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MODELS OF TRANSITION IN
EASTERN EUROPE WITH UNTRANSFERABLE
EASTERN CAPITAL

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*“MODELS OF TRANSITION IN EASTERN EUROPE
WITH UNTRANSFERABLE EASTERN CAPITAL”*

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ABSTRACT

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with Untransferable Eastern Capital

by

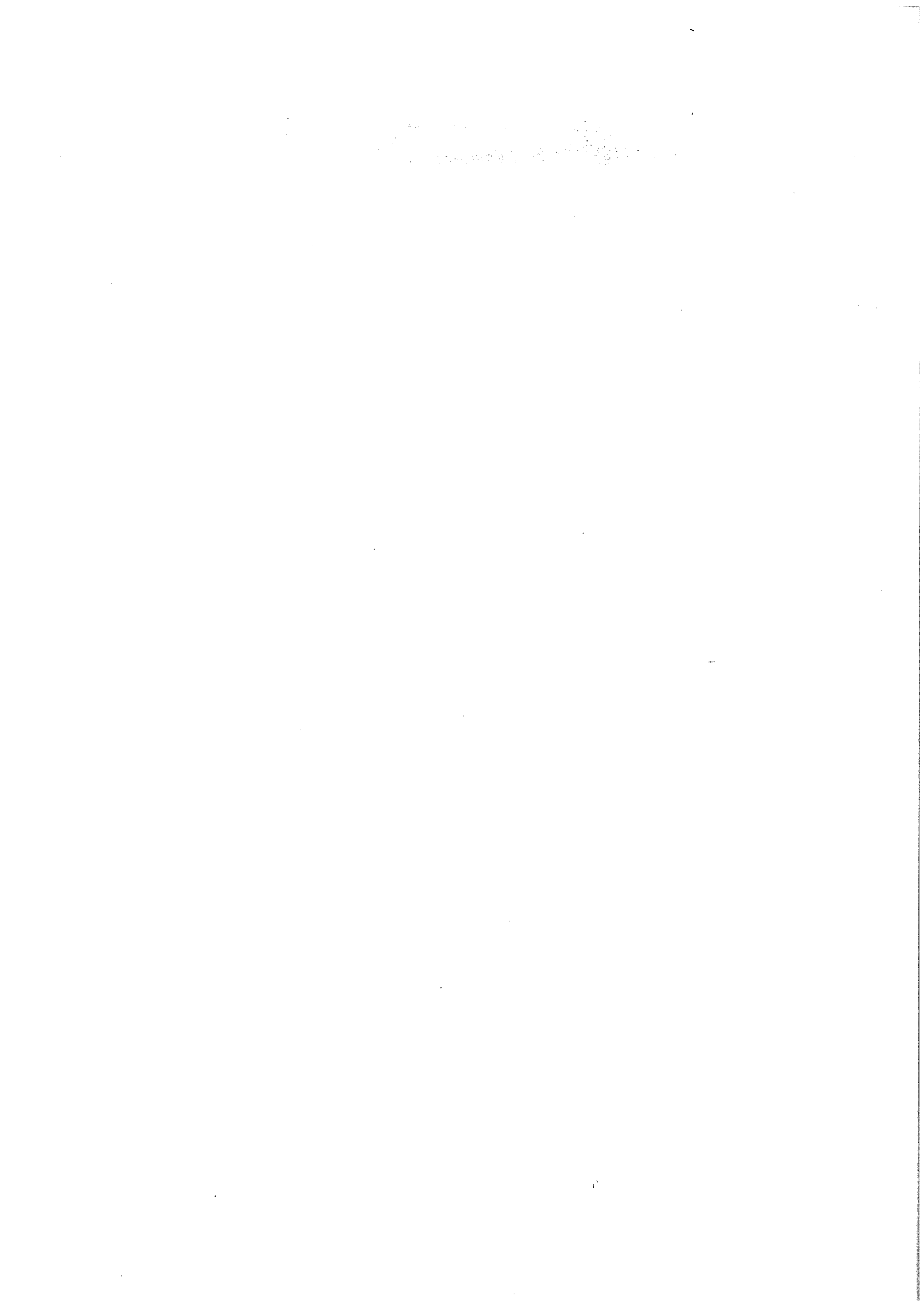
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Economic liberalization in Eastern Europe allows access to a superior foreign technology. The initial adoption of the new technology is limited by the adaptability of current Eastern productive inputs to Western technologies. Further adoption is limited by the rate of Eastern investment in suitable inputs. Both the immediate amount and the continuing flow of adoption can be increased if capital is available from Western sources.

Privatization that takes the form of a forced transfer of assets to the advanced sector is not necessarily desirable if all assets are not fully transferable. If the initial Eastern capital/labor ratio is high enough, it is desirable to allocate some of the new entrants in the labor force into the state-supported backward sector even as all new capital investment is placed in the advanced sector.

Generally the East should concentrate its product mix on the capital-intensive products using the backward technology and the labor-intensive products using the advanced technology. If privatization is the only option, it is better to privatize the labor-intensive sector, or more accurately the sector that uses intensely those inputs that are most readily transferable to the advanced technology.

Because of the preservation of the capital-intensive state-supported sector, the East may initially export the capital-intensive products made with the backward technology. Over time, with capital accumulation and depreciation, the product mix and the trade mix will shift in favor of the labor-intensive product made with the advanced technology.



Models of the Transition in Eastern Europe
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Economic liberalization in Eastern Europe is modelled in this paper as if it simply allowed access to a superior foreign technology. The sources of the superiority could be mechanical, for example, the use of state-of-the-art electronic computers instead of hand calculators, or it could be organizational, for example, the use of performance-based contracts instead of fuzzy budget constraints characteristic of state-owned or state-supported enterprises. These and other possibilities are embodied implicitly in the differences in Eastern and Western production functions which describe how savings and human effort are transformed into output.

Access to a superior technology does not mean immediate, complete and painless adoption. The initial adoption of the new technology is limited by the adaptability of current Eastern productive inputs to

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Western technologies. Further adoption is limited by the rate of Eastern investment in suitable inputs. Both the immediate amount and the continuing flow of adoption can be increased if capital is available from Western sources.

Two extreme assumptions are made about the adaptability of Eastern capital to the advanced technology. Either the capital is costlessly transferable or it is completely untransferable. The lack of transferability of capital is intended to capture the idea that tools and skills used in the backward technology may be unsuited to use in the advanced technology. This applies in an obvious way to equipment, but it applies also to human capital. Eastern managers and workers may perform fairly well with the familiar fuzzy budget constraint characteristic of Eastern economic systems, but they may be flustered by the Western way of doing business including the ever-present threat of bankruptcy.

