The two countries are similar in population, income, social indicators, and composition of output, and shared central planning and its attendant maladies. Both experienced economic problems in the 1970s which were eventually manifested in difficulties repaying accumulated external debts. One striking difference is that Nicolae Ceausescu made the fateful decision to repay the debt, while Kim Il-Sung simply defaulted on his Western creditors. (The lesson here may be if one has to displease a constituency, foreign bankers are a better choice than the local populace.)

Romanian living standards began falling in the early 1980s as domestic consumption was compressed to free up resources for debt repayment, and conditions worsened in 1985 as the country was hit by severe weather while experiencing an energy crisis. Yet the first mass unrest did not appear until 1987 -- six years after the decline in living standards began -- and it was not until two years later in 1989, with other socialist regimes beginning to collapse and the economy entering free fall, that the Ceausescu regime toppled. This would suggest caution in drawing too deterministic a link between economic hardship and political failure, a caveat reinforced by the contemporary experiences of countries as diverse as Cuba, Iraq, and (until recently) Zaire. The willingness of foreign powers to support the incumbent regime may also differ greatly in the Romanian and North Korean cases.

Moreover, Ceausescu's removal had more the air of a regime-preserving coup than a genuine revolution.

Subsequent Romanian experience suggests that muddling through may indeed be a viable strategy. As far as can be divined, North Korea and Romania exhibited similar rates of economic growth during the mid-1980s. Romania subsequently suffered a sharper contraction in output than North Korea has experienced. However, once the reform process was initiated in 1990, the Romanian economy began to stabilize, and by 1993 was registering positive if unspectacular economic growth.

Similar economic (and possibly even political) developments might occur in North Korea. The economic reform strategy in Romania has been strongly influenced by the political and economic interests of the former Communist Party embodied in (the only recently ousted) Ion Iliescu's Party of Social Democracy (PDSR). The state continues to be the dominant force in the economy. Political power is used to create and allocate rents which are channelled to politically influential groups and individuals either directly or informally through corruption. The process of restructuring has proceeded at a slow pace. It is not difficult to imagine Kim Jong-Il (or his successor) adopting a similar set of policies in response to the exigencies of economic hardship on the one hand, and the requirement of satisfying the regime's political base on the other. In the case of North Korea, these favored constituencies would presumably be the Kim clique, along with the military and possibly the upper echelons of the Korean Workers Party. Externally, the regime could expect tutelage and material support (presumably accompanied by conditionality) from China, an advantage the temporizers in Romania did not have.

North Korea is not Romania and one should not push such analogies too far. Most pertinently, the existence of a prosperous, democratic South Korea would seem to make it much more difficult for Kim Jong-Il (or his successors) to pursue apparatchik capitalism as a long-run development strategy. (Indeed, even in Romania, Iliescu's PDSR was driven from power in the last election.) Nor does ad hoc coping ensure success -- some of the "muddlers" among the states of the former Soviet union have experienced output declines of 50-80 percent. Nevertheless, the experience of Romania suggests that muddling through may last for years before a more permanent turn towards reform or chaos, especially if external powers find this solution to be in their interests.

Indeed, it may well be the case that China, Japan, Russia, and arguably even South Korea, would prefer a muddling, domesticated, North Korea to a unified, capitalist, and possibly nuclear armed state on the Korean peninsula. China (and for similar reasons Russia and Japan) may prefer continued economic engagement with South Korea, and would be willing to expend some resources to maintain North Korea as an allied buffer state. Unification along the lines of the German model would complicate the strategic planning of China and Japan, and would further reduce Russian influence in region. At least in the short- to medium-run, one can envision China providing North Korea with aid and technical assistance, South Korea engaging China (and possibly North Korea) economically while protected by the American security umbrella, and concerns of a Sino-Japanese military imbalance submerged by the American counterweight.

In contrast, the US would bear little of the unification's direct costs, and unification would hold forth the promise of eliminating the direct threat posed by North Korea to US troops currently stationed in Northeast Asia, as well as the prospect of ending North Korean proliferation of weapons of mass destruction. While there may be some benefit to the US in playing the regional security role outlined above, long-run US interests are surely better served by unification, and in this regard the US may be unique.

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The Economics of Korean Unification

Marcus Noland

South Korea is the first developing country to achieve developed country status. Time magazine once described North Korea as "a Stalinist Disneyland." The two states lie on a peninsula contested militarily by Japan, Russia, the United States, and China within this century. The eventual unification seems inevitable but the path to that result and the costs it will entail are both highly uncertain and potentially of global significance.

This book will examine the economic future of the Korean peninsula in terms of three basic scenarios: successful economic reform of North Korea; collapse of the North Korean state and its absorption into South Korea; and an intermediate "muddling through" in which North Korea makes a series of ad hoc regime-preserving changes that fall far short of fundamental transformation. These three scenarios are neither exhaustive nor exclusive. Rather than the peaceful collapse and absorption that occurred in East Germany, for example, North Korea could plunge into a civil war involving the intervention of external powers. Or eventual unification of Korea on essentially South Korean terms could be preceded by a prolonged period of muddling through.

Little is known about North Korea and the dynamics of the issues addressed in this book are exceedingly complex. Hence it would be foolhardy to predict any of these outcomes with a strong degree of confidence. The book will argue that muddling through or some sustained period of North Korean decline before the regime's ultimate denouement are the most likely outcomes, though collapse along the East German lines remains a distinct possibility. Successful economic reform in North Korea appears to be the least likely eventuality.

The costs of rebuilding the North Korean economy under any scenario, and the implications for the South Korean economy of increased economic integration with the North, are enormous. This book will examine the organization and performance of the North and South Korean economies, and the implications for South Korea and the rest of the world for economic opening in the North. It will develop estimates of the costs of rebuilding the North Korean economy under alternative scenarios. Special attention will be given to the prospective roles of third parties including the United States, China, Japan, and the international financial institutions, as well as the role of foreign private capital investment in this process.

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INSTITUTE FOR INTERNATIONAL ECONOMICS

Working Paper 97-5

The Economics of Korean Unification**Marcus Noland, Sherman Robinson, and Li-Gang Liu**

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ABSTRACT

We construct the Korean Integration Model (KIM), a two-country computable general equilibrium (CGE) model linking the North and South Korean economies. Using KIM, we simulate the impact of a customs union and a monetary union of the two economies both in the presence and absence of cross-border factor mobility, treating technological transfer in three ways. Factor mobility is of critical importance. If factor markets do not integrate, the macroeconomic impact on South Korea of economic integration with the North is relatively small, while the effects on North Korea are large. With a monetary union and factor market integration, there is a significant impact on the South Korean income and wealth distribution. If investment flows from South to North and labor flows from North to South, there is a shift in the South Korean income distribution toward capital, and within labor toward urban high skill labor, suggesting growing income and wealth inequality in the South. Similarly, the specific form of technological transfer is important: if North Korea succeeds in adopting South Korean technology, it experiences a tremendous boost in productivity in the traded goods sector which tends to increase the magnitude of change in macroeconomic aggregates and distributional shares exhibited by South Korea. If integration is accompanied by large capital inflows, there is a significant appreciation of the real exchange rate with deleterious implications for the South Korean traded-goods sector.

INTRODUCTION

The worsening economic plight of North Korea has been widely documented.¹ In response, the regime has initiated some modest reforms that do not alter the fundamental centrally planned character of the economy, but the policy changes to date are probably inadequate to address the task at hand. In a recent poll of scholars, 38 percent of the respondents predicted that the current regime would not last a decade (Y.S. Lee, 1995).

One obvious direction of reform would be to marketize the economy and open it to greater interaction to the outside world—including South Korea. Greater North-South economic integration, either in the context of a reform strategy initiated by the North, or in the context of collapse and absorption by the South, potentially could have profound effects on both economies, yet scant effort has been devoted to constructing economic models to analyze this possibility. In this paper we construct the Korean Integration Model (KIM), a two-country computable general equilibrium (CGE) model linking the North and South Korean economies, extending earlier modeling work on the North Korean economy by Noland, Robinson, and Scatasta ((NRS), 1997). That work developed an eight sector, four factor, constant returns to scale CGE model of the North Korean economy. The single-country NRS model was used to examine three issues associated with economic reform: the static gains to trade liberalization, the increase in total factor productivity induced by the importation of capital goods embodying new technologies, and the "obsolescence shock" reduction in the capital stock as a result of the introduction of new goods and significant changes in the structure of relative prices. The model was calibrated to 1990, the last year before North Korea entered a period of severe macroeconomic instability.

