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FOREIGN DIRECT INVESTMENT, CAPITAL FORMATION AND LABOUR COSTS: EVIDENCE FROM BRITAIN AND GERMANY

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ABSTRACT

This paper argues that the liberalisation of foreign direct investment (FDI) has made labour costs more important to domestic investment and long-run labour demand. It provides evidence from British and German data that is consistent with this view. First, high unit labour costs increase FDI outflows and lower FDI inflows. Second, the effect of unit labour costs on domestic manufacturing investment was more negative in the high-FDI 1980s than in the low-FDI 1970s, and this change was concentrated in high-FDI industries. The implied effect on long-run labour demand is substantial.

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1. INTRODUCTION

If higher labour costs induce firms to relocate production abroad, domestic employment will fall. In recent years, this has led some observers to argue that falling barriers to foreign direct investment (FDI) have made wage moderation more important for preserving employment. Unless wages are kept under control, the argument goes, capital will migrate to countries with lower labour costs, and unemployment will rise. If falling FDI barriers increase the elasticity of the capital stock with respect to costs, the underlying argument is perfectly consistent with standard labour demand theory. Hicks notes in *The Theory of Wages* that "[t]he demand for anything is likely to be more elastic, the more elastic is the supply of co-operant agents of production" (Hicks, 1932, p. 242).

The present paper examines the implications of falling FDI barriers using data from Germany and Britain. The public perception of FDI liberalisation differs profoundly in these two countries. In Germany, it is seen as a threat that will either drive companies out of the country, or reduce Germany's high wages and generous social welfare benefits. By contrast, many British commentators see lower FDI barriers as an opportunity to attract companies that seek access to European markets but want to avoid continental "inflexibility". Most commentators in both countries take it for granted that labour costs are a major determinant of FDI, and that falling FDI barriers make wage moderation more important for keeping investment and jobs at home.

Britain's FDI inflows of around 2% of GDP, as well as its share of over 40% of all EU inward FDI (Eurostat, 1994), are among the British government's favourite statistics and have encouraged it to

portray Britain as the "enterprise centre of Europe". FDI inflows to Germany, by contrast, have been below 0.5% of GDP for many years, causing great concern among policy makers and pundits. However, it is less often realised that outflows are also much higher in Britain (about 3% of GDP) than in Germany (about 1.5%) so that net FDI outflows are rather similar in the two countries (see OECD, 1995). Hence, Britain's higher inflows may simply reflect a different industrial structure, with a greater role for multinationals, rather than more attractive locational conditions.

Most policy debates take it for granted that FDI translates straight into physical investment.[i] It is therefore interesting to see what has happened to capital formation in Britain and Germany. While the aggregate investment rate is substantially lower in Britain than in Germany, manufacturing investment, which may be more relevant to the relocation debate, is quite similar (Bond and Jenkinson, 1996; see also Table 6). Both countries have seen their investment rates fall considerably since the early 1970s, but their relative positions have remained quite stable. These facts do not suggest that high costs have hurt capital formation in Germany as compared to Britain. Instead, it seems that if high costs have contributed to falling investment, both countries were affected in similar measure.

Globally, FDI has grown dramatically since the early 1980s. The combined annual outflows from OECD countries (including flows within the OECD) have increased from less than $30 billion before 1983 to over $160 billion in every year since 1988. It seems clear that deregulation has played its part in this process. The United Nations Transnational Corporations Division (UNTCD, 1993) finds that with the abolition of exchange controls in Europe during the 1980s, outward FDI is essentially only subject to market forces. Some controls on inward FDI remain in various countries, but the liberalisation trend that "began in the mid-1970s has continued through the 1980s and early 1990s" (UNTCD, 1993, p. 17). In addition, trade restrictions have fallen, through both GATT and regional institutions such as the European Community. The impact on FDI is theoretically ambiguous. Falling trade costs increase

"vertical" FDI, which is driven by production cost considerations, but reduce "horizontal" FDI, which is motivated by market access (Markusen *et al.*, 1996).

How do the elasticities of investment and labour demand relate to the level of FDI barriers? Under perfect markets and capital mobility, the capital stock of a small country is infinitely elastic with respect to the domestic rate of return. If unit labour costs are negatively related to the domestic rate of return, as is likely, they will be completely determined by the world rate of return. Hence, the supply of capital is infinitely elastic with respect to unit labour costs. This simple argument mirrors the well-known factor price equalisation (FPE) theorem of international trade theory, which states that factor prices are completely determined by world product prices under free trade, so that the labour demand curve is perfectly elastic. In reality, FPE is unlikely to hold exactly. However, while the labour demand elasticity will remain finite under market imperfections such as monopolistic competition or transport costs, it will nevertheless increase following trade or investment liberalisation (see Wes, 1996).

2. THEORETICAL CONSIDERATIONS

In an open economy, rising labour costs tend to reduce labour demand for three reasons. First, the typical firm produces less total output in response to higher unit costs (the output or scale effect). Second, capital is substituted for labour (the substitution effect). And third, some firms may move abroad (the location effect). The theoretical appendix provides a very simple example in which the location effect becomes larger as the barriers to FDI fall. The output and substitution effects, which are less likely to be affected by "globalisation", are neglected for simplicity in this example.

The idea underlying the model is as follows. Firms incur "FDI costs", or costs of producing abroad. The average level of FDI barriers is determined by policy. However, firm-specific FDI barriers

vary with a number of factors specific to the home and destination countries, the industry, and the firm itself. These include the similarity of labour force skills between countries, industry-specific barriers to foreign activity such as national ownership requirements, or the capability of managers to oversee foreign operations.

With high FDI barriers, a given small change in production costs will push only a small number of firms to relocate (because the density of the distribution is very low around the critical point). As FDI barriers fall, however, the same cost change will induce more firms to move (because the density of the distribution at the critical point is higher). Hence, the elasticity of the capital stock and labour demand with respect to production costs rises as relocation costs fall. The graphic analysis in the Appendix uses the example of a firm that must decide whether to produce at home or abroad to serve its home market. Similar results hold for export production. In fact, it turns out that falling FDI barriers increase the total location effect whenever initial average FDI barriers are sufficiently high relative to transport costs. Hence, a partial dismantling of high FDI barriers under relatively free trade will increase the effect of unit costs on labour demand. In the last thirty years, this has arguably been the relevant case for most industrial economies.

3. EVIDENCE: FOREIGN INVESTMENT

3.1 Approach and Specification

The effect of unit labour costs on British and German bilateral FDI flows is estimated from a simple equation relating foreign investment to unit labour costs and other control variables. Such an equation is standard in the literature on the determinants of FDI.[ii]

$$(1) \qquad FDI_{ijt} = a_i + a_j + a_t + a_1 \ln\left[\frac{w_{it} / (e_{ijt} w_{jt})}{pr_{it} / pr_{jt}}\right] + a_2 X_{ijt} + e_{ijt},$$

where *FDI* denotes FDI flows as a percentage of partner-country GDP; *w*, *pr*, and *e* denote labour costs, labour productivity, and the exchange rate; the subscripts *i*, *j*, and *t* denote the source country, the destination country, and time; *X* denotes other control variables that may influence FDI; and e denotes an i. i. d. error term. Details

on the construction of the two data sets are given in the data appendix.

The dependent variable is based on aggregate bilateral flows between Britain or Germany, and the partner country. The British data set is made up of aggregate manufacturing data. Relocating production for a given market requires that the product be transportable, so that manufacturing data are likely to be better suited to the analysis. The dependent variable is defined as the real annual flow of FDI, adjusted for exchange-rate fluctuations and divided by partner-country manufacturing value added.

Unfortunately, German bilateral manufacturing FDI data were unavailable for a sufficiently long time period. Hence, aggregate data are used for both the dependent and the explanatory variables. However, there is a choice of dependent variable since the Bundesbank provides both annual flow and stock data (stock data are only available on a three-yearly basis for Britain). The latter can be deflated and first-differenced to obtain a pseudo-flow, which should correspond roughly to the flow figures since I adjust for exchange rate fluctuations and both measures are supposed to include retained earnings. But in practice, the change in the real FDI stock usually exceeds the real FDI flow by a substantial amount, particularly in the case of inflows (see Figures 2 and 3). The procyclical pattern of this difference suggests that the flow data may pick up retained earnings only imperfectly. Also, there may be procyclical valuation adjustments to the stock data, although this explanation begs the question why differenced stocks exceed flows even in a recession.