The word "privatization" is used here to describe the forced redeployment of Eastern capital to the advanced technology regardless of productivity considerations. Although a partial transfer of assets may be the economic optimum, it is not obvious how to design an institution that can make the difficult choices concerning which assets to transfer to the advanced sector and which to leave behind. Western market-oriented economists might suggest letting the market decide, which advice is quite appropriate for choice of technology within the Western free-market setting. But an essential feature of the Eastern backward technology may be state support and fuzzy budget constraints. Obviously, one cannot let the "market" decide which firms should be

The two-product models have some even more interesting implications. Generally the East should concentrate its product mix on the capital-intensive product using the backward technology and the labor-intensive product using the advanced technology. If privatization is the only option, it is better to privatize the labor-intensive sector, or more accurately the sector that uses intensely those inputs that are most readily transferable to the advanced technology. It is quite possible that the East may initially export the capital-intensive product made with the backward technology. Over time, with capital accumulation and depreciation, the product mix and the trade mix will shift in favor of the labor-intensive product made with the advanced technology.

The ideas in this paper are, of course, not entirely new. A basic implication of this paper is that a "big-bang" 100% privatization is not necessarily the economic optimum when assets are only partially transferable to the advanced Western style of production. In a similar spirit, Leijonhufvud(1993) has described the Gosplan as if it organized production in the form of long assembly lines linking workstations irrevocably to each other. He points out that one cannot privatize one of these workstations without greatly reducing the productivity of the other workstations.

A second implication of this paper is that labor-intensive sectors should be privatized but capital intensive sectors should continue to operate under state control. The success of the Chinese liberalization has been attributed to this feature: "In contrast to the Eastern Europe liberalizations, China did not liberalize or privatize state-owned industry, mainly, according to McKinnon, because of the 'dire social

state supported and which firms should not.² Absent a mechanism for deciding the efficient amount of partial privatization, the real options may only be no liberalization and complete privatization, in which case privatization is not necessarily preferred.

Flows of capital from the West can have a substantial effect on the nature of the liberalization. Two extreme assumptions are made here regarding the availability of Western capital: Either none is available or the supply to Eastern Europe is infinitely elastic at a price equal to its current Western marginal product. In the latter case, the rate of capital flow is limited by the rate at which Eastern Europe can supply complementary factors of production.

Both one-product and two-product models of technology adoption are presented in this paper.³ An important but fairly obvious lesson from studying the one-product model with untransferable Eastern capital is that it is economically inefficient to abandon the state-supported backward technology since that would amount to throwing away productive capital. It is not obvious but it is true that if the initial Eastern capital/labor ratio is high enough, it is desirable to allocate some of the new entrants in the labor force into the state-supported backward sector even as all new capital investment is placed in the advanced sector.

² Eastern firms can be thought to combine physical capital in the form of machines and also human capital embodied in a contract enforcement institution - the network of contacts between firms and the state. A market presupposes a legal system for the enforcement of contracts and therefore cannot mediate between two alternative systems, one applicable to state-supported enterprises and one applicable to private enterprises.

³ A one sector algebraic model of the type discussed here but with both human and physical capital is used by Leamer and Taylor (1993) to study transitions in Eastern Europe.

On the backward isoquant is the point labelled E which represents the current supply of Eastern inputs suitable to the backward technology. These figures contain a Western isocost line which is tangent to the advanced isoquant at a point which selects the Western capital/labor ratio. The Western isocost line is relevant when Western capital is freely mobile into the East. This capital flow equalizes the marginal product of capital in the East and in the West, which implies an equalization of the capital/labor ratios and consequently an equalization of the marginal productivities of labor and the wage rates.

Figure 1 illustrates the case of completely transferable capital when it is obviously efficient to transfer all the Eastern inputs immediately to the advanced technology. The proportional gain from this transfer is the ratio EG'/EO since G' is the amount of resources under the new technology that can produce the same output as E under the old technology. At G' the ratio of capital to labor is lower in the East than in the West and accordingly the marginal productivity of capital is higher. Western capital flow of EF will equalize the rate of return and will raise the wage rate of Eastern labor to the Western level. The proportional increase in the earnings of Eastern inputs (in Western prices) is the ratio EG/EO . This exceeds the gain EG'/EO of simply transferring the inputs to the new technology AA because the Eastern inputs are complemented by capital from the West.

Figure 2 depicts the case of perfect capital mobility from the West but untransferable Eastern capital. On this figure are drawn two different isocost lines, one applicable to the advanced technology and the other applicable to the backward technology. These isocost lines have a common wage rate because of the mobility of labor between the two

consequences' and economic costs that would follow on the collapse of part of the 'old heavy industrial sector' that were not able to survive decontrol and rationalization."⁴ McMillan and Naughton(1992) in commenting on the Chinese success put it succinctly: "Privatization is not crucial, competition is."

Partial transferability of assets is not the only element of the transition story. The economics profession has responded to the events in Eastern Europe by producing a variety of models of the transition. For example, Aghion and Blanchard(1993) present of model with unemployment caused by a wage distortion in the state sector and limited capacity growth in the private sector. Murphy, Shleifer and Vishny(1992) analyze a model in which private firms are required to sell to state firms at state prices.

1. One-Product Model of the Technology Adoption

Figures 1 and 2 offer a graphical analysis of four types of adoption scenarios. In each of these figures are drawn a unit isoquant for the advanced technology, labelled AA, and a unit isoquant for the backward technology, labelled BB. These are combinations of capital and labor that are required to produce a unit of GDP. Constant returns to scale is assumed and this figure is accordingly not affected by the units used to define output. Note that the backward technology is shifted away from the origin to indicate that relatively more capital and labor are required to produce a unit of output. The shift depicted here is neutral with respect to capital and labor. Nothing that follows is particularly dependent on whether the backward technology is relatively capital- or labor-intensive.

⁴ IMF Survey, May 31, 1993, page 175.

subsidy thus encourages the state-supported firms to hire too much labor which would be employed more productively in the advanced sector. This inefficiency could be cured if the Eastern firms were required to pay a wage premium. A wage rate of w^{**} for the Eastern firms would induce them to release the optimal amount of labor to the advanced sector.

The deeper part of this argument is that state-supported organizations can be thought to be maximizing something, even if it is not profit, and soft budget constraints must ultimately become hard, not unlike limits to private borrowing opportunities. If that is the case, the same kind of calculus applies to Eastern state-supported firms as Western competitors. It is only a matter of getting the maximand correct. Except for these few tangential remarks, the discussion will proceed as if the Eastern organizations operated competitively. Amendments to deal with allowable cost overruns and wage subsidies are straightforward.