1990, the last year before North Korea entered a period of severe macroeconomic instability.

The main results obtained by NRS are that 1) the static gains from trade liberalization for North Korea are potentially huge--on the order of 25 to 35 percent depending on specific assumptions about factor market adjustment; 2) total factor productivity could increase by 18 percent, leading to a roughly 50 percent increase in national income in the complete liberalization scenario; and 3) that North Korea could absorb up to an approximately 50 percent "obsolescence shock" reduction in the capital stock before national income fell under successful economic reform.

✓ Sectoral results reported in that paper indicated that there would be an enormous shift in the composition of output and employment towards the light industry sector (and to a lesser extent mining), while agriculture and the capital goods sector would tend to contract as factors were reallocated in a more economically rational way.

The NRS model was then used to calculate the "cost of unification" defined as the addition to the North Korean capital stock necessary to increase North Korean per capita incomes to 60 percent of those of the South, a target thought adequate to choke off incentives for mass migration. In 1990 this "cost of unification" was \$319 billion, rising to \$754 billion in 1995, and \$1,721 billion in 2000 as the gap between North and South Korean incomes grew with delay in the initiation of reform.

In this paper we alter and extend the NRS model to a two-country setting by constructing a similar eight sector, four factor, constant returns to scale model of the South Korean economy and linking it to the North Korean model.² The Korean Integration Model (KIM) allows us to examine three issues of major importance--the mechanism of technological convergence, the macroeconomic impact on the North and South Korean economies of different modes of economic integration, and the impact on the distribution of income in and across the two economies. Using KIM we simulate the impact of a North Korea-South Korea customs union, and a monetary union of the two economies in the both presence and absence of cross-border factor mobility. Our results indicate that this distinction is of critical importance. If factor markets do not integrate, the macroeconomic impact on South Korea of economic integration with the North is relatively small. Far larger macroeconomic results are obtained when we create a monetary union and begin allowing factor market integration. Indeed, factor market integration has a significant impact on the South Korean income and wealth distribution. If investment flows from South to North and labor flows from North to South, there is a shift in the South Korean income distribution toward capital, and within labor toward urban high skill labor, suggesting increased income and wealth inequality in the South. The magnitude of these effects is increased if North Korea adopts South Korean technology. If integration is accompanied by large capital inflows, there is a significant appreciation of the real exchange rate and output falls in the South Korean traded-goods sector.

THE KOREAN INTEGRATION MODEL (KIM)

The Korean Integration Model (KIM) is a member of a growing family of trade-focused, multi-country, computable general equilibrium models designed to analyze the impact of trade liberalization and the formation of free trade areas and customs unions. KIM consists of two linked country CGE models, one for North Korea and one for South Korea. The rest of the world is included by means of a simple representation of fixed world prices for North and South Korean exports and imports. The countries are linked by trade flows, and the model solves for all internal prices, including commodity and factor prices, and external prices of all traded goods. Domestically produced and traded goods are specified as imperfect substitutes, which provides for a realistic continuum of "tradability" and allows for two-way intersectoral trade.

KIM has a standard neoclassical specification, except that the model incorporates severe quantity controls in exports and imports, with concomitant distortions in domestic product and factor markets. The markets for goods, factors, and foreign exchange are assumed to respond to changing demand and supply conditions, which, in turn, are affected by government policies, the external environment, and other exogenous influences. The model can be considered medium-to-long run in that all factors are assumed to be intersectorally mobile. It is Walrasian in that only relative prices matter. Sectoral product prices, factor prices, and the exchange rate are determined relative to an aggregate consumer price index, which defines the numeraire.³

The model has eight sectors: agriculture/forest/fisheries, mining, light manufacturing, industrial intermediates, capital goods, construction, public administration, and services. There are three "demanders": a single aggregate household which buys consumer goods, a government which spends on goods and public administration, and an aggregate capital account which purchases investment goods. Primary factors of production are capital, agricultural labor, high-skill urban labor, and low-skill urban labor. Land is not explicitly modeled as a separate factor and can be considered as subsumed in agricultural capital.

Sectoral production technology is represented by a set of Cobb-Douglas functions of the primary factors, while intermediate inputs are demanded according to Leontief, fixed input-output coefficients.⁴ On the demand side, import demand functions are specified as AIDS (Almost Ideal Demand System)-translog--which allows substitution elasticities to differ between domestic-, Korean partner-, and rest-of-the-world-produced goods.

KIM focuses on real trade flows, relative prices, and the real exchange rate. The aggregate price level in each country is taken as exogenous, and the model does not include money or other assets. The model includes the basic macro aggregates for each country, including the government deficit, the balance of trade, and the savings-investment balance. The balance of trade for each country is fixed exogenously (except when modeling full integration), so the model does not consider any possible macro feedbacks from trade liberalization to changes in international capital flows. The macro "closure" for each country is simple. Government revenue is determined endogenously, given a variety of fixed tax rates, while government expenditure is fixed endogenously. The government deficit is endogenous. Aggregate investment in each country is assumed to be a fixed share of GDP, and aggregate savings is assumed to adjust to equate total savings and investment.

KIM includes quantity rationing of both exports and imports. North Korea is assumed to have levels of "desired" exports and imports that would be typical for a country of its size and per capita income, but that exports and imports are rationed physically, yielding the low levels observed in the base data.⁵ South Korean trade with North Korea is similarly assumed to be rationed in physical terms, and "desired" trade between the two countries is assumed to equal levels that would be predicted from a gravity model. Trade liberalization and integration in the form of a customs union is modeled by removing all quantity rationing and imposing a common external tariff equal to South Korean tariffs.

KIM also includes a facility for modeling monetary union by specifying: (1) a fixed exchange rate between North and South Korea, and (2) a unified, fixed, balance of trade for the two countries together. The result is that, in the various experiments done with this specification, the separate North and South Korean trade balances can vary, but their sum is fixed.

Modeling Quantity Controls in Trade

In the case of North Korea, the major distortion in the economy is assumed to be quantitative controls on both imports and exports. Because of data problems, discussed below, we assume no other sources of price distortions such as sectorally differentiated taxes and subsidies, which we treat explicitly in the case of South Korea. Such sectoral distortions undoubtedly exist in North Korea, but due to the organization of the North Korean economy are effectively impossible to conceptualize much less measure, so we focus only on trade liberalization.⁶ Demanders are assumed to treat imports and domestically produced goods as imperfect substitutes (the Armington assumption), and have an AIDS-translog sectoral import demand function that depends on the relative prices of imports and domestically produced goods on the domestic market. These demand functions are parameterized according to the "normal" levels of sectoral imports that one would expect North Korea to have without any rationing, given the results from the gravity model. Then, we assume the difference between desired imports and observed imports is due to the imposition of quantity rationing by the government. That is:

$$(1) \quad \left(\frac{M_i}{D_i} \right)^{rationed} = qr_i \cdot \left(\frac{M_i}{D_i} \right)^{desired}$$

where M is imports, D is domestic supply, qr is the quantity rationing rate, and the subscript I refers to the sector.⁷

The model also specifies sectoral export supply functions, where the export supply ratio depends on the ratio of the export price to the price on the domestic market.⁸ The supply functions are parameterized so that the desired ratio is consistent with the results from the gravity model. Symmetrically with the treatment of imports, quantity controls are specified so that actual exports are less than desired.

The result is that demanders are forced off their import demand curves and producers are forced off their export supply curves.⁹ The distortions are quite large, indicating large potential gains from liberalizing trade and allowing markets to clear. The trade rationing leads to major distortions in the domestic price system as well.

Data

The model utilizes four main databases, macroeconomic and microeconomic Social Accounting Matrices (SAMs) of North and South Korea for 1990, the most recent year for which data were relatively unaffected by the severe macroeconomic shocks that North Korea began to suffer in 1989 (see Appendix 1). In the case of South Korea, construction of the SAMs was straightforward. However in the case of North Korea, the approach we adopted was to draw on a variety of data sources and use a matrix balancing technique to ensure consistency that is essentially Bayesian in that it stays "close" to known controls (or Bayesian prior) while imposing all the consistency requirements of the balanced accounts.¹⁰

Data for the North Korean macroeconomic SAM were primarily derived from North Korean government budget data as reported in Hwang (1993). One assumption made to build the macro SAM is that the North Korean government makes all investments. Government revenues are treated as being derived solely from direct household and enterprise taxes. Indirect taxes, import tariffs, and export tax rates are set to zero. In reality, revenues are raised from a transaction tax which varies depending on the legal status (state-owned, co-op, etc.) of the transacting parties, thus obviating the whole notion of a sectoral tax rate. In the absence of precise information about tax incidence, this was computed on the basis of a number of assumptions: (i) households' marginal propensity to save is between 30 percent and 40 percent; (ii) private savings are seized by the government via a number of instruments which are here summarized as a direct income tax; (iii) data about government current expenditure and investment are assumed to be reliable; (iv) part of capital/land returns are distributed to households, but capital/land income from public enterprises is appropriated by the government in the form of an enterprise tax.