In both data sets, the main explanatory variable is log relative unit labour cost at market exchange rates, defined as the log annual labour cost difference minus the trend productivity difference between source and destination country. The idea is that high labour costs will only be detrimental to investment if they are not matched by high labour productivity. Unit labour costs are assumed to be exogenous to foreign investment decisions. It is possible to think of situations in which this condition is violated. First, net FDI inflows may appreciate the currency and thus raise relative unit labour costs.

Second, net FDI inflows may expand employment, increasing wage pressure and unit labour costs. However, it should be noted that bilateral FDI flows are very small, given that total inward plus outward FDI flows are typically less than 10% of British manufacturing output, and less than 2% of German GDP. Hence, it is unlikely that bilateral FDI flows have a sufficiently large effect on economy-wide (or in the British case, manufacturing-wide) aggregates such as unit labour costs and the exchange rate to bias the coefficients seriously. Since the effect of net FDI inflows on unit labour costs, if one exists, is likely to be positive, any simultaneity bias will be towards zero and will cause an understatement of the true effect of labour costs on FDI.[iii]

One other variable that turns out to be important in the case of Germany (but not Britain) is a dummy denoting European Community (EC) membership. It is entered both on its own and interacted with the labour cost variable, to test the hypothesis that EC membership may not only raise FDI flows *per se*, but also facilitate cost-induced relocation and thus reinforce the effect of labour costs. For instance, the absence of trade barriers within the EC should make it easier for firms to locate the production of intermediate goods on the basis of relative cost levels.

Other control variables are included in some equations to test the robustness of the basic results. For instance, the deviation of output from trend in the source and destination country is intended to control for short-term business cycle fluctuations; the relative number of days lost to strikes and lockouts to control for the industrial relations climate; and the relative real long-term interest rate to control for differences in the return to financial assets across countries. In addition, I always include time dummies to control for unobserved factors that drive the international propensity to invest abroad and may be partly responsible for the FDI surge in the late 1980s. Time dummies are conceptually important because the point of the econometric equations is to estimate the effect of unit labour costs for a given level of FDI barriers. (In practice, however, no qualitative results hinge on the inclusion of time dummies). In addition, most equations contain country or bilateral dummies.

Country dummies control for fixed characteristics that affect both inflows and outflows in the same direction, such as distance. Bilateral dummies, which are less restrictive and are sometimes used instead of country dummies, control for fixed characteristics that may affect only one flow, such as one-way barriers to FDI inflows. Note that bilateral dummies eliminate all cross-sectional information from the analysis.

3.2 Results

Patterns

The best way to start is to look at the raw data. Tables 1 and 2 present average relative bilateral FDI flows and unit labour cost differences between Britain or Germany and the partner country. Starting with Britain in Table 1, a large group of countries have average unit labour costs within a 10% range of the UK. Most of these have received net FDI flows from the UK during the sample period. However, looking at the outliers reveals quite a striking correlation between high unit labour costs and net FDI outflows. The UK sees substantial net inflows from the two countries with the highest unit labour costs, Denmark and Sweden. By contrast, UK outflows to Australia, Italy, New Zealand, Portugal and Spain – all countries with low unit labour costs – are typically large, while no complete FDI inflow series is available for these countries. This lack of data reflects the practice of the Central Statistical Office to suppress FDI data if the number of investors is too small to ensure anonymity, and is therefore in itself evidence of small inflows. Hence, high unit labour costs seem to be associated with net FDI outflows.

Table 2 repeats the exercise for German bilateral flows and stock changes. It is clear that both outflows and inflows, but particularly the latter, are larger on average when measured as a stock change. This reflects both the usual excess of stock changes over recorded flows noted above, and the fact that the stock change is measured only from 1984 onwards and thus leaves out two low-FDI years. More importantly, however, there is an even stronger

association between high unit labour costs and net FDI outflows than in the British data. All countries with lower unit labour costs than Germany – except the Netherlands when looking at stock differences – receive net FDI inflows from Germany. By contrast, all countries with higher unit labour costs – except Switzerland when looking at the flow data – provide net FDI outflows to Germany. Incidentally, the raw correlation between high unit labour costs and net FDI outflows observed in both data sets suggests that unit labour costs are more likely to cause FDI than the other way around: after all, there is no obvious reason why FDI outflows should cause unit labour costs to be high.

Regression Results

The econometric results should be thought of as a test whether the association of unit labour costs and FDI flows stands up after controlling for other variables. Table 3 presents the results for FDI in Britain. The coefficient on relative unit labour costs (RULC) in a simple regression is over 0.5 if country dummies are included, and is significant at the 1% level. Columns (2) through (4) show that this result is essentially robust to the inclusion of other variables such as EC membership (both on its own and interacted with RULC), business cycle factors, an industrial relations variable and real interest rates. Moreover, none of these additional variables are significant after controlling for unit labour costs.[iv] However, note that introducing bilateral dummies in columns (5) through (7) reduces the RULC coefficient to about 0.3 and make it insignificant at all conventional levels. Bilateral dummies eliminate all cross-sectional information – that is, the entire content of Table 1 – from the analysis.

Tables 4 and 5 contain analogous results for Germany, for the flow and differenced stock data respectively. Broadly speaking, the results are similar to those for Britain. However, unit labour costs are only significant within the EC. This may indicate that German multinationals (and foreign firms with subsidiaries in Germany) engage in cost-induced relocation mainly within Europe, while their British counterparts seek low-cost production locations worldwide.

Within the EC, the coefficient on unit labour costs is about 0.3 for the flow data and 0.7 for the stock data, and it is typically significant at the 1% level. These estimates remain broadly the same when bilateral dummies are included, but rising standard errors make all estimates insignificant at conventional levels. Nevertheless, it is noteworthy that the predicted effect of unit labour costs on FDI remains basically the same when all cross-sectional information – that is, the entire content of Table 2 – is eliminated.

The estimates are much larger in Table 4 than in Table 5. This is not surprising in the light of Figures 1 and 2, where FDI stock differences look like a magnified FDI flow series (at least as far as inflows to Germany are concerned). Again, a possible reason for the diverging estimates is that retained earnings, which are presumably lower when unit labour costs are high, may only be imperfectly captured in the flow data.

All the regressions in Tables 3 to 5 assume that a 1% increase in real domestic unit labour costs has the same effect as a 1% fall in the real exchange rate. This restriction is accepted at the 10% level of significance in all cases. Similarly, the symmetry restriction that unit labour costs in the source and destination county have equal and opposite effects is always accepted at the 10% level. Hence, the relative unit labour cost specification is consistent with the data. The additional regressions are available on request.

Note that the adjusted R^2 is quite low in all regressions; in fact, even if bilateral and time dummies are included, it never exceeds 0.3. This means that only a small part of the variation in FDI flows is "explained" by the independent variables. The main reason is that bilateral FDI data are very "lumpy" as the number of transactions in each year is quite small. However, my interest lies not in "explaining" the variation in FDI, much of which is presumably due to firm-specific factors hard to capture in an aggregate equation, but rather in the "conditional expectation function", or the expected effect of variations in unit labour costs on FDI (see Goldberger, 1991, p. 177f.). For this purpose, the low R^2 is irrelevant.

Overall, the results clearly support a positive effect of unit labour costs on FDI outflows. This effect becomes insignificant when

bilateral dummies are introduced. However, the resulting loss of information as compared to the inclusion of only country dummies – which also control for characteristics such as distance and other FDI barriers affecting both flows – is very substantial. In any case, the bilateral-dummy results provide no evidence that the basic results are biased by the use of cross-sectional information.