The capital inflow EF from the West in Figure 1 with transferable capital exceeds the inflow in Figure 2 with untransferable Eastern capital. The reverse would occur if the efficient capital/labor ratio in the backward technology is less than in the advanced technology.⁶ The case of a more capital intensive backward technology illustrated in the figures might seem peculiar, but it is in fact the outcome that should be expected because the post-reform Eastern capital/labor ratio

⁶ If Eastern capital is transferable, the western investment must be enough to bring the Eastern capital/labor ratio to the Western level: $I_0 = L_E k_W - K_E$, where k_W is the Western capital/labor ratio. If Eastern capital is not transferable, the labor flow out of the backward technology must be enough to bring the backward capital/labor ratio to its desired level: $L^* = L_E - K_E/k_E$. This amount of labor is multiplied by the Western capital/labor ratio to solve for the Western capital flow under the 0% transferability scenario: $I_{100} = L_E k_W - K_E (k_W/k_E)$.

sectors, but the rate of return to capital is lower in the backward technology.⁵ The tangency of the backward isocost with the backward isoquant selects the efficient post-reform capital/labor ratio which is achieved by a flow of labor EH from the backward sector to the advanced sector. This labor flow is complemented with a capital flow EF from the West to equate the capital labor ratio in the advanced sector to the Western ratio. Note that the percentage gain in factor earnings, EG/EO , is less in Figure 2 when capital is not transferable in Figure 1 when capital is transferable.

In Figure 2 the tangency at E^* between the backward isoquant BB and the post-reform Eastern unit isocost implicitly is making a very important assumption: After the reform, organizations that operate with the backward technology act competitively when they hire inputs. They minimize costs and operate at zero profits. This might seem like a very doubtful assumption if these organizations continue to be state supported, but it is possible to interpret the BB isoquant inclusive of one kind of soft budget constraint that allows cost overruns. This is illustrated in Figure 3 where the CC isoquant represents a unit value of sales and BB represents a unit value of revenues, the difference being the state subsidy. The Eastern organizations ought to be operating on the CC isoquant and selecting the capital/labor ratio E^{**} . But because of the state subsidy, these firms can generate a unit value of revenue and cover their costs with the lower amounts of capital and labor indicated by the BB isoquant. They respond to this subsidy by selecting an excessively labor intensive method of production, E^* . The state

⁵ The intersection with the labor axis is the inverse of the wage rate, $1/w$, and the intersection with the capital axis is the inverse of the rate of return on capital, $1/r$.

exceeds OP. This is less likely to be the case if the Eastern endowment point E is slid up the BB backward isoquant toward the point E*, that is if the East is relatively capital rich and the big-bang privatization amounts to discarding a relatively large amount of capital. Indeed privatization is not at all called for if the Eastern endowment point is E*, with a capital/labor ratio that is ideally suited to the backward sector after the reform. Then the optimal policy is to leave all the capital in place in the backward sector and not to import any Western capital. If E* is even farther up the BB isoquant it would seem desirable to add labor to the backward sector, but no additional labor is available. This calls for a "corner solution" in which no productive resources are transferred to the new technology.

2. Allocation of New Factors of Production

Figures 4, 5 and 6 are used to discuss the allocation of labor market entrants and new investment between the two sectors. It is generally desirable to allocate new investment flows entirely to the advanced sector, but it is possible that some of the additional workers may be optimally employed in the backward sector. This occurs when the backward sector initially is too capital intensive, to the left of E* in Figure 2. In this case, the marginal product of labor in the backward sector exceeds the marginal productivity of labor in the advanced sector. In order to facilitate the discussion, the relevant parts of Figure 2 are extracted to form Figure 4 which includes also a unit cost line applicable to the backward technology with a very capital abundant East with factor supplies equal to E**. With this level of eastern factor supplies, the rate of return to capital is higher in the West than in either sector in the East, and no inward flow of Western capital

is computed using a lower return on capital than in the West. This lower rate of return is applicable to the undepreciated financial investments that had been made in Eastern assets before the liberalization. Tradeable claims on existing Eastern assets must suffer a capital loss enough to assure the same rate of return as advanced-sector assets. After this adjustment of the capital value of existing Eastern assets, the implicit post-liberalization Eastern capital/labor ratio is less and can be found by dropping the point E^* to the isocost line applicable to the advanced technology. In the figure this selects just about the same capital/labor ratio as in the advanced sector.

A "big-bang" privatization works perfectly if Eastern capital is 100% transferable as in Figure 1, but otherwise it forces factors to redeploy to the Western technology when they might better be left operating under the old conditions. If, as in Figure 2, there is 100% loss of productivity if Eastern capital is transferred to the advanced sector, a big-bang privatization discards the current capital stock and transfers all the labor to the advanced technology where it is complemented with Western capital. If capital is optimally deployed between the advanced technology, then GDP in labor units post reform is the amount ON - the amount of labor that the endowment E can purchase at post-reform factor prices. If the capital stock is destroyed by a big-bang privatization, an amount OM out of a total of ON is lost. This amount ON is the post-reform capital earnings in labor units. The value of output before the liberalization is represented by the line segment OP . This is the amount of labor that would earn just enough to purchase a unit of output using the Western technology and the Western factor prices. The big-bang is better than no liberalization at all only if MN

returns are too low. That case is not different fundamentally from the one now discussed when international capital flows are disallowed altogether. If Eastern capital is fully transferable, it is optimal merely to transfer all the factors to the advanced technology and to allocate any additional increments of capital and labor to the same sector. If transfer cannot occur, all the existing factors should stay in the backward sector. The allocation of additional factors between the advanced and backward sector presents some interesting problems under this case. An equilibrium with labor paid the same in both sectors has to have isocost lines of the type depicted in Figure 5 which select the same initial wage rate w_0 . If factor accumulation conforms exactly with the capital/labor ratio indicated by point OC, then all of the new factors are allocated to the advanced technology and the factor returns remain just as indicated. Liberalization would then leave unchanged the wage rate and the return on old capital, but would raise the return on new investment. If the rate of capital accumulation is relatively high, for example at the point N in Figure 5, then the rate of return to capital in the advanced sector must fall. A new equilibrium can be found with the dotted line isocosts selecting a higher common wage rate w_1 , lower rates of return to capital and higher capital/labor ratios in both sectors. The new factor accumulation ON is supplemented with a labor flow $EE' = NN'$ from the backward sector bringing the total factor allocation to the advanced sector to ON' and to the backward sector to OE' .

On the other hand, if the new factor accumulation is relatively labor intensive, say at the point N in Figure 6, then it is necessary to lower the wage rate which requires a reduction in the capital/labor

occurs. There are two possibilities for the allocation of new Eastern capital. If Eastern investors can make Western investments, all Eastern investment flows to the West. Labor is added to the Eastern endowment point E^{**} , gradually lowering the Eastern capital/labor ratio and forcing down the wage rate until the capital/labor ratio takes on the level indicated by the point E^* when Eastern and Western factor prices are completely equalized.