The input-output coefficients are contained in a microeconomic SAM which was derived from a pre-reform (1979) Chinese input-output table compiled by the World Bank. This table was constructed to SNA standards, expanding on the material product accounts (World Bank, 1985). The assumption is that a good starting point (or prior) for inter-industry input-output relations in North Korea is pre-reform China, reflecting their common links to 1970s vintage Soviet manufacturing technology. (This assumption is subsequently relaxed, as explained below.)

Urban workers are divided into high skilled (professional, technical, and managerial) and low skilled (the remainder). The initial starting point for industry employment structure was taken from the Chinese data. The wage premium was calculated on the basis of South Korean data. While one might expect *a priori* that wage dispersion in the North would be less than in the South, at this level of sectoral aggregation, the skilled wage premium obtained from the South Korean data was within the dispersion observed in fragmentary data on North Korean wages. Sectoral outputs are derived from estimates of North Korean GDP (Noland, 1996) and output shares reported by the Korea Development Bank (1994). When these output shares were applied to the labor data they yielded a rural wage that was too high

relative to urban wages. The agricultural sector's share was reduced to about 21 percent of value-added which reduced agricultural wages to a level more consistent with the fragmentary North Korean wage data.¹¹ A real exchange rate was constructed from the GDP estimates reported in Noland (1996). The real (PPP adjusted) North Korean won-US dollar exchange rate was used to convert export and import data from dollars into won to obtain the domestic resource equivalent of external trade. (The model equations and further description are presented in Appendix 2.)

POLICY EXPERIMENTS

Integration is studied under two main scenarios. The formation of a customs union which involves: (a) the elimination of North Korean quantity rationing of trade, (b) the elimination of intra-Korean barriers to trade, and (c) the adoption of South Korea tariffs as the common external barrier. In this scenario, there is product, but not factor, market integration between North and South Korea. The second main scenario involves the formation of a monetary union in which the real exchange rate between North and South Korea is fixed. Three variants are examined. In the first, capital moves from South to North Korea until North Korean per capita income rises to 60 percent that of the South's.¹² In the second variant, this is achieved by allowing labor to migrate from North to South Korea. In the third variant, the per capita income target is achieved through the movement of both labor and capital. This formulation not only allows us to calculate the macroeconomic impacts of product and factor market integration, but also permits us to calculate income and its distribution with respect to the both the original populations of North and South Korea, and the post factor market integration distribution of population on the Korean peninsula.

A final issue involves the specification of the North Korean economy. As argued in NRS, liberalization of the North Korean economy is likely to involve at least three identifiable effects: static reallocation of factors according to comparative advantage; an increase in total factor productivity (TFP) associated with importation of capital equipment embodying new, superior, technology developed abroad; and an "obsolescence shock" reduction in the value of the existing capital stock.

The Static Reallocation Effect

This is illustrated graphically in Figure 1, which presents a simplified model with an imported good (M), an export (E), and a domestic non-traded good (D). The country produces two goods, D and E, and consumes two goods, D and M. The production possibility frontier is given in quadrant IV (lower right) and the balance-of-trade constraint is given in quadrant I (upper right). The consumption possibility frontier is given in quadrant II (upper left), which indicates supplies to the domestic market of domestically produced goods (D) and imports (M), with M being purchased from export receipts (quadrant I).

Figure 1 shows the movement from rationing equilibrium A to free trade equilibrium B in quadrants II and IV.¹³ The movement from point A to point B in the fourth (lower right) quadrant changes the structure of production and will yield an increase in real output (GDP) measured in base prices, even though it represents a movement along the same production possibility frontier. In quadrant II, real expenditure (absorption) measured at base prices also increases, as does welfare (measured by the difference between two indifference curves). These three measures all reflect the increase in efficiency arising from the removal of rationing.¹⁴

Technological Transfer

Recent research suggests that the world is characterized by international technological spillovers. These are quite important in the case of developing countries which benefit from technological innovations abroad primarily transmitted through international trade in capital goods embodying these innovations. In the case of North Korea, the parameters estimated by Coe, Helpman, and Hoffmaister (1995) indicate that complete liberalization would result in a total factor productivity gain of approximately 18 percent.¹⁵ This is depicted in Figure 1 as the movement from the rationing equilibrium A to the free trade equilibrium C on the new, larger, production and consumption possibility frontiers.

However, the specific case in hand may differ fundamentally from the generic phenomenon analyzed by Coe, Helpman, and Hoffmaister. For the purposes of their regression model they classify South Korea as a developing country. Thus no technological spillovers would be attributed to North Korea importing capital goods from the South. Moreover, in the monetary union simulations, we allow cross-border factor flows; in particular, we allow capital to move from South to North Korea. In this case it would be plausible to expect that the North would adopt South Korean technology embodied in the capital. We model this channel of technology transfer in two ways.

In the first approach, the North Korean average level of productivity is assumed to converge to the South's. Operationally, the North's CES production function shift parameter (its productivity level) increases to the level of the South's. In the second, more sophisticated version, not only does the North attain the South's level of productivity, but it also adopts its technology in the form of the South's input-output coefficients. The rationale behind this approach is that as new plants are built using South Korean capital, and new production technologies are adopted in North Korea, this will be reflected in the allocation of basic inputs and produced intermediates. Thus as South Korean techniques become the norm, the input-output coefficients in the North converge to those of the South. These are presumably optimal given the existing factor prices and distortions in South Korea, so their adoption by North Korea would imply the elimination of non-trade related distortions which we are unable to model explicitly.

In the model, the sectoral production technology is described by a CES real value-added function of primary inputs (labor and capital) and fixed input-output coefficients, which give the demand for intermediate inputs. In the first step, we assume that North Korea achieves the South's value-added technology (sector by sector). In the second step, we assume that the North also adopts the South Korean input-output coefficients. To allow North and South value-added productivity levels to converge, we first measure the differences in the level of value-added total factor productivity (by sector) in the two countries. The value-added productivity gap is defined as:

$$(2) \text{ PROD GAP}_i = \frac{\text{MRP}(sk)_i * \text{FCTR}(nk)_i}{\text{MRP}(nk)_i * \text{FCTR}(nk)_i}$$

where PROD GAP_i is the productivity gap in sector i ; MRP is the value-added marginal revenue product, which equals

$$(3) \text{ MRP}_i = \frac{\partial X(\text{FCTR})_i}{\partial \text{FCTR}} * \text{PV}_i$$

where X_i is the output; FCTR is a primary factor (labor or capital); and PV_i is the value-added price of output.

In the first approach, we adjust the sectoral shift parameters in North Korea to reflect capital transfers from the South, with the Northern shift parameter attaining the South Korean value in the final experiment.

While the technology transfer mechanism described above is arguably an improvement over the simple uniform increase in TFP in the particular application at hand, it has some unrealistic features. Although North Korea now possesses the same value-added productivity level as does South Korea, Northern production still embodies an inefficient set of production processes as embodied in its input-output coefficients. In the second step, we also allow the input-output coefficients to converge gradually. This is implemented by computing a linear combination of the North and South Korean input-output coefficients. The only difference here is that the weight or the share of the linear parameter changes in each experiment as capital investment starts to move from the South to the North. So at the last experiment, the weight attached to the South Korean input-output coefficients is one and the weight attached to the North Korean coefficients is zero. Thus, at the end of the simulation, North Korea fully adopts the South Korean input mix. This feature, combined with the North Korea productivity convergence, fully captures the technology spillover effect associated with capital migration. Indeed, in

the final experiment, North Korea can be said to have adopted South Korean technology.