Implications

What are the quantitative implications of the results in Tables 3 to 5? Starting with the British estimates (those that include country dummies), we calculate the predicted effect of a 1% increase in British unit labour costs on net FDI inflows in 1993. Total manufacturing value-added (at 1985 prices) was equal to about £1,350 billion in all destination countries for UK multinationals in the data set, and about £1,173 billion in all home countries of multinationals with UK subsidiaries. Using the coefficient in column (2) of Table 3 of 0.54, a 1% increase in British unit labour costs would be expected to increase annual UK outflows by £74 million, and reduce inflows by £65 million. Hence, net UK FDI inflows fall by £139 million, or 1.7% of Britain's 1993 manufacturing investment (CSO, 1996).

We can calculate the predicted effect for Germany in a similar manner using the range of estimates of 0.3 to 0.7. A significant effect is found only within the EC in column (3) of Tables 4 and 5. In 1993, the combined GDP of the EC countries in the sample was DM 12,700 billion (in 1985 prices). The estimates therefore imply that FDI outflows rise, and inflows fall, by between DM 381 million and DM 898 million in response to a 1% labour cost increase. Hence, net FDI inflows fall by between DM 762 million and DM 1,796 million, or between 0.3% and 0.7% of Germany's aggregate 1993 investment (excluding dwellings) of DM 259 billion (Statistisches Bundesamt, 1996).

Indeed, the effect for Germany in manufacturing alone may be similarly strong as in Britain. It is likely that capital relocation is largely confined to that sector because service industries offer little

scope for relocating production away from the point of final sale. German manufacturing investment was DM 70.7 billion in 1993 (Statistisches Bundesamt, 1996). Under the (extreme) assumption that the net outflow takes place exclusively in manufacturing, a one-percent increase in unit labour costs would reduce net manufacturing FDI inflows by between 1.1% and 2.5% of manufacturing investment. This range neatly encompasses the predicted effect in British manufacturing.

What do these results imply for the elasticities of investment and labour demand with respect to labour costs? To provide an approximate answer to this question, it is necessary to make some restrictive assumptions. First, assume that FDI barriers were prohibitive before the start of the sample period but much lower afterwards. Second, assume that FDI flows correspond to physical investment flows. Third, assume that any FDI outflow induced by higher unit labour costs in the 1980s would have been invested in the home country in the 1970s. Under these assumptions, the elasticity of net FDI inflows with respect to unit labour costs calculated above corresponds to the rise in the domestic investment elasticity that we should observe (other things equal) between the 1970s and the 1980s. All of these assumptions, but particularly the last, are likely to lead to an overstatement of the change in the investment elasticity. There may have been some labour-cost induced relocation in the 1970s, when FDI barriers were high but not prohibitive (see UNTCD, 1993); FDI flows may partially reflect financial flows unrelated to physical investment; and most importantly, investment relocated in response to higher domestic costs in the 1980s may have been scrapped rather than undertaken at home, had FDI barriers been prohibitive.

Hence, FDI liberalisation may have raised the investment elasticity by 1.7 in British manufacturing and by between 0.3 and 0.7 in the entire German economy, but these estimates should be seen as an upper bound. Note, however, that the potential implications for labour demand are substantial since under constant returns investment, the capital stock and labour demand are all proportional in the long-run. Hence, an increase in the investment

elasticity by 1.7 (in the British case) would imply an increase in the labour demand elasticity by the same amount, which exceeds most estimates of the total labour demand elasticity estimated from historical data (see Hamermesh, 1993). Given the importance of such a change and the restrictive assumptions underlying its calculation, independent evidence on changes in the investment elasticity is clearly needed. This is provided in the following section.

4. EVIDENCE: DOMESTIC INVESTMENT

4.1 Approach and Specification

This section estimates directly whether the effect of labour costs on domestic manufacturing investment has become more negative between the low-FDI 1970s and the high-FDI 1980s and, in particular, whether such a change has taken place in FDI-intensive industries. The approach is to estimate separate manufacturing investment equations for the two time periods, and for each of industry group defined by FDI intensity. Other approaches are conceivable. First, one may want to estimate the determinants of domestic and foreign investment jointly. However, the FDI data are conceptually rather different from the domestic investment data and are not available for the entire period or at the same level of industrial disaggregation. Second, one may want to pool all the data and let only the unit labour cost coefficients vary by sub-period or industry group. However, it turns out that pooling over time is statistically rejected in all cases and pooling across industry groups is rejected in most cases.

The classification of industries in terms of their FDI intensity is described in the data appendix. Some important differences between Britain and Germany emerge. For instance, food and beverages are FDI-intensive in Britain but not in Germany. By contrast, clothing and engineering industries are FDI-intensive in Germany but not in Britain. However, chemical industries are consistently among the most FDI-intensive in both countries.

The investment equations can be thought of as skeleton versions of those estimated in Denny and Nickell (1992) and Dinenis and Funke (1994). I regress log investment on normalised log unit labour costs, an industry-specific demand index, an industry-specific fixed effect, a lagged dependent variable and, in some cases, an aggregate time effect. In the calculation of normalised unit labour costs, labour productivity is defined as the predicted value from a regression of industry value-added per worker on a cubic trend (the

main results are robust to altering this definition). Besides unit labour costs, all equations contain an industry demand index that controls for the cyclical behaviour of investment. It is defined as the deviation of log industry value-added from a cubic trend. This variable is preferable to total value-added because the trend component of output is clearly endogenous to investment; in practice, however, replacing the demand variable by log value-added does not have a major effect on the unit labour cost results. A lagged dependent variable allows for sluggish adjustment in investment rates which has been found important by Dinenis and Funke (1994). Time dummies control for all aggregate variables that may influence industry investment, such as aggregate demand, interest rates, the exchange rate, and possibly "animal spirits". All equations are estimated by the least-squares dummy-variable (LSDV) estimator.[v]

4.2 Results

The regression results are contained in Tables 7 to 14. The most important pieces of information is given in the row entitled "Sum ULC", which shows the total effect of current and lagged unit labour costs, along with its significance level.

Tables 7 and 8 show the results for the entire sample of manufacturing industries. In Britain, the effect is insignificant at the 5% level for the 1970s, but significantly negative for the 1980s. The difference is more pronounced when time dummies are included. In Germany, the results are stronger: In the 1970s, the estimated total effect is essentially zero, but in the 1980s it is around minus unity and significant at the 0.1% level. Hence, the effect of unit labour costs on investment has become more negative in both countries.

Tables 9 and 10 restrict the samples to low-FDI industries. In Britain, the unit labour cost effect seems to have become less negative. While the point estimates are negative in both the 1970s and the 1980s, they are smaller in absolute terms in the 1980s and are no longer significant at the 5% level. In Germany, the results are somewhat more ambiguous. If time dummies are excluded, the effect

changes from negative and insignificant in the 1970s to negative, very large (-2.7) and highly significant in the 1980s. However, if time dummies are included, the estimates change from negative and significant at the 5% level to negative, smaller in absolute size and insignificant at all conventional levels. Hence the large negative effect of labour costs in the 1980s seems to be driven by an aggregate correlation between labour costs and investment activity. It is quite conceivable that this correlation represents a causal relationship, but one would have more confidence in the estimated negative effect of labour costs if it held up at the level of the individual industry when controlling for aggregate factors. Thus, the effect has become less negative in Britain but may have become either more or less negative in Germany.

Tables 11 and 12 repeat this exercise for medium-FDI industries. In Britain, the effect becomes less negative and insignificant between the two periods if time dummies are excluded, but becomes much more negative and significant at the 10% level if time dummies are included. In Germany, the effect is mildly positive and insignificant in the 1970s, and negative in the 1980s, but only significant if time dummies are excluded. Overall, the evidence for a more negative effect in the 1980s is weak.

Finally, Tables 13 and 14 show the results for high-FDI industries. In Britain, the effect of unit labour costs is roughly zero in the 1970s. In the 1980s, it is negative and significant at the 5% level if time dummies are included. In Germany, the results are even stronger. The effect is around zero in the 1970s but is around minus unity and significant at the 0.1% level in the 1980s. Hence, the effect has clearly become more negative in both countries.

Overall, the results support the notion that FDI liberalisation has made the effect of labour costs on investment more negative. Not only is there strong evidence that this effect has become more negative in manufacturing as a whole, but the subsample of high-FDI industries shows the clearest change in both Britain and Germany.