Another possibility is that institutional constraints prevent the flow of Eastern investment into the West. Then all new factor flows are directed to the advanced sector, with factor price changes to accommodate these new factors. If the new factor flow conforms exactly with the initial capital/labor ratio in the advanced technology, OC , then all these new factors are allocated to the advanced sector with no change in factor prices. If, however, the factor flow is more labor intensive than OC , then to accommodate the increased labor, the wage rate must fall and more labor intensive techniques must be used in each sector. This calls for allocating all of the new investment to the advanced sector, but some of the new labor force to the backward sector. This addition of labor to the backward sector ends when the capital/labor ratio E^* is achieved, at which point Western and Eastern factor prices are equalized. The opposite happens if the new factor flows are relatively capital intensive. Then it is necessary to lower the return on capital and to use a more capital intensive technique in both sectors. This calls for an extraction of labor from the backward sector.

The foregoing paragraph describes the case when Western capital is available in principle but no capital flow occurs because Eastern

units are needed to compare the output levels in the different products and an implicit assumption underlying this figure is that the prices of the products after liberalization are equalized by international trade. There is no assurance that liberalization leaves unchanged the relative price of the products in the East and accordingly the backward sector unit value isoquants need not be the same before and after the liberalization.

Also on Figure 7 is the Western unit cost line and a unit cost line that selects the high Western wage rate and is tangent to one of the backward sector unit value isoquants. Among the two such tangencies, the one selected will have the higher return on capital. This generates a preference for the capital intensive product, as in Figure 7, but it is not impossible that the technological inferiority is sufficiently great in the capital intensive sector that the preferred tangency condition selects the labor intensive product.

The equilibrium depicted in this figure is based on the assumption that Eastern capital is redeployable between the products but cannot be transferred to the advanced technology. The flow of capital from the West will increase the wage rate to w_A and leave only one of the two backward sectors economically viable. All Eastern capital is accordingly shifted into this product and is complemented with the efficient amount of Eastern labor. The rest of Eastern labor is employed in the labor-intensive advanced-technology sector in conjunction with a suitable amount of Western capital. In the figure, the Eastern endowment of productive factors is E , and the labor reallocation to the advanced sector is EH , leaving the appropriate level of the capital/labor ratio in the backward, capital-intensive sector.

ratio in both sectors. This can be only accomplished by adding some of the additional labor to the backward sector as depicted in Figure 6. The additional labor in the backward sector is EE' which is just enough to select the efficient capital/labor ratio in that sector. Extracting this amount of labor $EE'=NN'$ leaves the remaining factor accumulation ideally suited to the advanced sector.

In summary, then, with no international capital flows, new Eastern investment is efficiently allocated completely to the advanced sector. The labor in the backward sector may be reduced if capital accumulation is sufficiently rapid compared with labor force growth, but labor to the backward sector may be increased if labor force growth is rapid. Corresponding to these two alternatives are increasing and decreasing wages, respectively, and the opposite changes in returns to capital in both sectors.

3.0 Two Product Model of Technology Adoption

A basic lesson learned from the preceding section is that the state-supported relatively unproductive sector should not be immediately disbanded if human and physical capital are not transferable to the new Western technology. In order to make labor available to the advanced sector, the capital intensity of the backward sector must be increased. This increased capital intensity can be accomplished either by an increased capital intensity of productive techniques or by a shift of the product mix in favor of the capital intensive products. To make this latter possibility clear, a two-product model is discussed in this section.

Figure 7 has two advanced sector unit value isoquants, labelled A_1 and A_2 , and two backward sector isoquants labelled B_1 and B_2 . Monetary

These laborers in the advanced sector use Western capital in the amount EF , just enough to get the capital/labor ratio up to the level needed for efficient production in the labor intensive sector.

In summary then, if Western capital is available for use in the East, and if Eastern capital is not transferable to the advanced technologies, all Eastern capital should be concentrated on the one product that yields the highest rate of return when labor is paid the Western wage. The high Western wage tends to make this preferred sector the capital intensive product, but the choice depends on the degree of backwardness as well. Eastern laborers are employed at the Western wage both in this preferred backward sector and also in the advanced technology labor-intensive sector. Depending on the initial endowment of factors in relationship with the post-reform level of the capital/labor ratio in the preferred backward sector, the East may export either the labor-intensive product or the capital-intensive product.

When the East accumulates capital suited to the advanced technology, these new investments are used entirely in the labor-intensive advanced-technology sector where they receive the highest rate of return. Since there is no addition of capital to the backward sector, no additional labor is allocated there. Thus with growth will come an increase in output of the labor intensive product. Although the East may initially export the capital-intensive product made with the backward technology, this product mix will change as more and more of the labor-intensive product is made and as the Eastern backward capital depreciates.

If Western capital is not available, the Eastern lower level of wages continues to be applicable. At this lower level of wages, the sector with the highest rate of return on new investments is the labor-intensive advanced-technology sector, which accordingly attracts all new investment. This new capital must be accompanied by a suitable amount of labor which may come from labor force growth or may have to be extracted from the backward sectors through a competition that will raise wages. The slightest increase in wages will render the labor-intensive backward sector uneconomical and all backward capital should shift to the capital-intensive product. This creates an equilibrium that is very much like the one that applies when Western capital is available. Here all new Eastern investments go to the labor-intensive advanced-technology sector and all existing Eastern capital is concentrated on the capital-intensive sector.

Next we may consider the case illustrated in Figure 8 in which Eastern capital is both untransferable to the advanced technology and is also unredeployable between the backward sectors. Western capital inflows will again bid up the price of Eastern labor to the Western level w_A . At this new wage rates there are three relevant unit-cost lines each selecting a different rate of return on capital. The highest rate of return applies to the advanced sector, next comes the rate of return applicable to the capital-intensive backward sector and last comes the labor-intensive backward sector. All three are illustrated with solid lines in Figure 8. Just as in the one-sector case, these higher wage rates force a more capital intensive productive technique in both sectors, shifting from the solid-line expansion vectors in the figure to the dotted line expansion vectors. Labor must be moved out of

both sectors to bring about this increase in capital intensity. The two arrows labelled 1 and 2 illustrate this movement of labor, each beginning at the pre-reform sectoral capital/labor ratio and ending up at the new and higher ratio appropriate after reform. Because the reform has a greater impact on the rate of return in the labor-intensive sector, unless the substitution possibilities are much greater in the capital-intensive sector, the proportion of the workforce released from the labor-intensive sector will exceed the proportion released in the capital-intensive sector. (In figure 8, arrow 1 is (proportionally) shorter than arrow 2.) Incidentally, it is quite possible that the post-reform implicit rate of return in one or both of these sectors is negative, which calls for complete scrapping of the Eastern capital and the transfer of all of the labor force to the advanced technology. In the figure, this occurs when a unit cost line has to be rotated beyond the vertical to get to the sectoral unit value isoquant.