These two types of technology transfer are illustrated graphically in Figure 2. Before the cross-border factor flows take place, North and South Korean outputs and technologies are represented by their respective isoquants, $Q(NK1)$ and $Q(SK1)$, and their respective rates of factor substitution, RTS_{nk1} and RTS_{sk1} . The tangent points, A1 and B1, represent the equilibrium (and optimal) factor usage, given technology and factor prices. As factor flows and technology transfers occur, the North Korean isoquant moves outward to A2 due to the increased capital investment from the South, and the South Korean isoquant moves inward to B2 due to the capital outflow to the North and labor inflow from the North. Although South Korean output declines slightly, the combined output of North and South Korea increases.

Technology transfer is indicated by the convergence of the technical rates of substitution between capital and labor in North Korea (RTS_{nk2}) and South Korea (RTS_{sk2}). The parallel slopes indicates that the North and South are using the same input factor proportions (though at different levels of aggregate factor supplies). If the figure were redrawn, using unit isoquants, the isoquants for North and South Korea would converge.

As expected, the overall level of North Korean TFP is considerably below that of the South. Sectoral differences range from no difference in TFP in the case of agriculture (remember the model is calibrated for 1990--probably the peak year of North Korean agricultural output) to more than 300 percent higher TFP in South Korean construction, with TFP differences in the non-agricultural traded goods sectors ranging between 49 percent (industrial intermediates) to 110 percent (light manufacturing). Patterns of intermediate input usage vary significantly across the two economies as well, with North Korea's use of intermediate inputs in its traded-goods sectors higher than South Korea's in most cases, and in some cases significantly so. Wastage of intermediate inputs is typical of centrally planned economies.

In summary we have three ways of modeling technological transfer. In the first, North Korea experiences a uniform increase in TFP across sectors. In the second, it experiences a sectorally non-uniform convergence to South Korean productivity levels. In the third it adopts the South Korean pattern of input usage as well as achieving the South Korean level of productivity.

Capital Obsolescence

Finally, an important question involves the value after liberalization of the pre-existing capital stock. There are two points to consider. First, due to the putty-clay nature of technology, the capital stock accumulated under one set of output and factor prices is likely to be sub-optimal for different relative prices. While this is true for all economies, the impact is particularly acute for transition economies, where the relative prices under central planning were wildly at variance with those observed in world markets. Second, economies sheltered from international trade may manufacture products that are essentially worthless in world markets. (Think of televisions or radios without tuners--both of which are produced in North Korea.) To the extent that capital is product-specific, this capital will be effectively worthless when the economy is opened up to trade. Sinn and Sinn (1992) report that one-half to two-thirds of East Germany's capital stock was worthless after unification. If lack of exposure to international trade is taken as a proxy for internal distortion, the North Korean economy is likely to be even more distorted than the East German economy was.¹⁶ This is depicted as equilibrium D on the new, smaller, production and consumption possibility frontiers.¹⁷

SIMULATION RESULTS

The key results are that the impact on South Korea of *product* market integration in the customs union scenario is relatively minor: trade with North Korea simply substitutes for trade with other countries and, given the small size of North Korea relative to South Korea, trade creation and diversion have a trivial impact on South Korea (Tables 1 and 2).¹⁸ With regards to North Korea, the results are similar to those obtained under MFN liberalization as reported by NRS, and are completely dominated by the assumed size of the obsolescence shock.¹⁹

TABLE 1 - KOREAN CUSTOMS UNION

	Trade Liberalization, TFP increase, no obsolescence shock	Trade Liberalization, TFP increase, 2/3 reduction in capital stock
	Percentage changes from base	
GDP Growth		
South Korea	0.1	-0.1
North Korea	29.3	-32.3
Combined	3.8	-4.1
Agricultural Labor Wage		
South Korea	-1.2	-0.6
North Korea	23.1	-29.5
Low-Skill Urban Wage		
South Korea	0.5	0.5
North Korea	43.9	-5.6
High-Skill Urban Wage		
South Korea	0.5	0.4
North Korea	35.2	-6.1
Rental Rate on Capital		
South Korea	0.5	0.3
North Korea	36.6	87.4

TABLE 2 - KOREAN CUSTOMS UNION WITH RURAL-URBAN MIGRATION

	Trade Liberalization, TFP increase, no obsolescence shock	Trade Liberalization, TFP increase, 2/3 reduction in capital stock
	Percentage changes from base	
GDP Growth		
South Korea	0.2	0.0
North Korea	29.8	-31.7
Combined	3.9	-4.0
Agricultural Labor Wage		
South Korea	0.1	0.2
North Korea	37.5	-12.8
Low-Skill Urban Wage		
South Korea	0.1	0.2
North Korea	37.5	-12.8
High-Skill Urban Wage		
South Korea	0.6	0.4
North Korea	34.9	-6.6
Rental Rate on Capital		
South Korea	0.4	0.3
North Korea	37.0	88.0

The integration of *factor* markets is a different story, however. With monetary union, it is natural to expect the capital market, if not the labor market, to integrate. For heuristic purposes, however, we initially consider the hypothetical case in which the inter-Korean labor market integrates but the inter-Korean capital market does not (that is to say labor flows from North to South, but capital does not flow the other direction). This could happen if, for example, North Korea suddenly collapsed a la East Germany before political rapprochement and cross-border capital flows had occurred. In this case, three-quarters of the population of North Korea would migrate South before the 60 percent per capita income target was attained (Figure 3). This extreme result serves to underscore the critical importance of generating capital inflows into North Korea.²⁰

In the more plausible converse case, where capital flows North and North Korea adopts South Korean technology, but labor is not permitted to move South, around \$240 billion of capital (11 percent of the South Korean capital stock) would be required to move in order to attain the per capita income target, underlining the implicit trade-off between capital and labor flows as equilibrating adjustment mechanisms (Figure 4).²¹

Having established the extreme bounds of cross-border factor mobility necessary to achieve the per capita income convergence target, we focus on the intermediate case in which there is a degree of cross-border movement in both labor and capital (Figure 5). Five experiments are run. In EXP1, North Korea experiences income gains from static reallocation of factors and induced total factor productivity increase, but these are not sufficient to maintain income in the face of a two-thirds of the capital stock obsolescence shock. In the succeeding experiments we allow workers to migrate from North Korea to South Korea in increments of three percent of the population (approximately 600,000 people). At the same time we transfer capital from South to North Korea in increments of approximately 30 percent of

the North Korean capital stock, or around \$60 billion per experiment.

Real GDP rises significantly in North Korea and falls slightly in South Korea in response to these factor movements (Figure 5). Income for the combined Koreas rises as the returns to factors are equalized in the two economies, with combined income exceeding the base by more than twelve percent in experiment 6 (EXP6).

The capital-labor ratio and the returns to labor rise in North Korea, which experiences capital inflow and labor outflow. The opposite is true in South Korea. The rate of return on capital rises in both Koreas, however. (The capital-labor ratio is falling in South Korea. Due to the obsolescence shock, it also falls in North Korea, plus the increase in TFP increases the productivity and returns to all factors, including capital.) In EXP5, where approximately \$240 billion of capital flows North, and roughly 1.2 million workers come South, the 60 percent per capita income target is attained. Further increases in capital transfers and labor migration (EXP6) lead to even greater per capita income convergence. As for GDP changes, North Korean GDP increases by nearly half, whereas South Korean GDP declines by less than one percent. Combined GDP increases by more than five percent (Figure 5). These results are reasonably robust to the treatment of technological transfer.

The specific model of technological transfer has a significant effect on the composition of output, as shown in Figure 6.²² As noted earlier, the productivity gap between North and South Korea varies across sectors. Moreover, North Korea's traded-goods production is more intermediate input-intensive than South Korea's. As a consequence, when North Korea adopts South Korean technology and stops wasting inputs, production of traded-goods, especially light manufactures, soars.

The implications for the trade balance are depicted in Figure 7. When North Korea receives the Coe, Helpman, Hoffmaister-derived 18 percent uniform increase in TFP, its trade with the rest of the world (ROW) rises sharply, while South Korean trade with the ROW remains roughly constant. Inter-Korean trade increases enormously with the elimination of inter-Korean trade barriers, with the small North Korean surplus vis-a-vis the South growing to a surplus on the order of one to one and one half billion dollars, across the six experiments. With the aggregate trade balance fixed, the rise in the North Korean deficit is offset by South Korea, which goes from a small deficit to a small surplus with the rest of the world. The unified currency experiences a slight real depreciation.