Are the estimated magnitudes consistent with the FDI results in the last section? To evaluate the results, let us use the – short-run and long-run – total effect of unit labour costs in the more robust

regressions that include time dummies. The long-run effect is found in the usual way by dividing the "Sum ULC" coefficient by one minus the autoregressive coefficient. Note that the autoregressive coefficient is biased downwards so the estimated long-run effect is biased towards zero (Nickell, 1981). In British manufacturing, the whole-sample results imply a rise of 0.41 in the short-run and 0.86 in the long-run. Such a change is considerable, though less dramatic than the calculations of the previous section suggest. If factors other than FDI openness that potentially influence the investment elasticity were indeed constant between the 1970s and 1980s, the British results point to an overstatement of the elasticity change in the calculations of the last section. In German manufacturing, the whole-sample results imply a rise by 0.87 in the short-run and 2.60 in the long-run. These estimates are broadly in line with those of the previous section if most relocation takes place in manufacturing. No evidence for an overstatement of the elasticity change in the FDI calculations is found.

5. SUMMARY AND CONCLUSION

This paper analyses the hypothesis that the liberalisation of foreign direct investment has made labour costs more important to domestic investment. Using a very simplified model of the multinational corporation, the paper demonstrates that falling FDI barriers will tend to make the effect of unit costs on domestic production more negative. By way of evidence, it first shows that unit labour costs have a substantial positive effect on bilateral FDI flows. The results suggest that FDI liberalisation has considerably increased the investment elasticity in both Britain and Germany. In turn, this implies that the long-run labour demand elasticity may also have risen substantially. Then, the paper tests directly whether the effect of unit labour costs on domestic investment has changed between the 1970s and 1980s, a time when FDI grew substantially. And indeed, the long-run elasticity of manufacturing investment with

respect to unit labour costs seems to have risen substantially, particularly in Germany. This change is especially clear in those industries where FDI plays an important role.

What are the implications of a flatter labour demand curve, whether brought about by trade or FDI liberalisation? Clearly, workers' bargaining power will be reduced, an effect which may be partly responsible for at least some of the problems experienced by the British – and to a lesser extent German – trade union movement over the last 20 years. In a general equilibrium setting, Wes (1996) shows that a flatter labour demand curve leads to lower aggregate unemployment as the markup of bargained wages over prices falls. However, it is important to note the underlying assumption that wage-setters have adjusted fully to the new labour demand environment. If wage-setting behaviour takes time to adjust, a transition phase of higher unemployment may result. Quite possibly, we are currently witnessing such a high-unemployment transition phase in both countries. It is probably too early to say whether the recent fall in British unemployment indicates that the transition phase is coming to an end.

ENDNOTES

[1] Whether this assumption is justified is subject to debate. Graham (1995) argues that in general FDI should be viewed as a *source* of funds and not a *use* of funds. He finds that in the case of US-owned foreign subsidiaries, the short-run effect of FDI flows on the subsidiary's fixed investment is significantly positive, but less than unity. Using aggregate FDI flows for all OECD countries, by contrast, Feldstein (1995) finds that net FDI outflows translate straight into lower domestic investment in the long-run, and he cannot reject a one-for-one relationship. The robustness of Feldstein's findings is challenged by Devereux (1996).

[2] Similar equations have recently been estimated by Cushman (1987), Culem (1988), Lucas (1993), Moore (1993), Pain (1993), Klein and Rosengren (1994), Bajo-Rubio and Sosvilla-Rivero (1994), Barrell and Pain (1996), and Wang and Swain (1996). While the effects are not always significant, most find that higher (unit) labour costs increase outward or reduce inward FDI.

[3] In preliminary work, I found standard wage-setting or labour supply variables such as strikes and lockouts or participation rates to be poor instruments for unit labour costs in my time-series cross-section framework. Note that Cushman (1987) finds little evidence for simultaneity of labour costs, exchange rates, and American FDI flows.

[4] In particular, there is no evidence that EC membership is important for the determination of FDI flows. Note, however, that this does not rule out the kind of positive effect of *British* EC membership on FDI inflows that is often assumed in the British public debate.

[5] In a static model, the LSDV estimator is unbiased and efficient under classical assumptions. In a dynamic model, the autoregressive is biased downwards for finite T (see Nickell, 1981). However, recent simulation studies by Harris and Matyas (1996) and Judson and Owen (1996) find that the estimates on the X variables, in which

I am most interested, are very good in terms of small-sample bias and efficiency. Under a sample design similar to mine, moreover, Harris and Matyas (1996) find that the small-sample performance of the lagged dependent variable estimates is at least as good as that of the most popular instrumental-variable alternatives, which typically perform poorly with a small cross-sectional dimension. Note also that none of my manufacturing investment equations shows signs of residual autocorrelation, as required for consistency.

[6] No labour cost data are available for Portugal in 1992 and 93; they are extrapolated using manufacturing earnings growth published in the OECD's *Main Economic Indicators*.

[7] Only current-price value-added is available for Spain and New Zealand; it is divided by the GDP deflator to obtain constant-price figures.

[8] Belgium and Luxembourg, which are consolidated in the OECD statistics, are excluded because flows to Luxembourg are likely to be dominated by subsidiaries of German banks. Many of these were set up in response to the German withholding tax on capital income.

TABLE 1
FDI and Relative Unit Labour Costs: Britain

	Outflows	Inflows	ULC
Australia	1.098%	n. a.	+0.161
Belgium	0.348%	0.135%	+0.041
Canada	0.660%	0.105%	+0.001
Denmark	0.111%	0.483%	-0.284
France	0.148%	0.190%	+0.029
Germany	0.079%	0.063%	-0.088
Italy	0.127%	n. a.	+0.337
Japan	0.007%	0.025%	+0.096
Netherlands	0.823%	0.434%	-0.033
New Zealand	0.582%	n. a.	+0.335
Portugal	0.653%	n. a.	+0.996
Spain	0.190%	n. a.	+0.499
Sweden	0.077%	0.637%	-0.314
US	0.458%	0.200%	+0.028

Note: The FDI data refer to manufacturing average real annual flows between 1979 and 1993 in volume terms and scale the flow by the partner country's real value added in manufacturing. Outflows are from the UK. The unit labour cost (ULC) data refer to the UK's average log manufacturing ULC in a common currency minus that of the partner country.

TABLE 2
FDI and Relative Unit Labour Costs: Germany

	Outflows	Inflows	Outward stock change	Inward stock change	ULC
Australia	0.037%	0.002%	0.110%	0.004%	+0.216
Austria	0.411%	0.094%	0.702%	0.349%	+0.029
Canada	0.062%	0.008%	0.074%	0.029%	+0.063
Denmark	0.053%	0.042%	0.099%	0.157%	-0.091
France	0.100%	0.047%	0.141%	0.071%	+0.128
Ireland	1.774%	0.034%	3.621%	0.000%	+0.143
Italy	0.074%	0.010%	0.168%	0.021%	+0.424
Japan	0.006%	0.017%	0.007%	0.034%	-0.153
Netherlands	0.369%	0.108%	0.345%	0.868%	+0.082
Portugal	0.183%	0.000%	1.089%	0.002%	+0.921
Spain	0.176%	0.006%	0.285%	-0.003%	+0.527
Sweden	0.062%	0.075%	0.142%	0.248%	-0.207
Switzerland	0.292%	0.007%	0.297%	0.669%	-0.301
UK	0.149%	0.029%	0.232%	0.058%	+0.185
US	0.063%	-0.002%	0.074%	0.020%	+0.009

Note: The FDI data refer to average real annual flows between 1982 (stock changes: 1984) and 1993 in volume terms and scale the flow by the partner country's real GDP. Outflows and outward stock changes are from Germany. The unit labour cost (ULC) data refer to Germany's average log total ULC in a common currency minus that of the partner country.