Last we may consider again the issue of privatization, which is taken to mean the transfer of assets to the advanced technology. In this two-sector model it is better to privatize the labor-intensive sector than the capital-intensive sector. This is illustrated in Figure 9. The endowment points E1 and E2 are combinations of old capital and labor that can produce a unit value of output using the backward technology. Privatization in the face of untransferable assets simply moves these endowment points to the locations L1 and L2 on labor axis. These workers, if complemented with Western capital, are able to earn the Western wage. Because the point L2 is beyond the Western unit-cost line, this amount of labor can earn more than enough to purchase one unit value of output. Thus the higher earnings of these workers more

than compensate for the lost earnings Eastern capital. The point L1, however, is closer to the origin than the Western unit-cost line, and these few workers are not enough in number to earn as much the combined earnings of labor and capital in the backward capital-intensive sector before privatization. Of course it is possible to draw this figure so that both or neither of these sectors is wisely privatized. Still the point remains: the gain from privatization is relatively large in those sectors that use intensely the inputs that can be used productively in the advanced-technology sector.

Selected Reference

- Aghion, Phillipe and Olivier Jean Blanchard (1993), "On the Speed of Transition in Eastern Europe," unpublished manuscript.
- Leamer, Edward E. and Mark P. Taylor (1993), "The Empirics of Economic Growth in Previously Centrally Planned Economies," forthcoming.
- Leijonhufvud, Axel (1993), "The Nature of the Depression in the Former Soviet Union," delivered at the Anaheim AEA meeting, January.
- McMillan, John and Barry Naughton (1992), "How to Reform a Planned Economy: Lessons From China," Oxford Review of Economic Policy, Vol 8, No. 1, 130- 143.
- Murphy, Kevin M., Andre Shleifer and Robert W. Vishny (1992), "The Transition to a Market Economy: Pitfalls of Partial Reform," The Quarterly Journal of Economics, (August), 889-906.