If North Korea adopts South Korean technology however, its prime sector of comparative advantage, light manufactures, receives a tremendous productivity boost, and North Korea actually generates a surplus with both South Korea and the ROW, forcing South Korea into a significant deficit. When North Korea attains the South Korean TFP level, but not its input usage pattern, the results are more like the simple 18 percent TFP increase case: the North Korean trade deficit increases and South Korea goes from deficit to surplus to offset the larger North Korean deficit with the ROW, with the magnitude of these effects larger than under the first approach. The reason for the significantly different results obtained in the two approaches involving the transfer of South Korean technology is the previously mentioned North Korean wastage of intermediate inputs in traded-goods production. Competitiveness in traded-goods receives a double boost when North Korea attains the South Korean level of productivity and stops wasting produced intermediates.

In the simulations thus far, the process of capital transfer amounts literally to taking capital from the South Korean capital stock and moving it north. It would be desirable to model external capital inflows as well. In the comparative statics set-up, one could model capital inflow as either an exogenous increase in the capital stock (which does not affect the current account balance) or as an exogenous increase in the trade or current account deficit--which does not affect the capital stock. One could think of the latter as representing the moment imported capital goods are purchased, and the former the moment they are installed.

A key issue is how the inflow of foreign capital would affect the real exchange rate. To explore this issue, we took the monetary union model and subjected it to a series of trade balance shocks that would leave the measured capital stocks in the two countries unaffected. These experiments are summarized in Figure 8, which depicts the response of the real exchange rate to a series of trade balance shocks. In

experiment 6, the monetary union's trade deficit is increased by \$319 billion and the real exchange rate appreciates by 50 percent. Predictably, the level of output in the South Korean traded-goods sectors falls, while the non-traded goods sectors (construction, public administration, and services) exhibit increases in output.

The model can also be used to examine the impact of factor market integration on the distribution of income--both among income classes, and between capital and labor, both inclusive and exclusive of migrants. We focus exclusively on EXP5, where approximately \$240 billion of capital flows from South to North Korea, and around 1.2 million North Korean workers migrate South.

In this case, the distribution of income in South Korea shifts away from capital and toward labor when the capital flow is treated as a pure grant and the distribution of income is calculated inclusive of wages earned by immigrants from North Korea (Table 3), regardless of the way technology transfer is modeled. Within labor there is a slight shift concentration of income in the high skilled group.

TABLE 3 - SOUTH KOREAN INCOME DISTRIBUTION

FACTOR	Percentage Share of National Income			
	Base	EXP4, capital transfer treated as grant	EXP4, capital transfer treated as remitted profits	EXP4, defined with respect to current residents - capital transfer treated as profits, migrants' wages excluded
Uniform TFP case				
Agricultural Labor	2.8	2.9	2.6	2.4
Low Skill Labor	19.4	20.6	17.9	17.1
High Skill Labor	28.5	28.8	25.1	25.4
Capital	49.4	47.6	54.4	55.1
South Korean Technology case				
Agricultural Labor	2.8	2.8	2.4	2.3
Low Skill Labor	19.4	20.0	17.2	16.6
High Skill Labor	28.5	29.4	25.3	25.0
Capital	49.4	47.8	55.0	56.1

However, if the capital transfer is treated as investment yielding a stream of remitted profits, the income distribution shifts strongly toward capital and away from labor. This outcome is reinforced if the income distribution is calculated with respect to current residents of South Korea--that is to say if immigrants' wages are excluded from the calculation. In this case there is both a shift in the income distribution toward capital and within labor a shift in the distribution toward the high skilled group. Ownership of capital is presumably concentrated in the high skilled group, which suggests that economic integration along the lines of EXP5 would result in widening income and wealth inequality among current South Koreans.

CONCLUSION

The Korea Integration Model (KIM) is, to our knowledge, the first behavioral economic model of economic integration between North and South Korea. We have used it to focus on the macroeconomic impact on the two economies of economic integration and the impact of economic integration on the distribution of income.

From the standpoint of South Korea the results highlight the critical role of cross-border factor mobility. As shown in Tables 1 and 2, if factor markets do not integrate, the macroeconomic impact of economic integration with the North on South Korea is relatively small, regardless of assumption about the magnitude of the obsolescence shock to the North Korean capital stock. The North Korean economy is small relative to South Korea and inter-Korean trade simply substitutes for trade with third parties. The degree of trade creation and diversion are trivial under a customs union without cross-border factor movements.

However, far more significant results are obtained when we create a monetary union and begin allowing factor market integration. As shown in Figures 3 through 5, labor and capital movements are in effect substitutes: enormous movements of labor are required to attain the per capita income convergence target in the absence of capital flows from South to North.

Some results depend on the specific modality of technological transfer. Three approaches are modeled: in the first, North Korea experiences a sectorally uniform increase in TFP in response to liberalization and opening. In the second, sectoral TFP levels converge to South Korea's level (implying non-uniform increases) as a function of capital transfers from South to North. The final approach involves North Korea adopting South Korea's input mix as well as achieving South Korean productivity levels.

One implication of the third approach is that North Korea stops wasting produced intermediates and as a consequence gets a big boost in competitiveness in the traded goods sectors. As a consequence the external trade results using in this set-up differ appreciably from those obtained using the other two approaches.

The qualitative effects of cross-border factor mobility are invariant to the approach to modeling technological spillovers. These capital and labor flows have a significant impact on the distribution of income in both economies, which we calculate with respect to both the pre- and post-migration distribution of the population (Table 3). As might be expected, the results depend critically on whether the capital transfer is treated as a grant or as investment yielding remitted profits. In the latter case, the South Korean distribution of income shifts toward capital and away from labor, and within labor toward urban high skill labor.

A final caveat is in order. The model is calibrated for 1990, the most recent year for which the North Korean data are not contaminated by severe macroeconomic shocks. One possibility would be to update the South Korean part of the model using actual data, and the North Korean part of the model using conjectured data. If the model were recalibrated in this way, the amounts of labor and capital that would have to move to attain per capita income convergence would increase. Calculations reported by NRS indicate that on current trends the doubling rate of the divergence between North and South Korean per capita income is roughly every five years, so for example, if the model were recalibrated to 1995, roughly twice as much capital or labor would have to move to achieve the same degree of convergence.