TABLE 3
Foreign Investment, Britain

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
RULC	0.376*	0.545*	0.625*	0.543*	0.590*	0.297	0.289	0.279
	(0.138)	(0.168)	(0.235)	(0.169)	(0.176)	(0.238)	(0.241)	(0.251)
EC	-	-	0.212	-	-	-	-	-
			(0.323)					
RULC*EC	-	-	-0.119	-	-	-	-	-
			(0.315)					
Demand index source	-	-	-	-0.078	-0.188	-	-0.187	-0.175
				(1.246)	(1.250)		(1.243)	(1.253)
Demand index destin.	-	-	-	0.107	0.287	-	0.126	0.169
				(0.890)	(0.899)		(0.881)	(0.896)
Relative days lost	-	-	-	-	-0.048	-	-	-0.026
					(0.042)			(0.048)
Relative real interest rate	-	-	-	-	-1.311	-	-	-0.026
					(1.077)			(1.230)
Dummies:								
Country	no	yes	yes	yes	yes	yes	yes	yes
Bilateral	no	no	no	no	no	yes	yes	yes
Time	yes	yes	yes	yes	yes	yes	yes	yes
Adjusted R2	0.077	0.206	0.202	0.201	0.200	0.225	0.220	0.216
N	342	342	342	342	342	342	342	342

Note: All equations include a constant. Standard errors are given in parentheses. The sample period is 1979-93. The symbol * indicates significance at the five percent level.

TABLE 4
Foreign Investment, Germany (flow data)

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
RULC	-	0.157	-	-	-	-	-	-
		(0.091)						
EC	1.087	-	-0.068	-0.067	-0.067	-0.068	-0.067	-0.067
	(0.652)		(0.194)	(0.197)	(0.195)	(0.184)	(0.186)	(0.186)
RULC*EC	0.295*	-	0.295*	0.297*	0.335*	0.362	0.376	0.383
	(0.127)		(0.123)	(0.123)	(0.140)	(0.359)	(0.360)	(0.362)
RULC	-0.009	-	-0.001	-0.001	0.081	0.160	0.169	0.315
*(1-EC)	(0.139)		(0.135)	(0.135)	(0.140)	(0.277)	(0.278)	(0.293)
Demand index	-	-	-	-0.668	-1.110	-	-0.752	-1.103
source				(2.012)	(2.006)		(1.902)	(1.913)
Demand index	-	-	-	0.759	1.201	-	0.842	1.194
destin.				(2.012)	(2.006)		(1.902)	(1.913)
Relative days	-	-	-	-	0.052	-	-	0.030
lost					(0.042)			(0.058)
Relative real	-	-	-	-	-2.689*	-	-	-2.423
interest rate					(1.124)			(1.678)
Dummies:								
Country	no	yes	yes	yes	yes	yes	yes	yes
Bilateral	no	no	no	no	no	yes	yes	yes
Time	yes	yes	yes	yes	yes	yes	yes	yes
Adjusted R2	0.024	0.088	0.091	0.087	0.100	0.188	0.184	0.186
N	358	358	358	358	358	358	358	358

Note: All equations include a constant. Standard errors are given in parentheses. The sample period is 1982-93. The symbol * indicates significance at the five percent level.

TABLE 5
Foreign Investment, Germany (differenced stock data)

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
RULC	-	0.523*	-	-	-	-	-	-
		(0.154)						
EC	0.206	-	0.012	0.001	0.001	0.012	0.001	0.001
	(0.112)		(0.387)	(0.387)	(0.380)	(0.356)	(0.356)	(0.354)
RULC*EC	0.698*	-	0.698*	0.698*	0.816*	0.517	0.534	0.865
	(0.207)		(0.196)	(0.196)	(0.221)	(0.621)	(0.623)	(0.638)
RULC *(1-EC)	0.241	-	0.241	0.243	0.339	0.098	0.118	0.544
	(0.263)		(0.249)	(0.250)	(0.253)	(0.465)	(0.467)	(0.509)
Demand index source	-	-	-	3.570	2.222	-	3.035	1.722
				(3.535)	(3.507)		(3.267)	(3.310)
Demand index destin.	-	-	-	3.905	5.254	-	4.441	5.754
				(3.535)	(3.507)		(3.267)	(3.310)
Relative days lost	-	-	-	-	0.201	-	-	0.162
					(0.093)			(0.125)
Relative real interest rate	-	-	-	-	-7.063*	-	-	-5.581
					(2.127)			(3.112)
Dummies:								
Country	no	yes	yes	yes	yes	yes	yes	yes
Bilateral	no	no	no	no	no	yes	yes	yes
Time	yes	yes	yes	yes	yes	yes	yes	yes
Adjusted R2	0.068	0.167	0.167	0.166	0.198	0.294	0.294	0.302
N	298	298	298	298	298	298	298	298

Note: All equations include a constant. Standard errors are given in parentheses. The sample period is 1984-93. The symbol * indicates significance at the 5% level.

TABLE 6
Average Industry Investment Rates and Unit Labour Costs, 1970-80 and 1981-91

Industry	Investment rate		Unit labour costs	
	Britain	Germany	Britain	Germany
Food (3110/3120)	0.098	0.164	0.438	0.586
Beverages (3130)	0.178	0.215	0.298	0.421
Tobacco (3140)	0.041	0.024	0.292	0.098
Textiles (3210)	0.130	0.145	0.896	0.688
Wearing apparel (3220)	0.065	0.050	0.923	0.758
Leather and products (3230)	0.063	0.075	0.848	0.642
Footwear (3240)	0.039	0.064	0.943	0.799
Wood products (3310)	0.105	0.145	0.619	0.681
Furniture and fixtures (3320)	0.056	0.083	0.684	0.760
Paper products (3410)	0.145	0.176	0.862	0.597
Printing, publishing (3420)	0.073	0.134	0.861	0.812
Industrial chemicals (3510)	0.334	0.247	0.726	0.559
Other chemicals (3520)	0.129	0.126	0.679	0.601
Petroleum refineries (3530)	0.269	0.066	0.267	0.111
Petroleum, coal prod. (3540)	0.095	-	0.725	-
Rubber products (3550)	0.110	0.149	1.044	0.914
Plastic products (3560)	0.133	0.184	0.968	0.833
Pottery and china (3610)	0.102	0.137	1.019	1.047
Glass and products (3620)	0.319	0.241	0.933	0.692
Non-metallic products (3690)	0.132	0.176	0.686	0.559
Iron and steel (3710)	0.233	0.179	0.956	0.761
Non-ferrous metals (3720)	0.216	0.128	0.841	0.706
Metal products (3810)	0.107	0.114	0.902	0.698
Non-electr. machinery (3820)	0.089	0.094	0.912	0.807
Electrical machinery (3830)	0.106	0.118	0.891	0.763
Transport equipment (3840)	0.114	0.139	0.963	0.752
Professional goods (3850)	0.273	0.169	0.791	0.683
Total manufacturing	0.139	0.136	0.777	0.666

Note: The investment rate is defined as gross capital formation over value added. Real unit labour costs are annual labour costs over value added.

TABLE 7
Log Industry Investment, Britain (All Industries)

Variable	(1)	(2)	(3)	(4)
	1970-1980		1981-1991	
Log inv. (t-1)	0.524***	0.527***	0.449***	0.527***
	(0.053)	(0.057)	(0.044)	(0.049)
ULC	0.151	0.284**	-0.084	-0.046
	(0.118)	(0.119)	(0.146)	(0.166)
ULC (t-1)	-0.404***	-0.383***	-0.245	-0.459***
	(0.118)	(0.119)	(0.149)	(0.159)
Demand	0.995***	0.423	1.706***	1.802***
	(0.229)	(0.317)	(0.157)	(0.273)
Sum ULC	-0.253*	-0.099	-0.329**	-0.505***
Fixed effects:				
Industry	yes	yes	yes	yes
Time	no	yes	no	yes
Adjusted R^2	0.970	0.977	0.978	0.978
N	270	270	297	297

Note: Standard errors are given in parentheses. "Sum ULC" denotes the sum of the current and lagged unit labour cost coefficients. The symbols *, **, and *** indicate significance at the ten, five, and one percent level, respectively.