Allocation of Factors 100% Transferable Capital

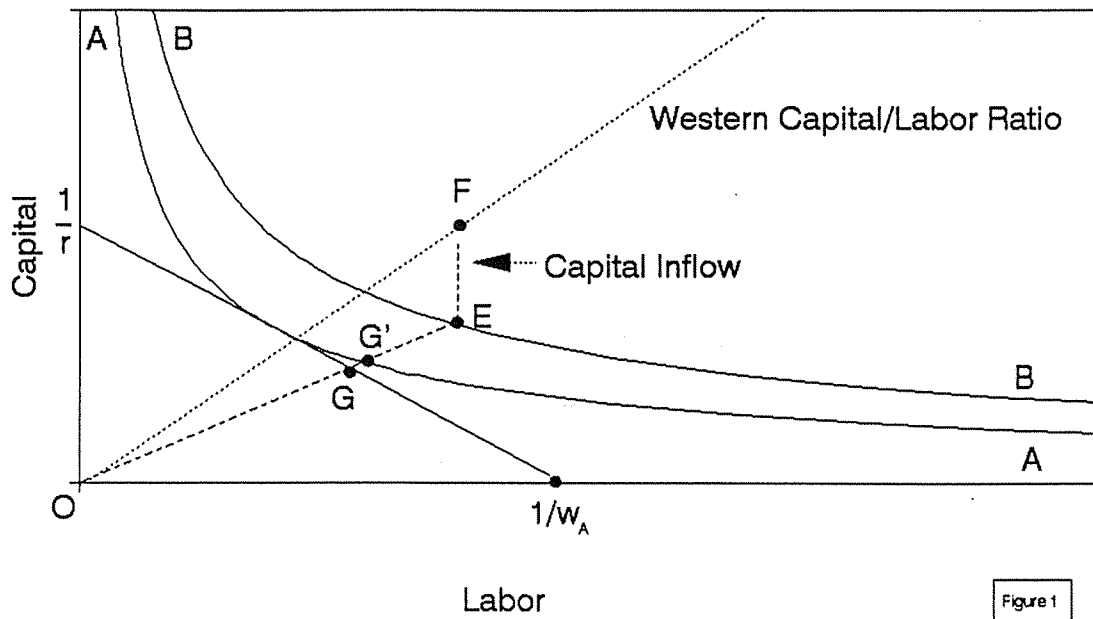


Figure 1

Allocation of Factors 0% Transferable Capital

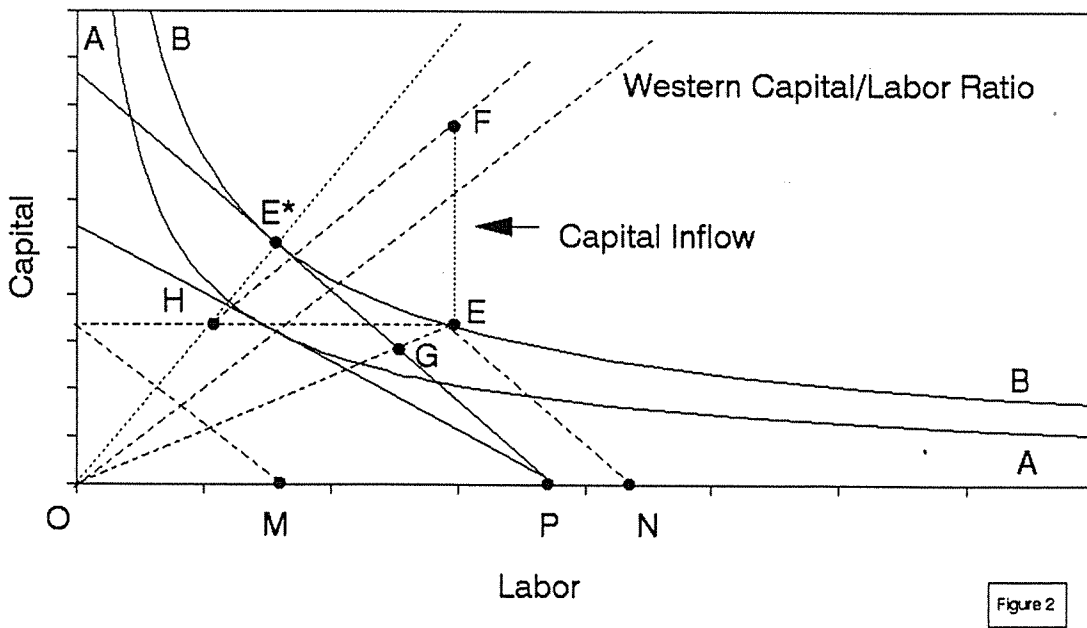
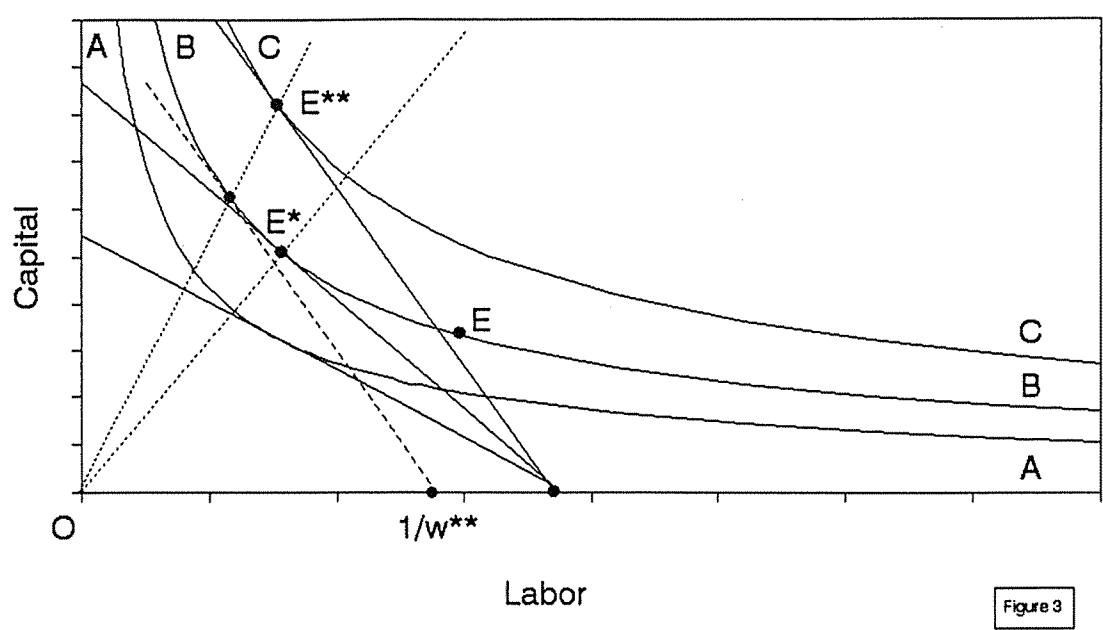
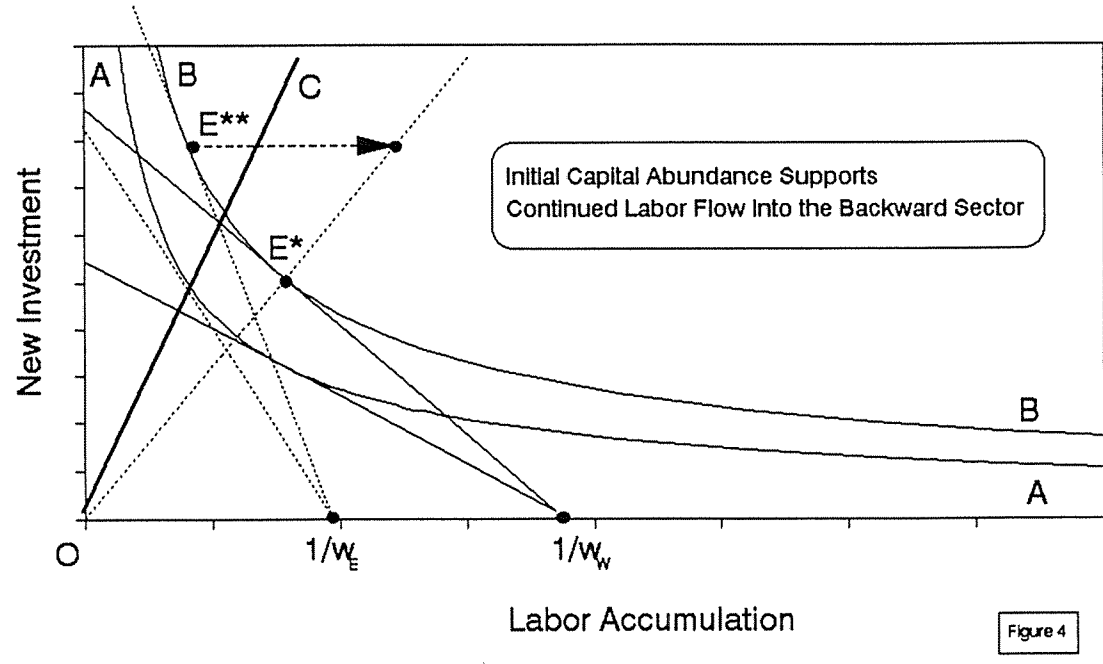


Figure 2

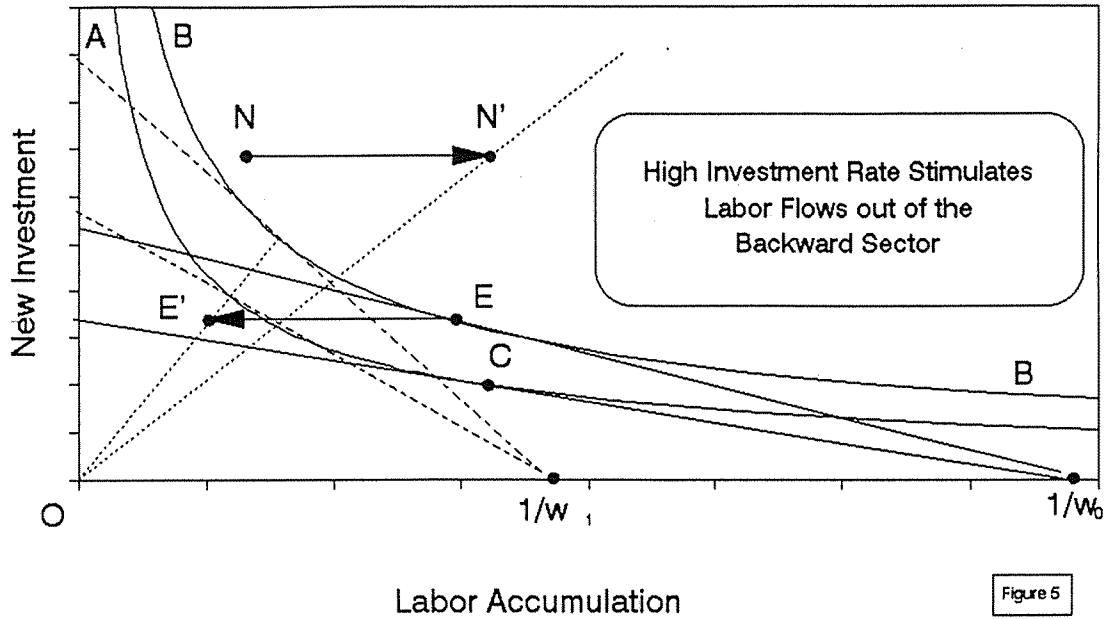
Allocation of Factors Soft Budget Constraint