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FIGURE 1

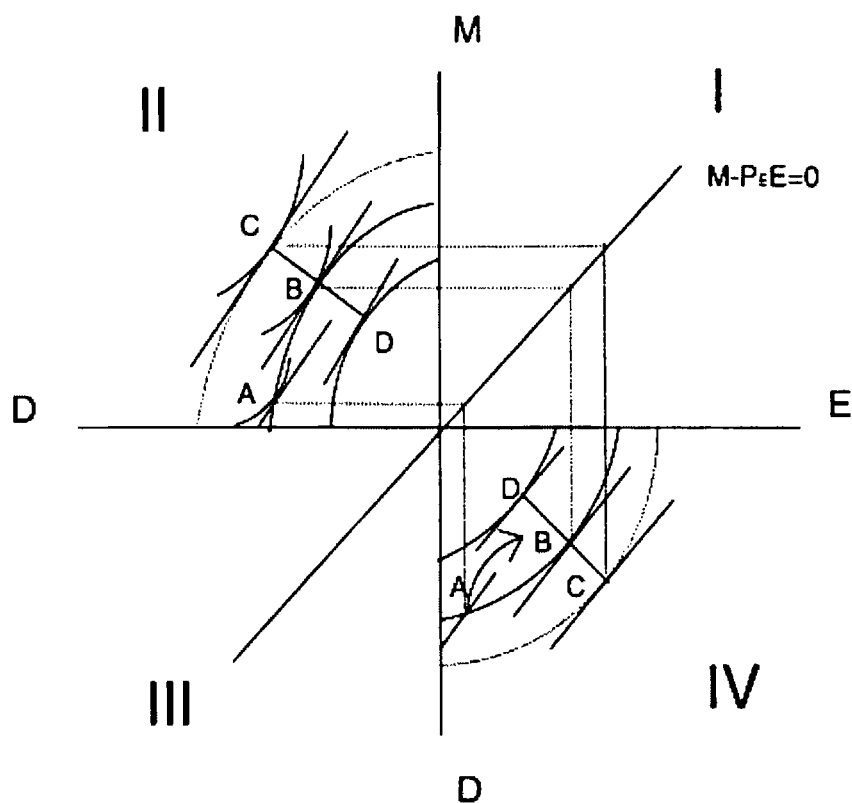


FIGURE 2: TECHNOLOGY TRANSFERS

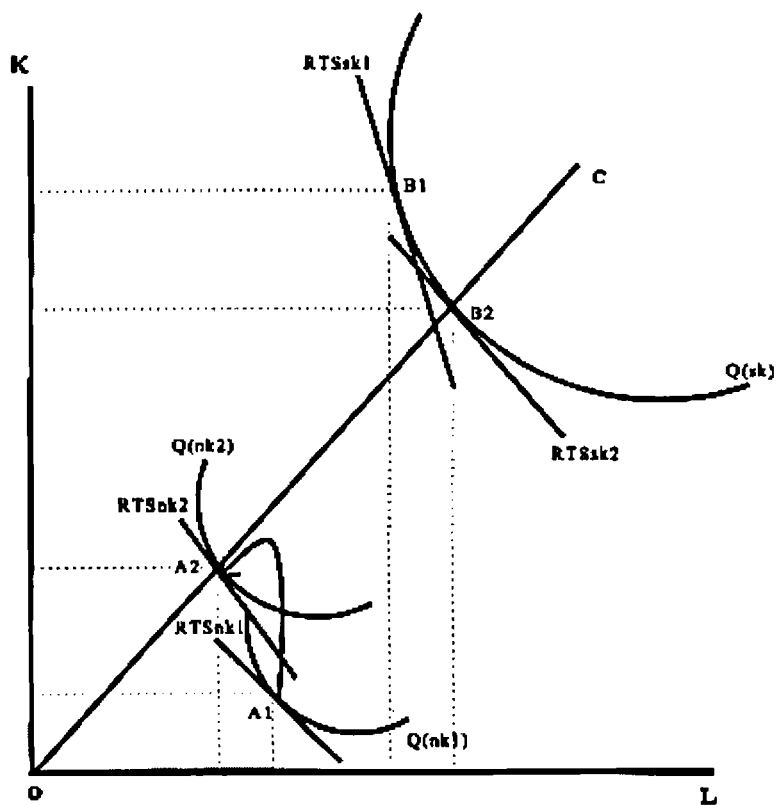


FIGURE 3: PER CAPITA GDP & LABOR MIGRATION

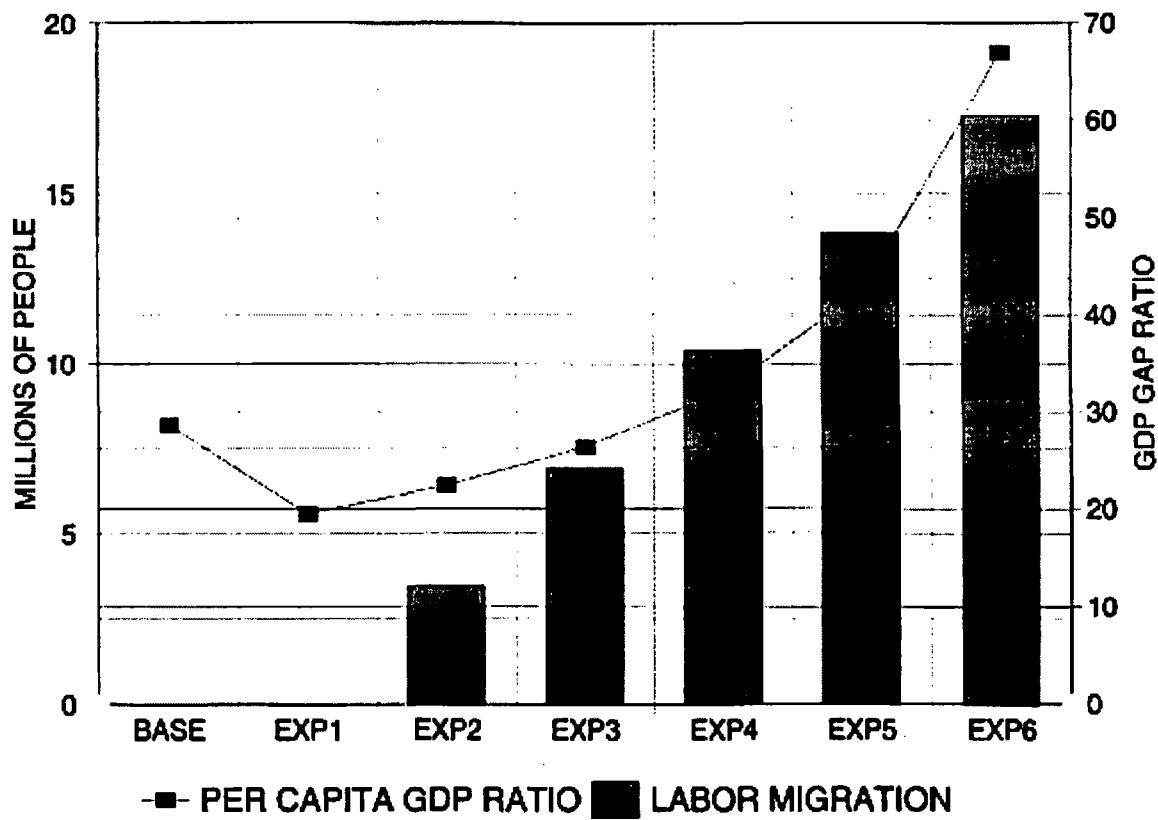


FIGURE 4: PER CAPITA GDP GAP & CAPITAL MIGRATION

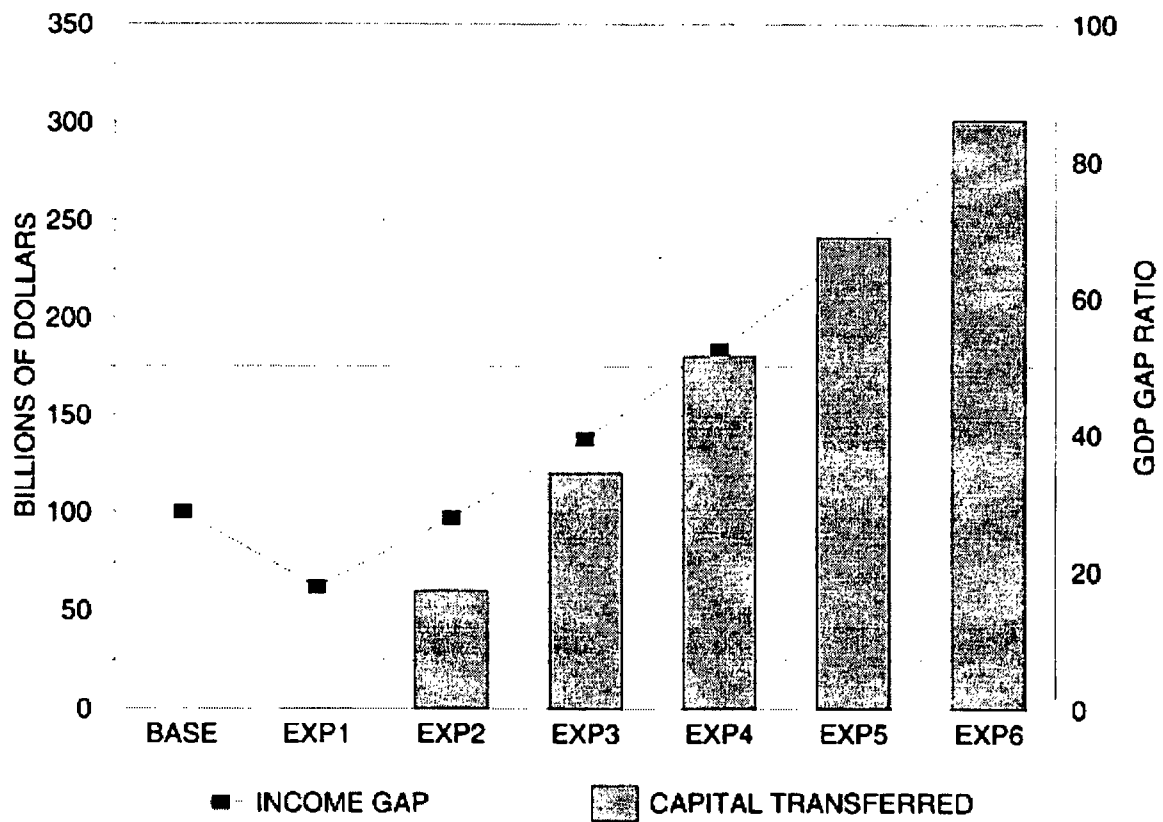


FIGURE 5: PER CAPITA GDP GAP & K-L MIGRATION

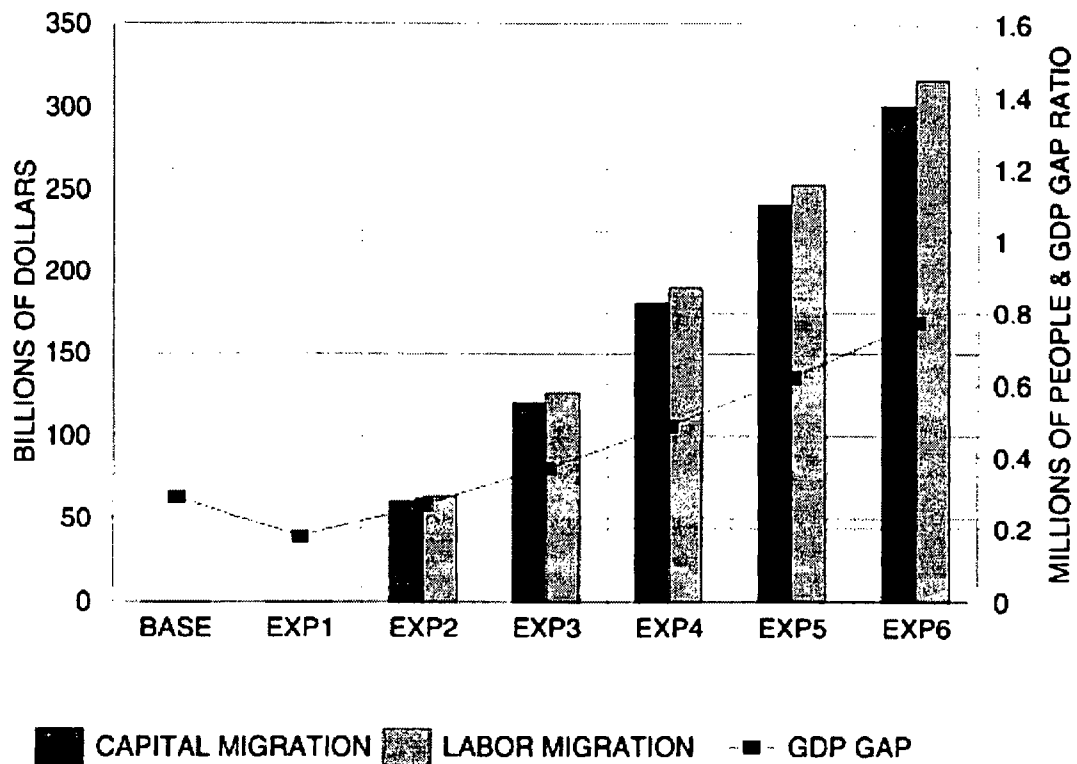


FIGURE 6: OUTPUT CHANGE BY SECTOR (NK)

