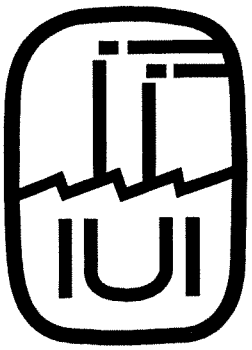

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FOREIGN DIRECT INVESTMENT, CAPITAL FORMATION AND LABOUR COSTS: THEORY AND EVIDENCE FOR GERMANY

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Foreign Direct Investment, Capital Formation and Labour Costs: Theory and Evidence for Germany

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Abstract: This paper shows that the liberalisation of foreign direct investment (FDI) tends to make the effect of labour costs on domestic investment and labour demand more negative. Using data from Germany, it then provides evidence 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

Open any German newspaper, and you are likely to find an article on the demise of *Standort Deutschland* (location Germany). Two facts, perhaps above all, worry the nation's business writers: high labour costs, and large net outflows of foreign direct investment (FDI). Together, these are taken as evidence that firms are leaving Germany in response to excessive cost levels. Since an exodus of firms reduces domestic labour demand, it is often argued that "globalisation" has made wage moderation more important for preserving employment.

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). Hence, if the domestic capital stock becomes more elastic with respect to labour costs as barriers to FDI fall, the long-run demand for labour will also become more elastic. In this sense, the popular wisdom that globalisation makes wage restraint more important for employment is right on the mark. Of course, whether this effect is quantitatively important is a purely empirical question.

Using a very simple model of the multinational corporation (MNC), this paper first shows that falling barriers to foreign direct investment make the effect of higher labour costs on investment, the capital stock, and the demand for labour more negative. It then provides evidence that such a shift has indeed taken place in Germany, and that its pattern is consistent with a causal role of greater openness to FDI. In quantitative terms, the paper finds that the implications of growing FDI are substantial.

2. Motivation

The share of gross domestic fixed capital formation in German GDP was 20.9 percent in 1992, which is close to the OECD average (OECD, 1995a). The investment rate has decreased somewhat since the early 1970s, when it was around 25 percent, but has shown little trend since the recession of 1973/74 (OECD, various years). FDI flows have shown a very interesting pattern in recent years, with outflows of around DM 30 billion per year, or one percent of GDP, and almost negligible inflows (OECD, 1995b). This imbalance has aroused concern about Germany's future as a production location, but it is important to note that countries such as Britain, the Netherlands, or Switzerland typically have much higher net FDI outflows relative to their GDP (OECD, 1995b). Nevertheless, net annual FDI outflows equal to about five percent of domestic investment can make a noticeable impact on the long-run capital stock.

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 considerations (Markusen *et al.*, 1996).

The analysis of the causes and effects of foreign direct investment is notorious for identification problems. One study may regress FDI on wages, while the next may explain wages by FDI intensity. Since suitable instruments are typically hard to find, this is a serious econometric problem. To see what is at issue, it is useful to distinguish between two hypothetical cases. In the first case, falling FDI barriers prompt firms to exploit opportunities, such as tax and labour cost differentials, that were formerly closed to them. In such a situation, it may be appropriate to view FDI as essentially exogenous and focus on its effects. For instance, Feenstra and Hanson (1995) examine the effects of American FDI flows to Mexico, noting that Mexico's progressive liberalisation made it possible for American firms to exploit the huge labour cost differential between the two countries.[1]

In the second case, changes in economic variables such as demand, labour costs, or taxes, bring about changes in the geographic structure of production, while the level of FDI barriers remains unchanged. In this situation, FDI must be explained endogenously by the economic variables and attention naturally focuses on the determinants of FDI. However, a

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[1] In other cases, the assumption of exogenous foreign activity is harder to justify. For instance, Lipsey (1995) regresses the domestic employment of American MNCs on affiliate sales. As Brainard (1995) points out, such a regression may well suffer from simultaneity bias. For instance, an unobserved positive shock to the demand for an MNC's products would be expected to increase both foreign and domestic activity.