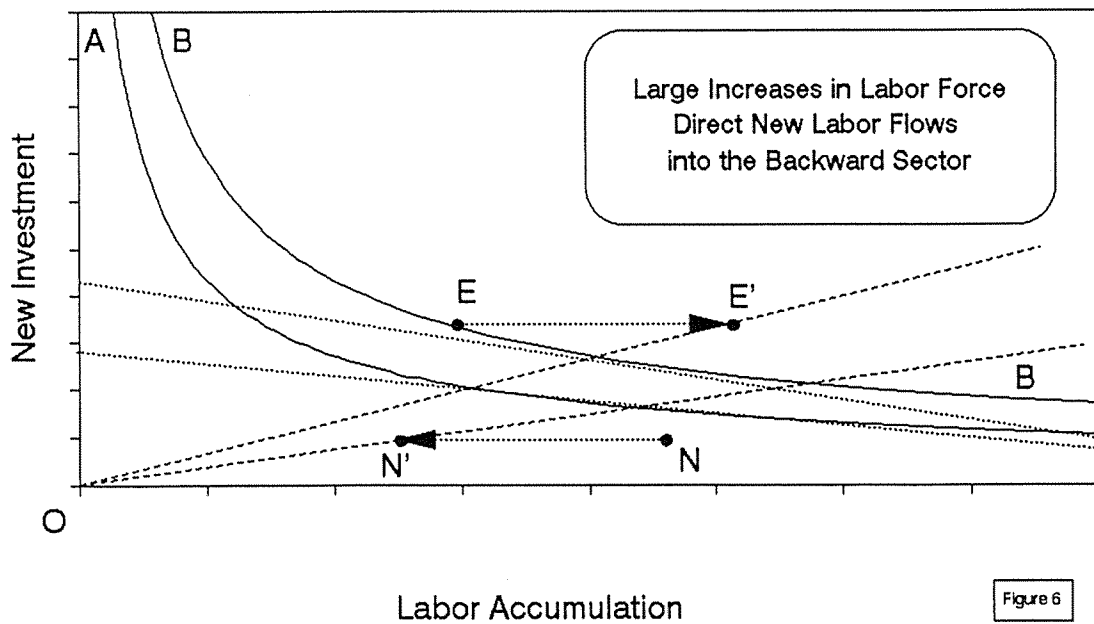
Allocation of New Factors 0% Transferable Capital