TABLE 8
Log Industry Investment, Germany (All Industries)

Variable	(1)	(2)	(3)	(4)
	1970-1980		1981-1991	
Log inv. (t-1)	0.656***	0.621***	0.757***	0.650***
	(0.043)	(0.056)	(0.042)	(0.049)
ULC	-0.052	-0.053	-0.443***	-0.203
	(0.133)	(0.135)	(0.191)	(0.197)
ULC (t-1)	0.123	0.102	-0.631***	-0.614***
	(0.115)	(0.115)	(0.213)	(0.213)
Demand	0.700***	0.410	1.104***	0.865***
	(0.223)	(0.282)	(0.239)	(0.260)
Sum ULC	0.071	0.049	-1.074***	-0.817***
Fixed effects:				
Industry	yes	yes	yes	yes
Time	no	yes	no	yes
Adjusted R^2	0.981	0.983	0.988	0.990
N	260	260	260	260

Note: See note for Table 7

TABLE 9
Log Industry Investment, Britain (Low-FDI Industries)

Variable	(1)	(2)	(3)	(4)
	1970-1980		1981-1991	
Log inv. (t-1)	0.422***	0.490***	0.325***	0.426***
	(0.076)	(0.081)	(0.061)	(0.075)
ULC	-0.117	0.107	-0.046	0.096
	(0.229)	(0.249)	(0.238)	(0.268)
ULC (t-1)	-0.688***	-0.716***	-0.320	-0.593**
	(0.222)	(0.227)	(0.243)	(0.253)
Demand	1.134***	0.130	1.884***	1.996***
	(0.295)	(0.442)	(0.187)	(0.454)
Sum ULC	-0.805***	-0.609**	-0.366	-0.497*
Fixed effects:				
Industry	yes	yes	yes	yes
Time	no	yes	no	yes
Adjusted R^2	0.974	0.977	0.975	0.977
N	140	140	154	154

Note: See note for Table 7

TABLE 10
Log Industry Investment, Germany (Low-FDI Industries)

Variable	(1)	(2)	(3)	(4)
	1970-1980		1981-1991	
Log inv. (t-1)	0.392***	0.373***	0.723***	0.523***
	(0.115)	(0.133)	(0.091)	(0.118)
ULC	-0.590	-0.793**	-1.310**	-0.472
	(0.380)	(0.310)	(0.584)	(0.543)
ULC (t-1)	0.155	0.126	-1.411**	-0.093
	(0.344)	(0.301)	(0.641)	(0.612)
Demand	1.536***	0.660	1.218**	0.927
	(0.480)	(0.526)	(0.622)	(0.648)
Sum ULC	-0.445	-0.667**	-2.721***	-0.569
Fixed effects:				
Industry	yes	yes	yes	yes
Time	no	yes	no	yes
Adjusted R^2	0.954	0.974	0.964	0.976
N	70	70	77	77

Note: See note for Table 7

TABLE 11
Log Industry Investment, Britain (Medium-FDI Industries)

Variable	(1)	(2)	(3)	(4)
	1970-1980		1981-1991	
Log inv. (t-1)	0.540***	0.265*	0.550***	0.635***
	(0.107)	(0.156)	(0.111)	(0.117)
ULC	-0.805***	-0.028	0.220	0.212
	(0.296)	(0.295)	(0.451)	(0.679)
ULC (t-1)	0.295	0.389	-0.637	-1.318*
	(0.239)	(0.278)	(0.556)	(0.763)
Demand	2.202***	0.688*	1.885***	0.930
	(0.358)	(0.361)	(0.528)	(0.884)
Sum ULC	-0.510*	0.361	-0.417	-1.106*
Fixed effects:				
Industry	yes	yes	yes	yes
Time	no	yes	no	yes
Adjusted R^2	0.961	0.984	0.875	0.910
N	40	40	44	44

Note: See note for Table 7

TABLE 12
Log Investment, Germany (Medium-FDI Industries)

Variable	(1)	(2)	(3)	(4)
	1970-1980		1981-1991	
Log inv. (t-1)	0.752***	0.659***	0.694***	0.527***
	(0.069)	(0.097)	(0.073)	(0.091)
ULC	-0.054	-0.124	0.115	0.310
	(0.264)	(0.304)	(0.363)	(0.360)
ULC (t-1)	0.165	0.338	-0.752**	-0.529
	(0.242)	(0.277)	(0.378)	(0.368)
Demand	1.110***	0.941*	1.733***	1.045*
	(0.431)	(0.591)	(0.378)	(0.567)
Sum ULC	0.111	0.214	-0.637**	-0.219
Fixed effects:				
Industry	yes	yes	yes	yes
Time	no	yes	no	yes
Adjusted R^2	0.965	0.967	0.978	0.982
N	90	90	99	99

Note: See note for Table 7

TABLE 13
Log Industry Investment, Britain (High-FDI Industries)

Variable	(1)	(2)	(3)	(4)
	1970-1980		1981-1991	
Log inv. (t-1)	0.564***	0.518***	0.574***	0.609***
	(0.096)	(0.112)	(0.081)	(0.085)
ULC	0.302*	0.364**	-0.242	-0.245
	(0.163)	(0.160)	(0.229)	(0.264)
ULC (t-1)	-0.378**	-0.382**	-0.177	-0.297
	(0.177)	(0.181)	(0.225)	(0.253)
Demand	0.574	0.477	1.319***	1.725***
	(0.499)	(0.707)	(0.371)	(0.506)
Sum ULC	-0.076	-0.018	-0.419*	-0.542**
Fixed effects:				
Industry	yes	yes	yes	yes
Time	no	yes	no	yes
Adjusted R^2	0.956	0.961	0.969	0.978
N	90	90	99	99

Note: See note for Table 7

TABLE 14
Log Industry Investment, Germany (High-FDI Industries)

Variable	(1)	(2)	(3)	(4)
	1970-1980		1981-1991	
Log inv. (t-1)	0.607***		0.727***	0.722***
	(0.072)	0.602****	(0.063)	(0.061)
		(0.092)		
ULC	-0.034	-0.095	-0.532**	-0.325
	(0.179)	(0.180)	(0.221)	(0.217)
ULC (t-1)	0.113	0.028	-0.476*	-0.742***
	(0.144)	(0.141)	(0.259)	(0.250)
Demand	0.374	0.450	0.922***	0.591**
	(0.337)	(0.392)	(0.276)	(0.278)
Sum ULC	0.079	-0.067	-1.008***	-1.076***
Fixed effects:				
Industry	yes	yes	yes	yes
Time	no	yes	no	yes
Adjusted R^2	0.989	0.991	0.995	0.996
N	100	100	110	110