regression of FDI on wages or taxes will only yield the desired result if FDI restrictions are in fact constant across the sample, or at least uncorrelated with the economic variables.[2]

This paper aims to integrate these two modes of analysis by examining whether lower FDI barriers have made the effect of labour costs on investment, and by implication labour demand, more negative. This hypothesis seems to underlie the popular notion that "globalisation" has made wage moderation more important for keeping firms from moving abroad. The approach to identification is as follows: The paper assumes FDI barriers to be prohibitive in the 1970s, but much lower and relatively constant in the 1980s.[3] It then estimates the effects of unit labour costs on FDI flows during the 1980s, and calculates the implied change in the effect of labour costs on domestic investment under the assumption that net FDI inflows increase domestic investment one-for-one.[4] To get more independent evidence on whether the investment elasticity has changed, however, the fifth section estimates the effect of unit labour costs on industry gross capital formation in the 1970s and the 1980s.

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[2] The large literature on the effects of labour costs on FDI flows falls into this category. Recent examples include 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 of these studies find that higher labour costs increase outward or reduce inward FDI.

[3] These assumptions are considerable simplifications; in reality, the fall in FDI barriers was more gradual. Nevertheless, the survey in UNTCD (1993) notes that many important changes took place in the early 1980s, such as the abolition of exchange controls in Europe.

[4] Is this assumption tenable? It is easy to think of counterexamples. In fact, 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. I assume that Feldstein's result holds for my sample.

If FDI liberalisation has made the effect of labour costs on domestic investment more negative, this has important implications for the slope of the long-run labour demand curve. For illustration, assume that FDI liberalisation changes the elasticity of domestic investment with respect to labour costs from zero to minus unity. Since gross investment is proportional to the capital stock in the long-run, which in turn is proportional to labour demand under constant returns, the labour demand elasticity will rise by one in absolute terms.[5]

3. Theory

In an open economy, rising labour costs tend to reduce labour demand for three reasons. First, the typical domestic firm produces less 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). This section provides a model showing that the location effect tends to become 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.

The idea underlying the model is as follows. With high FDI barriers, only very few firms will consider relocating in response to a small change in production costs. As FDI barriers fall, however, the number of firms that are roughly indifferent between two locations increases, and the same cost change will induce more firms to move. In the limiting case of

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[5] Note that $K_t = I_t + \delta K_{t-1}$, where K, I, and δ denote the capital stock, gross investment, and the depreciation rate. In a steady state, where K and I are constant, $K = (I / \delta)$.

zero relocation costs, a change in production costs may lead all firms to relocate. Hence, the elasticity of the capital stock and labour demand with respect to production costs rises as relocation costs fall.

The model contains two countries, h and f. Each has 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.

In addition, whenever a firm produces in a country different from that of final sale, it incurs a trade cost of t per unit of output which may reflect either transport costs or barriers to trade. Finally, a firm that produces outside its home country incurs a firm-specific "FDI cost" of ϕ. This cost captures both administrative barriers to FDI and the difficulty of producing abroad instead of at home. Strictly speaking, ϕ is a cost of foreign production rather than investment. In the remainder, however, it will be called the level of "FDI barriers", as the costs of relocation and foreign production are essentially the same in a static model.[6]

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[6] In reality, it is likely that the costs of foreign production are less than proportional to output, and it may actually be more appropriate to assume them to be fixed. However, the present formulation is much simpler because it keeps total unit costs constant, and shares the prediction that a given firm's production for a given market will take place in only one country.

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, the capability of managers to oversee foreign operations, and no doubt many others. To capture the wide variation in firms' costs of producing abroad, I assume that ϕ is distributed normally with expectation μ and variance σ^2. Note that this allows for negative values of ϕ which indicate that a firm finds production conditions (after controlling for unit labour costs) more favourable abroad than at home. As an example, a British manager in charge of an American firm may be more familiar with the British regulatory environment and, all else equal, might prefer to invest in Britain.