Allocation of New Factors 0% Transferability, No Western Capital

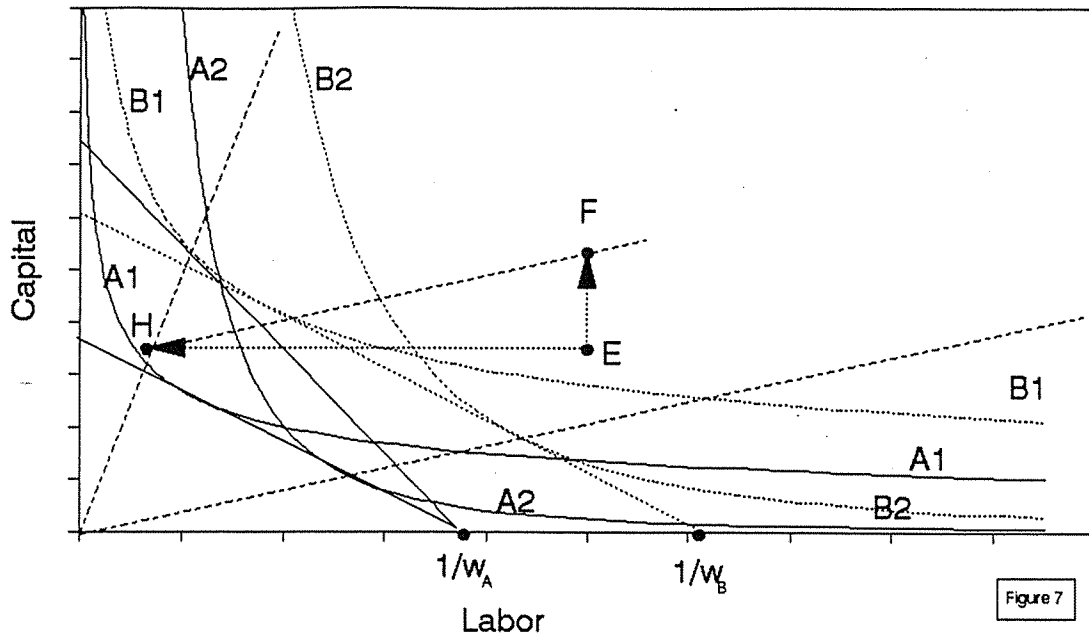


Allocation of New Factors 0% Transferability, No Western Capital



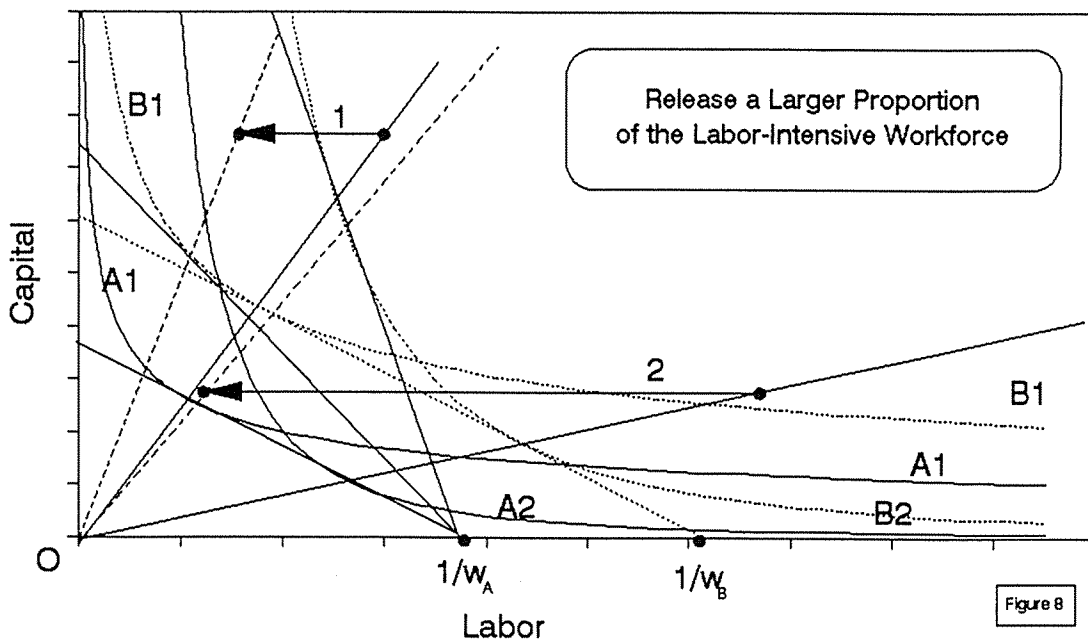
Liberalization with Two Sectors

0% Transferability, Sectoral Mobility



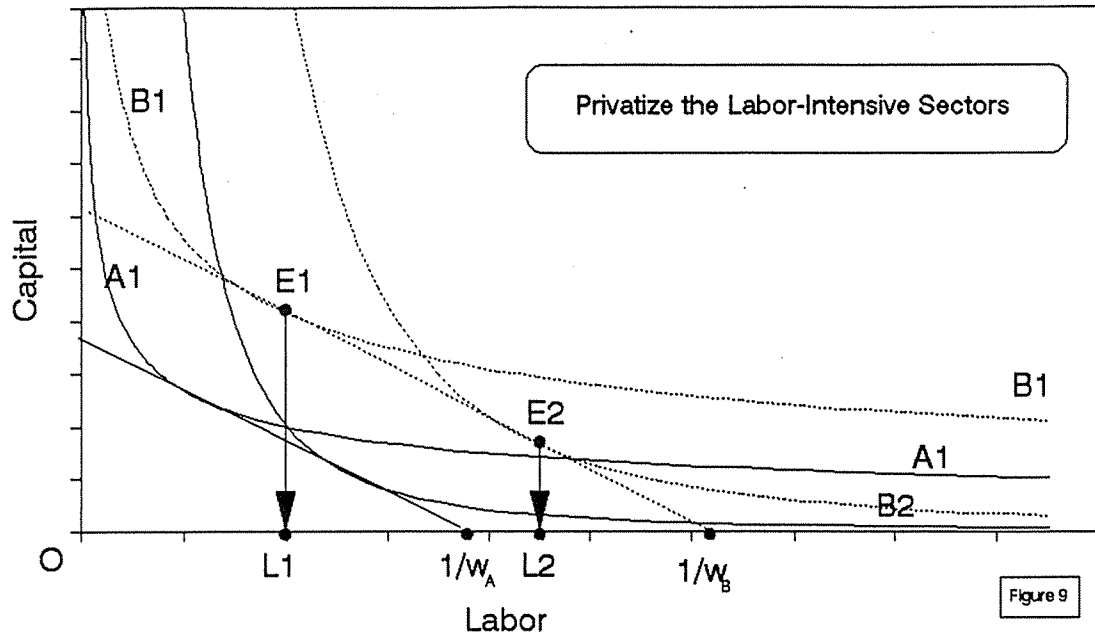
Liberalization with Two Sectors

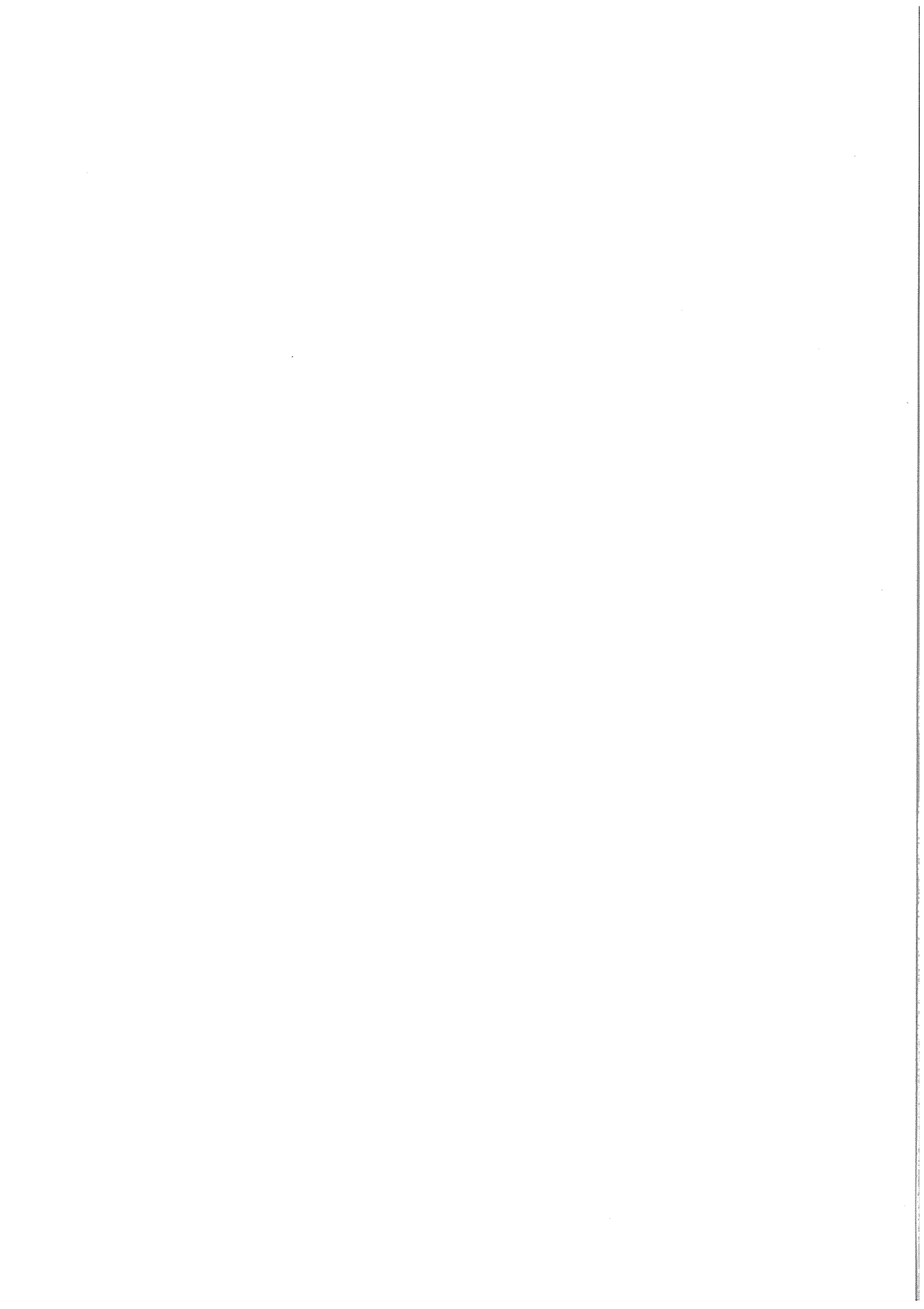
0% Transferability, Sectoral Immobility



Privatization with Two Sectors

0% Transferability, Sectoral Immobility





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