Note: See note for Table 7

FIGURE 1
A Fall in Average FDI Barriers

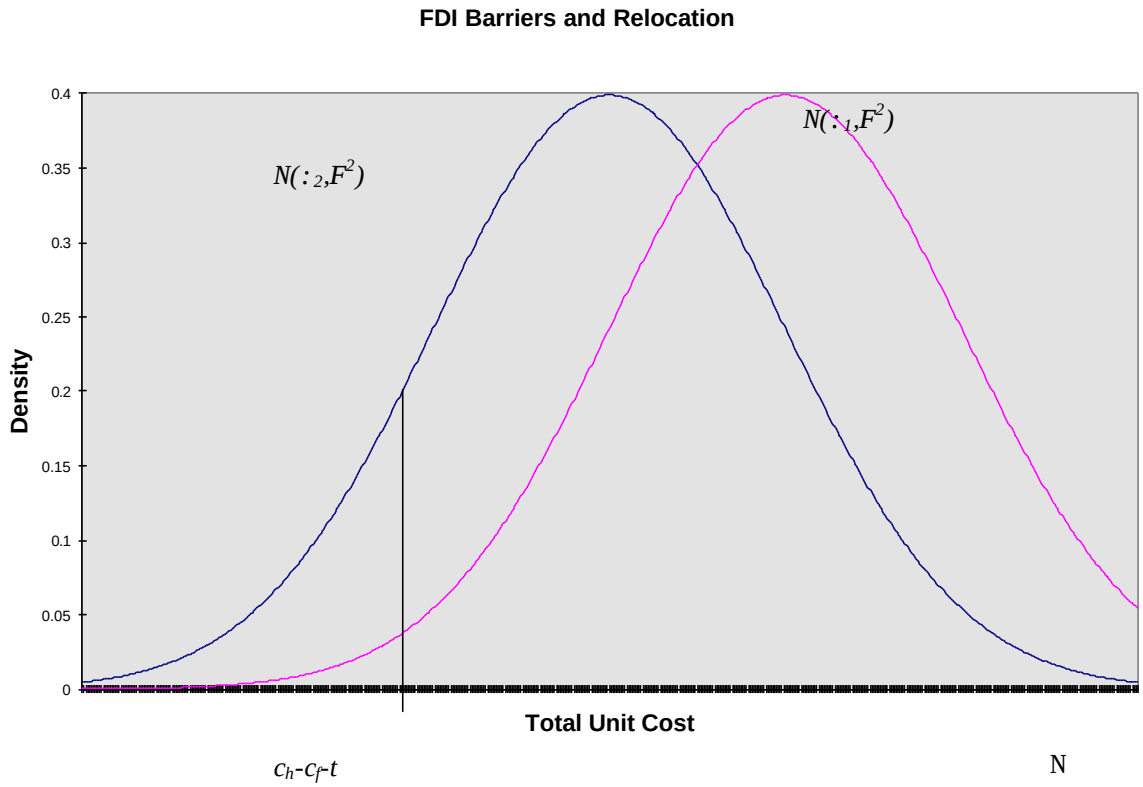


FIGURE 2
Real FDI Outflows and Changes in Outward FDI Stocks, Germany

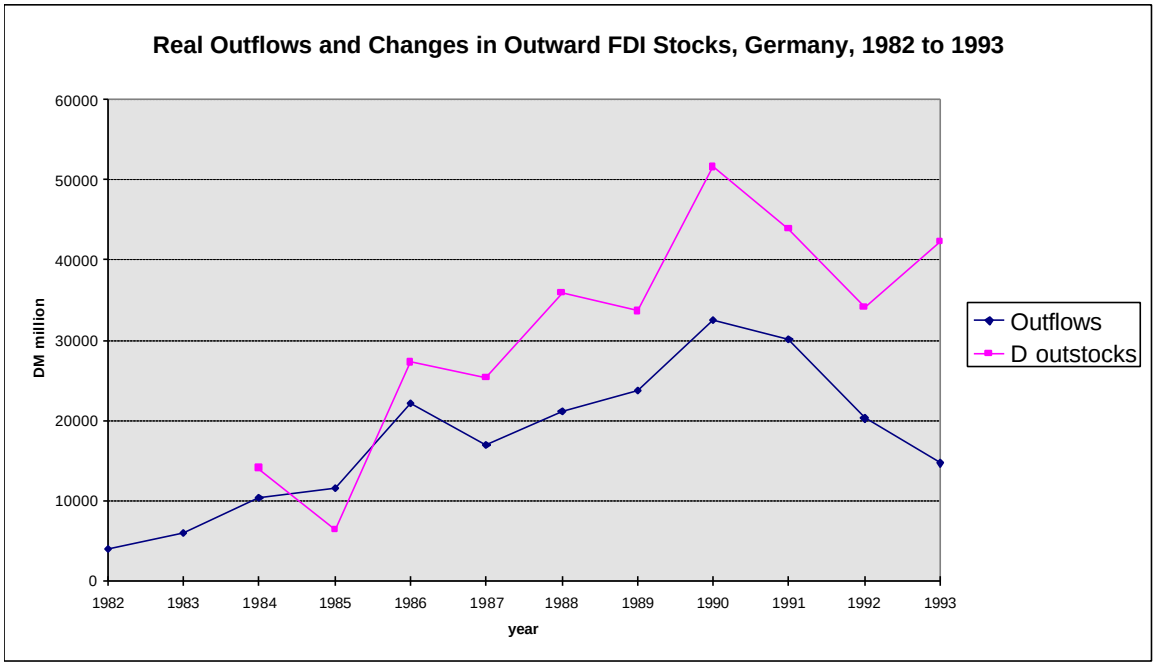
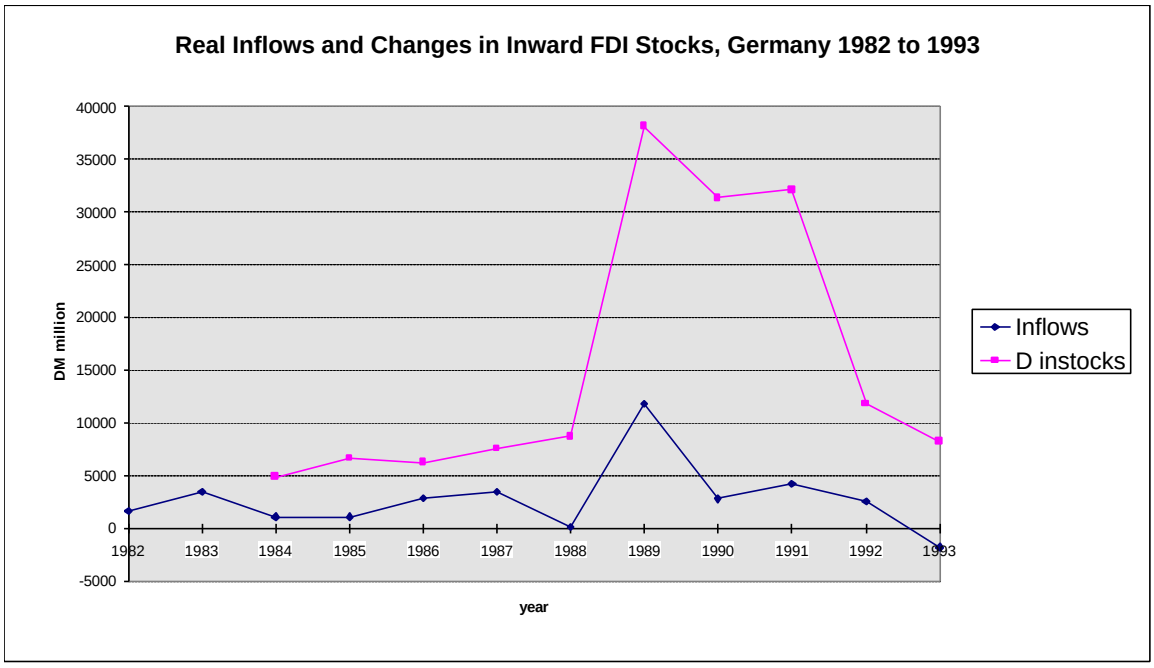


FIGURE 3
Real FDI Inflows and Changes in Inward FDI Stocks, Germany



THEORETICAL APPENDIX

Assume that countries *h* and *f* each have a large number of firms that produce under constant returns to scale and sell their products in both countries. Sales in each market are given, production is Leontief, technology is identical across countries, and capital is bought at a constant price and then deployed wherever production is to take place. However, both wages and worker effectiveness differ between countries. Under these conditions, unit labour costs, c_h and c_f, are sufficient to describe the relative costs of production in different countries.

Firms incur a trade cost of t per unit of output whenever the good is produced in a country different from that of final sale. Moreover, a firm that produces outside its home country incurs a firm-specific "FDI cost" of f, which is normally distributed with expectation m and variance s^2.

The four conditions that indicate whether an *h* or *f* firm, respectively, that sells in market *h* or *f*, respectively, will produce in country *h*, are obtained by adding the three cost components described above. Assume for convenience that firms will produce in *h* if total costs are less than or equal to costs in *f*. An *h* firm selling in *h* will produce in *h* as long as $c_h - c_f \leq t + f$, while an *h* firm selling in *f* will produce in *h* if $c_h - c_f \leq -t + f$. Equivalent conditions hold for country *f* firms. Together with the distributional assumptions about f, this implies that the proportion of country *h* firms that carry out their production for market *h* in country *h* is given by

$$q_{hhh} = F_{SN}\left[\frac{-c_h + c_f + t + m}{s}\right],$$

where F_{SN} [.] refers to the standard normal cumulative distribution function. Falling FDI barriers are modelled as a fall in m, which raises the proportion of *h* firms that move production to *f*; if c_h exceeds c_f initially, so that more *h* firms produce in *f* than vice versa,

such a fall causes a net reduction in country h labour demand. Likewise, a rise in c_h raises the proportion of h firms that move production to f and lowers the proportion of f firms that move production to h; this obviously lowers labour demand in h. Similar relationships hold for the other three cases.