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 $c_h - c_f \leq t + \phi$, while an h firm selling in f will produce in h if $c_h - c_f \leq -t + \phi$. Equivalent conditions hold for country f firms. Together with the distributional assumptions about ϕ, this implies that the proportion of country h firms that carry out their production for market h in country h is given by

$$\theta_{hhh} = F_{SN}\left[\frac{-c_h + c_f + t + \mu}{\sigma}\right],$$

where F_{SN} [.] refers to the standard normal cumulative distribution function. Similar relationships hold for the other three cases. A fall in average FDI barriers raises the proportion

of h firms that move production to f and vice versa; 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 country h.

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 Θ_{hhh} with respect to labour costs and average FDI barriers to be negative is that Θ_{hhh} exceeds one-half initially, so that a firm with $\phi = \mu$ 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 Θ_{hfh} and Θ_{fhf} both exceed one-half or – assuming constant firm size – each country exports more than its foreign subsidiaries produce for the foreign market. This condition is more likely to hold the higher are average FDI barriers relative to transport costs. Hence, a partial dismantling of high FDI barriers under relatively free trade will increase the effect of costs on labour demand. In the last thirty years, this has arguably been the relevant case for most industrial economies.

4. Evidence: Foreign Investment

4.1 Approach and Specification

The effect of unit labour costs on FDI is estimated from a standard partial-equilibrium factor demand equation relating the foreign investment to unit labour costs and other control variables Z_{ijt}. The basic equation is given by

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

where *FDI* denotes FDI flows as a percentage of foreign 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 ε denotes an i. i. d. error term. The construction of the data set is described in the data appendix.

The dependent variable is based on aggregate bilateral flows between Germany and the partner country.[7] It is defined in two alternative ways, namely as the real FDI flow and the first difference of the real FDI stock. Both measures are used in order to determine whether the results are sensitive to the exact definition of FDI.[8] The main explanatory variable is log

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[7] Aggregate FDI data are not ideal. The location effect on labour demand is unlikely to matter much outside manufacturing since services must usually be produced at the point of sale. However, only aggregate data are available disaggregated by country for a sufficiently long time period.

[8] In principle, flows should correspond to differenced stocks in real terms if exchange rate fluctuations are controlled for and both measures include retained earnings. But the two series differ substantially in practice, as shown in Charts 1 and 2. Stock data are taken from an annual survey of investors and refer to book values, while flow data are based on the balance of payments and are made

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.[9]

One other variable which turns out to be important 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 products on the basis of relative cost levels. As further control variables, I include the deviation of GDP from trend in the source and destination country 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 include two full sets of dummy variables in all equations presented below. The first set consists of either country or bilateral dummies. In the basic specification, country dummies control for fixed characteristics that affect both inflows and outflows in the same

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up of equity flows, inter-company loans, and retained earnings attributable to the parent company (see UNTCD, 1993).

[9] Unit labour costs are assumed to be exogenous to foreign investment decisions. It is certainly possible to think of situations in which this condition is violated. Perhaps most plausibly, net FDI inflows may appreciate the currency, thus raising unit labour costs and biasing the estimated coefficient towards zero. Unfortunately, suitable instruments – variables that affect unit labour costs without affecting FDI directly – are hard to find. Note that Cushman (1987) finds little evidence for simultaneity of labour costs, exchange rates, and American FDI flows.

direction, such as distance. Bilateral dummies, which are less restrictive, control for fixed characteristics that may affect only one flow, such as one-way barriers to FDI inflows. Comparing the estimates, one can see whether the results of the basic specification remain intact when attention is restricted only to time-series information. In addition, time dummies are included in all equations 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.

4.2 Results

Charts 1 and 2 show the evolution of total German FDI outflows and inflows vis-à-vis all the countries in the data set. Both definitions of FDI flows are shown, actual flows and differenced FDI stocks. Both outflows and inflows are substantially higher when measured as the change in the real FDI stock. The difference is dramatic for inflows: while the flow data indicate almost negligible FDI inflows for much of the sample period, the inward FDI stock grows quite rapidly, at least between 1989 and 1991. There are two possible reasons for this difference, namely underreporting of retained earnings in the flow data and valuation adjustments to the stock data. Both would explain why the discrepancy between the two series is procyclical. Because of the important differences between the two series, I proceed to analyse both.