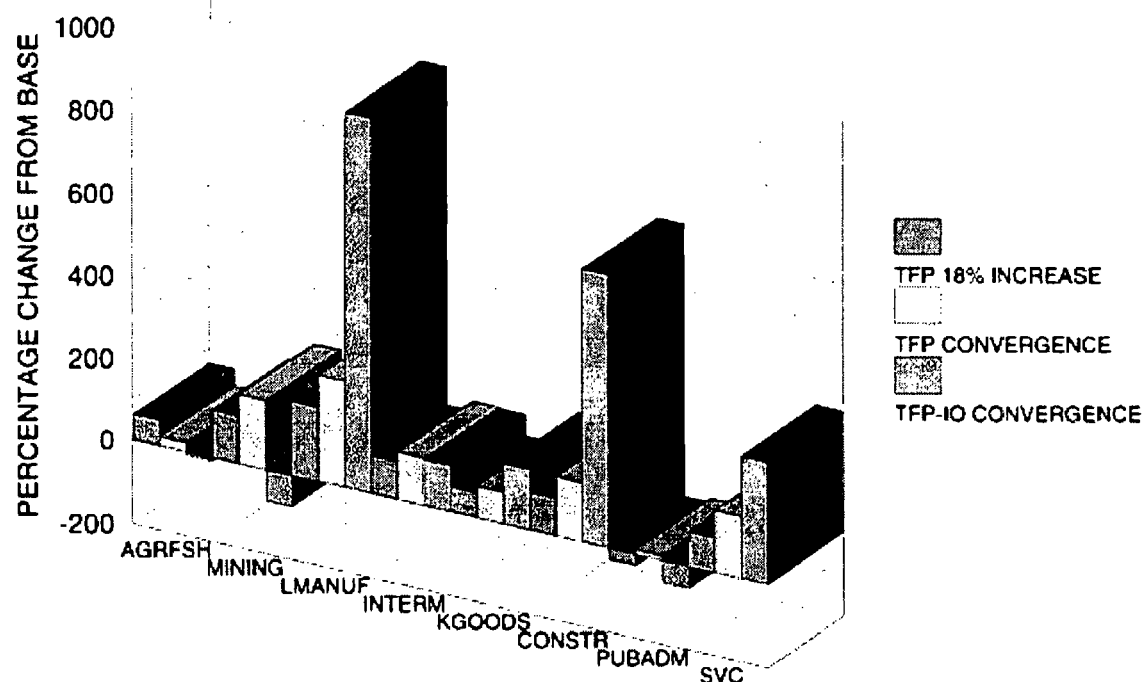


FIGURE 7: TRADE BALANCE AND EXCHANGE RATE

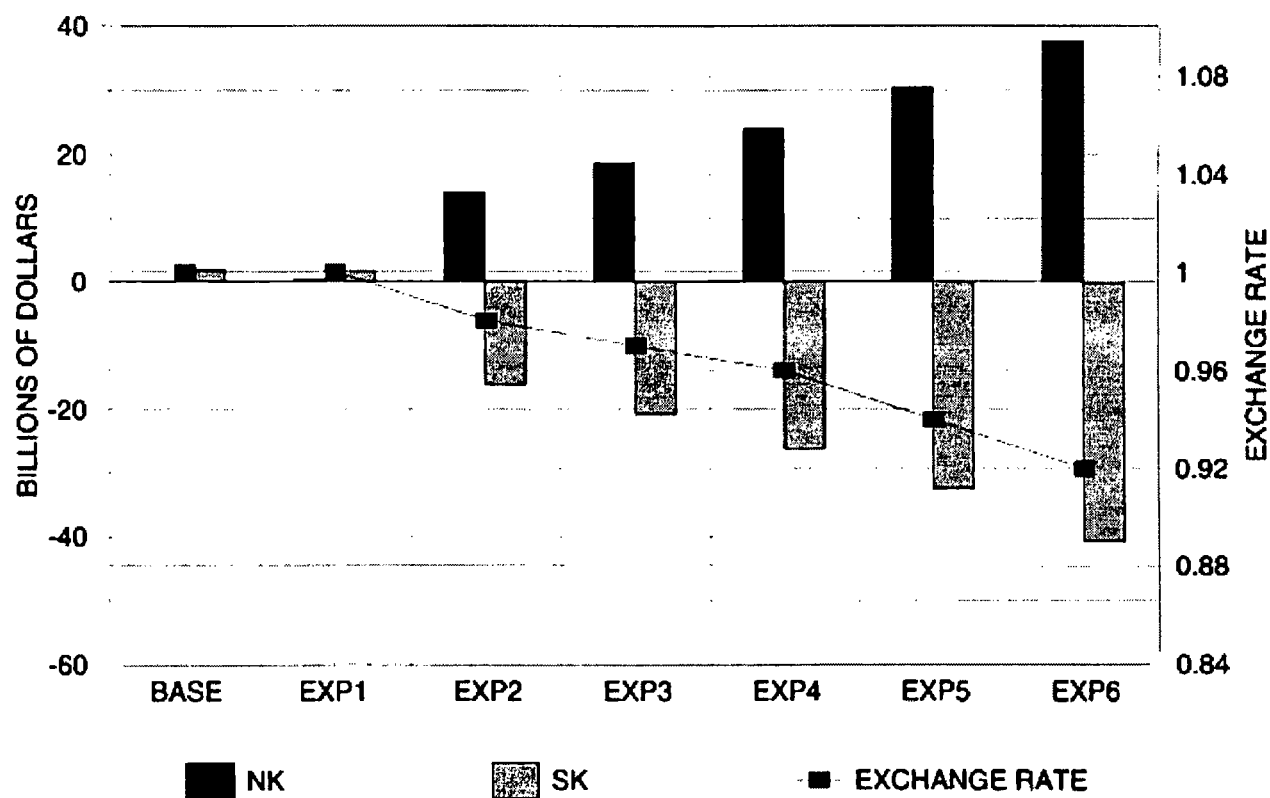
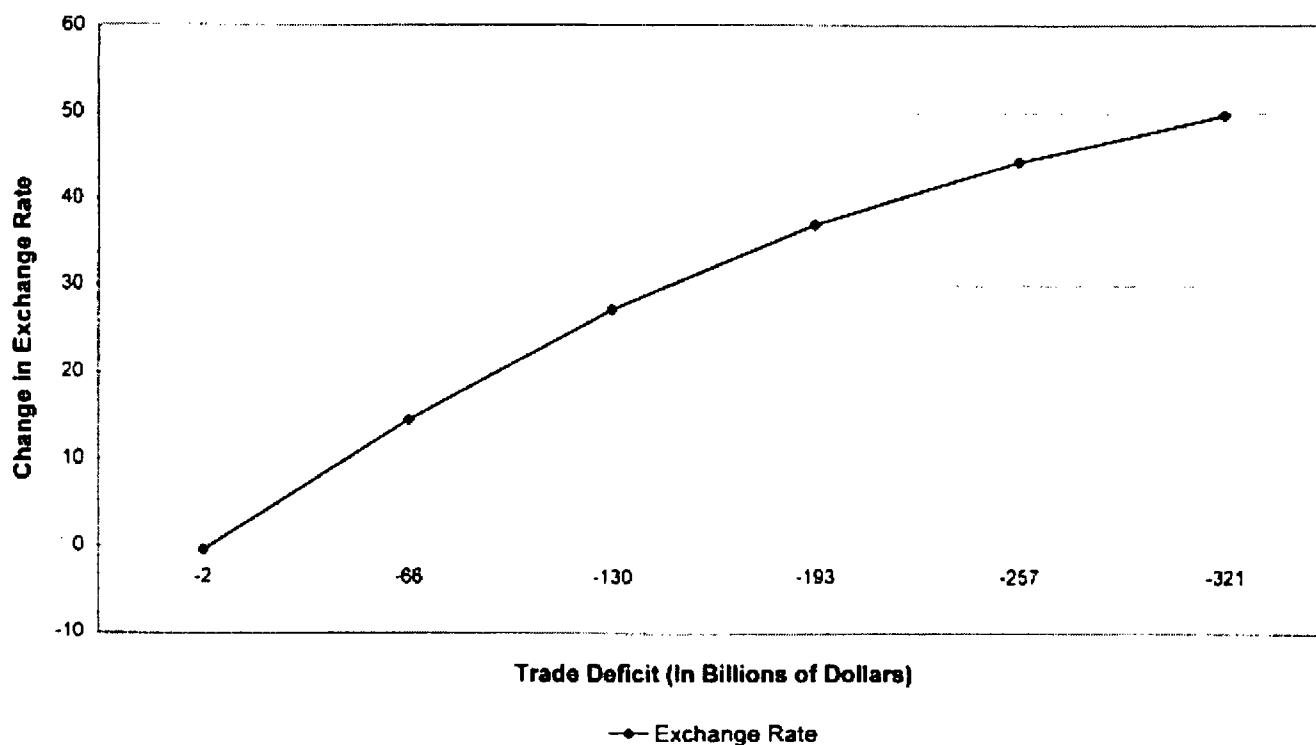


FIGURE 8: TRADE DEFICIT AND RATE OF EXCHANGE RATE APPRECIATION (External Capital Transfer Case)



See Appendices

Notes

1. See Noland (1996) for an overview of the North Korean economy and additional references not cited in this paper.
2. The KIM model differs from the NRS model in that the North Korean social accounting matrix (SAM) has been recalibrated and specified different substitution and transformation introduced.
3. The exchange rate variable in the model can be seen as a price level deflated (PLD) real exchange rate, deflating by the numeraire cost of living index.
4. In the case of North Korea, aggregate production functions were estimated for aggregate capital and labor using data reported in Hwang (1993) and Y.S. Lee (1994). The results are remarkably robust and plausible given the quality of the underlying data. Constant elasticity of substitution specifications yielded estimates of the substitutability between capital and labor of around unity. The hypothesis that the aggregate production function was Cobb-Douglas could not be rejected. In most specifications, North Korea exhibited slightly negative total factor productivity growth, which is typical of many pre-reform socialist economies.
5. The volume of "desired" trade is obtained through the use of a gravity model of international trade. The sectoral composition of that trade was estimated using detailed sectoral data on North Korean trade, together with the equivalent data from South Korea and Japan--North Korea's principal "natural" trading partners according to the gravity model. See Noland, Robinson, and Scatasta (1997) for details.
6. Sectoral tax rates, for example, are impossible to conceptualize: government revenues are raised through a transaction tax whose rate varies depending on the legal status (state-owned, co-op, etc.) of the transacting parties. Similarly, we implicitly assume that North Korea is on, rather than inside, its production possibility frontier, though as argued below our method of modeling technological transfer would put them on the frontier whether they started off on it or not.

7. This approach to modeling import rationing was first used by Dervis, de Melo, and Robinson (1982), who discuss the properties of this approach, including questions of incentive compatibility.
8. The sectoral export transformation functions are specified as constant elasticity of transformation (CET) functions.
9. The degree of sectoral quantity rationing is given in Appendix Table 1.
10. The particular technique we used is a "minimum entropy difference" method that is described in Golan, Judge, and Robinson (1994).
11. This highlights the importance of working within a SAM framework which enables the researcher to detect potential discrepancies between the available data sources and to adjust the data sets in a way which is internally consistent.
12. This is the figure conventionally thought to choke off incentives for mass migration and was selected to facilitate comparison with previous studies. See Noland (1997) for further discussion and citations.
13. As drawn, the economy is initially on (rather than inside) the production possibility frontier. As argued below, our method of modeling technological transfer would put them on a new, enhanced PPF regardless of whether they were the starting point was on or inside the original PPF.