A more interesting question is how the effect of labour costs on domestic labour demand changes as the barriers to FDI fall. A sufficient condition for the cross-partial derivative of q_{hhh} with respect to labour costs and average FDI barriers to be negative is that q_{hhh} exceeds one-half initially, so that a firm with $f = m$ produces in h. In this case, lower FDI barriers will always make the effect of higher domestic labour costs on domestic labour demand more negative. Similar results hold for the other three cases, namely h firms producing for market f, and f firms producing for markets h and f. The effect of falling FDI barriers on the total labour demand effect of labour costs is given by the sum of all four second derivatives. A sufficient condition for this sum to be negative is that q_{hfh} and q_{fhf} both exceed one-half or – assuming constant firm size – each country exports more than its foreign subsidiaries produce for the foreign market.

In Figure 1, which depicts the case of a home firm producing for the home market, production will take place abroad whenever $f < c_h - c_f - t$. A fall in average FDI barriers from m_1 to m_2 shifts the distribution of f leftwards, which increases both the total proportion of output produced abroad and its marginal change as labour costs in either country change.

DATA APPENDIX

FDI equations

The British FDI data refer to two-way manufacturing flows between Britain and other OECD countries for the period 1978 to 1993 as published by the Central Statistical Office (CSO) in *Business Monitor MA4*. The sample consists of two-way flows between the UK and Belgium, Denmark, France, Germany, the Netherlands, Sweden, Canada, the US, Australia, and Japan; in addition, the sample includes outflows from the UK to Italy, Portugal, Spain, Australia, and New Zealand. The UK inflow series were deflated by the UK capital formation deflator (OECD: *National Accounts*). The outflow series were converted into host-country currency using market exchange rates, deflated by the host-country gross capital formation deflator, and reconverted into pounds sterling at purchasing power parity to obtain FDI volume series. They were then expressed as a percentage of the partner country's GDP. The other explanatory variables for both the foreign and domestic investment equations are mainly taken from the OECD's STAN database. The labour cost variable refers to annual total labour compensation per worker. It is adjusted by the GDP deflator (a manufacturing value-added deflator is not available for all countries).[vi] The productivity variable is constant-price value added divided by the number of employees.[vii] All other variables are taken from the CEP-OECD data set described in Bell and Dryden (1996).

The German FDI data are constructed in a similar manner but use aggregate data. Two alternative measures are employed for the numerator. First, "FDI flows" represent two-way flows between Germany (until 1990: West Germany) and other OECD countries for the period 1982 to 1993 as published by the OECD in its *International Direct Investment Statistics Yearbooks* 1993 to 1995. Second, "FDI stock differences" refer to the first difference of real German inward and outward FDI stocks *vis-à-vis* other OECD countries for the period 1984 to 1993. The sample is made up of two-way FDI between Germany and Australia, Austria, Canada,

Denmark, France, Ireland, Italy, Japan, the Netherlands, Portugal, Spain, Sweden, Switzerland, the UK, and the US. Within the OECD, these are the most important FDI partner countries for Germany.[viii] Inflows and outflows are pooled. All other variables are taken from the CEP-OECD data set.

Domestic Investment Equations

For both countries, all variables in the domestic manufacturing investment equations are taken from the OECD's STAN data base. The number of industries is 26, while the sample period is from 1970 to 1991. The variable definitions are generally similar to the FDI equations. Investment is defined as the logarithm of real investment deflated by the capital goods price deflator. Unit labour costs are defined as log real annual labour costs, deflated by the industry value-added deflator, minus log productivity, where log productivity is the predicted value from an industry-specific cubic trend in log value-added per worker. Finally, demand is defined as the deviation of log real industry output from a cubic trend.

For Britain, FDI intensity is defined as the 1984-93 average of inward plus outward FDI flows (OECD, 1995) divided by gross domestic capital formation (STAN). Whenever this ratio (whose aggregate value is 0.72) exceeds 0.4 (1.1), the industry is classified as medium-FDI (high-FDI). As the CSO uses a different industrial classifications from the OECD, all industries except ISIC group 38 (metal and engineering industries), where three-digit information is available, were classified according to their two-digit FDI intensity. Moreover, there is no information on FDI in ISIC groups 33 and 36; the classification of these industries as low-FDI is based on German FDI data taken from Deutsche Bundesbank (1995). ISIC codes 341, 342, 382, 383 are classified as medium-FDI. ISIC codes 311/312, 313, 314, 351, 352, 353, 354, 355, 356 are high-FDI.

In Germany, the industries are classified according to their FDI intensity by dividing the 1991 inward plus outward FDI stock (Deutsche Bundesbank, 1995), which is available at a higher level of industrial disaggregation than the flow data, by 1991 gross domestic capital formation (STAN). Whenever this ratio (whose aggregate

value is 1.25) exceeds 0.6 (2.0), the industry is classified as medium-FDI (high-FDI). As the industrial classifications differ, the results are only approximate and ISIC groups 311/2/3, 323/4, 351/2, 353/4, and 361/2/9 had to be aggregated. ISIC groups: 321, 322, 356, 361, 362, 369, 371, 372, 385 are classified as medium-FDI. ISIC groups 314, 323, 324, 351, 352, 353, 355, 382, 383, 384 are classified as high-FDI.

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ENDNOTES

[i] Whether this assumption is justified is subject to debate. Graham (1995) argues that in general FDI should be viewed as a *source* of funds and not a *use* of funds. He finds that in the case of US-owned foreign subsidiaries, the short-run effect of FDI flows on the subsidiary's fixed investment is significantly positive, but less than unity. Using aggregate FDI flows for all OECD countries, by contrast, Feldstein (1995) finds that net FDI outflows translate straight into lower domestic investment in the long-run, and he cannot reject a one-for-one relationship. The robustness of Feldstein's findings is challenged by Devereux (1996).

[ii] Similar equations have recently been estimated by Cushman (1987), Culem (1988), Lucas (1993), Moore (1993), Pain (1993), Klein and Rosengren (1994), Bajo-Rubio and Sosvilla-Rivero (1994), Barrell and Pain (1996), and Wang and Swain (1996). While the effects are not always significant, most find that higher (unit) labour costs increase outward or reduce inward FDI.

[iii] In preliminary work, I found standard wage-setting or labour supply variables such as strikes and lockouts or participation rates to be poor instruments for unit labour costs in my time-series cross-section framework. Note that Cushman (1987) finds little evidence for simultaneity of labour costs, exchange rates, and American FDI flows.

[iv] In particular, there is no evidence that EC membership is important for the determination of FDI flows. Note, however, that this does not rule out the kind of positive effect of *British* EC membership on FDI inflows that is often assumed in the British public debate.

[v] In a static model, the LSDV estimator is unbiased and efficient under classical assumptions. In a dynamic model, the autoregressive is biased downwards for finite T (see Nickell, 1981). However, recent simulation studies by Harris and Matyas (1996) and Judson and Owen (1996) find that the estimates on the X variables, in which I am most interested, are very good in terms of small-sample bias and efficiency. Under a sample design similar to mine, moreover, Harris and Matyas (1996) find that the small-sample performance of the lagged dependent variable estimates is at least as good as that of the most popular instrumental-variable alternatives, which typically perform poorly with a small cross-sectional dimension. Note also that none of my manufacturing investment equations shows signs of residual autocorrelation, as required for consistency.

[vi] No labour cost data are available for Portugal in 1992 and 93; they are extrapolated using manufacturing earnings growth published in the OECD's *Main Economic Indicators*.

[vii] Only current-price value-added is available for Spain and New Zealand; it is divided by the GDP deflator to obtain constant-price figures.

[viii] Belgium and Luxembourg, which are consolidated in the OECD statistics, are excluded because flows to Luxembourg are likely to be dominated by subsidiaries of German banks. Many of these were set up in response to the German withholding tax on capital income.

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