Next, Table 1 gives country averages for FDI outflows and inflows relative to foreign GDP, as well as unit labour costs relative to Germany. 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.

Looking at Table 1, there is an obvious cross-sectional correlation between low unit labour costs and net FDI inflows. 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.

Tables 2 and 3 provide more systematic evidence in the form of econometric FDI equations. In Table 2, the dependent variable is real FDI flows, while in Table 3 it is the change in real FDI stocks. Equation (1) in both tables shows the simple regression of FDI on relative unit labour costs. The coefficient is positive and significant, although only at the ten percent level for FDI flows.[10] Equation (2) includes a dummy variable indicating EC membership and interacts it with the labour cost variable. While EC membership seems to have no effect *per se*, the unit labour cost effect is much larger and significant only within the EC. This is intuitively appealing and consistent with the hypothesis that free trade and geographical proximity facilitate cost-induced relocation. Column (3) adds bilateral dummies to the equation and thus excludes all cross-sectional information from the analysis. This makes most of the estimates insignificant, but it does not change the labour cost point estimates dramatically. While time-series variability alone seems to provide too little information for

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[10] The restrictions that a) productivity and real labour cost effects are opposite and equal, and b) real exchange rate and domestic unit labour cost effects are equal, cannot be rejected. Hence, the relative unit labour cost specification is consistent with the data.

estimating the determinants of FDI, there is no evidence that using cross-sectional information biases the estimates.

Columns (4) and (5) add the deviation of output from trend to control for business cycle effects, a modification which hardly affects the unit labour cost effects. Destination country output has a positive and borderline significant effect in the stock estimates. This may be expected if the main difference between the flow and differenced stock data is that the latter better capture retained earnings. Columns (6) and (7) add the relative number of days lost to strikes and lockouts and relative real interest rates as additional control variables. Again, their inclusion only has a limited effect on the labour cost variables, but bad labour relations seem to repel, and higher interest rates to attract, foreign capital.[11] Overall, the effect of unit labour costs in each table is remarkably stable across specifications.

However, the estimates are much larger in Table 3 than in Table 2. While this is not surprising in the light of Charts 1 and 2, where FDI stock differences look like a magnified FDI flow series (at least as far as inflows to Germany are concerned), it would be useful to know which set of results is preferable. If the two series differ primarily because retained earnings are only imperfectly captured in the flow data, the answer depends on whether the retained earnings component of FDI contributes to physical investment in the same way as cross-border capital flows. Feldstein's (1995) evidence supports this view. Based on his results, the stock estimates seem preferable under the assumption that they differ from flows

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[11] One may be concerned that the significant effect of unit labour costs is driven by Germany's large FDI outflows to Ireland shown in Table 1. However, while excluding Ireland lowers the point estimates, it actually increases the marginal significance levels of the labour cost variables. No other single country has a substantial effect on either the point estimates or their standard errors.

primarily because of retained earnings. To illustrate the range of possible results, however, both sets of results are used in the following calculations.

Let us calculate by how much a one-percent increase in labour costs reduces net FDI inflows, using the estimates in column (2) of Tables 2 and 3 which find a significant labour cost effect only for the EC. 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 one-percent 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 percent of Germany's aggregate 1993 investment (excluding dwellings) of DM 259 billion. If net FDI inflows contribute one-for-one to domestic capital formation, the elasticity of investment with respect to labour costs is therefore between 0.3 and 0.7 higher (in absolute terms) than it would be in the absence of FDI opportunities.

Indeed, the effect may be even stronger in manufacturing. 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. Manufacturing investment was equal to DM 70.7 billion in 1993. Under the extreme assumption that the net outflow takes place exclusively in manufacturing, the elasticity of manufacturing investment with respect to labour costs is 1.1 to 2.5 higher (in absolute terms) than it would be in the absence of FDI opportunities.