14. Empirically, these three measures turn out to assume very similar values.
15. This estimate is derived from a regression model relating total factor productivity to imports of capital goods from developed countries, secondary school enrollments, and interaction terms.
16. This treatment is obviously a stylized one. One way to think of it is that there are goods with positive prices in autarchy and a world price of zero. When the economy is opened up, product specific capital depreciates instantly.
17. There is a counter argument that the North Korean capital stock might not decline by as much as the East German case. Two reasons are given. First, it is argued that the decline in the value of the East German capital stock was partly a result of West German transfers that facilitated the shift in demand from formerly East German home goods to imports from the West. If the North Koreans received fewer transfers they would be forced to continue buying home goods, maintaining the value of the North Korean capital stock. Second, the East Germans lost their major markets in other centrally planned economies, contributing to the decline in the capital stock. It has been asserted that China represents a viable market for cheap, low quality North Korean manufactured goods. If one accepts these arguments, then one should focus on the previously described scenarios in which the value of the North Korean capital stock is implicitly maintained.
18. In the interests of parsimony, we report only the experiments in which North Korea undergoes complete liberalization and suffers an "obsolescence shock" reduction of two-thirds of its capital stock (unless otherwise indicated). In the customs union experiments and the monetary union experiments where there is no capital mobility, we apply the uniform 18 percent increase in TFP. In the monetary union scenario where cross-border capital transfers occur, we report the North Korea adopting South Korean technology results unless otherwise noted.
19. The decline in the agricultural wage while urban wages are rising would presumably lead to rural-urban migration. The model was re-run allowing for migration between the rural and low-skill urban labor. In the baseline case in which the large wage relative difference arose in the customs union model with trade liberalization and TFP growth, when migration was permitted, 540,000 workers in North Korea, and 40,000 workers in South Korea left agriculture for the urban sector. In the customs union model with trade liberalization, TFP increase, and two-thirds capital stock reduction, the rural to urban migration figures are 310,000 for North Korea and 61,000 for South Korea. These results are summarized in Table 2. Results reported in the remainder of the paper allow for rural-urban migration.

20. We have assumed that this migration solely takes the form of North Korea - South Korea migration. It is quite possible that in reality there might also be emigration to other destinations, in particular China. If this were the case it would obviously effect the precise calculation of migration necessary to achieve the income convergence target.

21. We have treated the capital movement as a pure grant. It is also possible to calculate the rents and impute them to South Korean national income as remitted profits, as is done in one calculation below.

22. For the sake of brevity, only results from EXP 5 are reported in this section.

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