Summing up, there is fairly strong evidence that labour costs affect FDI flows in the expected direction. As a consequence, the growing importance of foreign investment should have increased the effect of labour costs on domestic investment, provided net FDI inflows

contribute to domestic capital formation. In quantitative terms, the estimates imply that the liberalisation of FDI has increased the whole-economy investment elasticity by between 0.3 and 0.7 (in absolute terms). However, the effect in manufacturing may be substantially larger if cost-induced relocation is largely confined to this sector.

5. Evidence: Domestic Investment

5.1 Approach and Specification

The previous section has dealt with the question whether aggregate FDI flows are consistent with the idea that greater FDI openness has made investment more responsive to labour costs, assuming that net FDI contributes to domestic investment one-for-one. This section pursues a more direct avenue. On the basis of inward and outward FDI data by industry, which are taken from Deutsche Bundesbank (1995), I classify 26 manufacturing industries according to their FDI intensity (low, medium, or high). Using data for the period 1970 to 1991, I then examine whether investment has become more responsive to labour costs from the low-FDI 1970s to the high-FDI 1980s and, if so, whether the increasing responsiveness is concentrated in high-FDI industries.[12]

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[12] Why not estimate the determinants of foreign and domestic investment jointly? First, while measured FDI flows may eventually induce physical investment (Feldstein, 1995), the two measures are conceptually quite different. Hence, one should be careful in pooling foreign and domestic investment data. Second, the FDI data are classified according to the Bundesbank's industry classification, while the remaining data are based on ISIC, Rev. 2. As a consequence, the classification of industries according to their FDI intensity is only approximate in some cases. Third, consistent FDI data by industry are only available since 1986.

Industry FDI intensity was defined as the 1991 ratio of the inward plus outward FDI stock, which is a useful summary statistic for past average FDI flow intensity and was taken from Deutsche Bundesbank (1995), to gross domestic capital formation, taken from the STAN database. Low-FDI industries (ISIC 311, 312, 313, 331, 332, 341, 342, 381) are concentrated in the food, beverages, wood, and paper sectors, medium-FDI industries (ISIC 321, 322, 356, 361, 362, 369, 371, 372, 385) in basic textile, mineral and metal sectors, and high-FDI industries (ISIC 314, 323, 324, 351, 352, 353, 355, 382, 383, 384) in clothing and leather, chemical products, and engineering sectors. In some cases, such as basic metal industries (ISIC 37), FDI information was only available at the two-digit level as the Bundesbank uses an industrial classification that differs from ISIC.

The investment equations can be thought of as skeleton versions of those estimated in Denny and Nickell (1992). They are obtained from regressing log investment on normalised log unit labour costs, an industry-specific demand index, an industry-specific fixed effect and, in some cases, a lagged dependent variable and/ or an aggregate time effect. An industry fixed effect is clearly necessary given the great variation in total industry investment. (Table 4 shows manufacturing investment and unit labour costs by three-digit industry in the 1970s and the 1980s.) 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; however, replacing the demand variable by log value-added does not have a

major effect on the unit labour cost results. 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". A lagged dependent variable allows for sluggish adjustment in investment rates. All equations are estimated by the least-squares dummy-variable (LSDV) estimator.[13]

5.2 Results

The regression results are contained in Tables 5 to 8. Table 5 shows the results for the whole sample of all 26 industries. The effect of unit labour costs on investment seems to have become more negative in German manufacturing. While the effect is insignificant for the 1970s, it is negative and significant for the 1980s, regardless of whether a lagged dependent variable or time dummies are included in the equation.

While this result is consistent with the hypothesis that greater openness to FDI has increased the responsiveness of investment to labour costs, a more interesting question is whether the change over time was concentrated in FDI-intensive industries. The results from splitting the sample into low-FDI, medium-FDI, and high-FDI industries are shown in Tables 6

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[13] In a static model, the LSDV estimator is minimum variance linear unbiased under classical assumptions. In a dynamic model, the estimate on the lagged dependent variable is biased downwards (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 no worse than that of the most popular instrumental-variable alternatives, which typically perform poorly with a small cross-sectional dimension.

to 8.[14] There is some evidence in Table 6 that low-FDI industries have become more responsive to labour costs, but this result is not robust to the inclusion of time dummies. Hence, the negative (and very large) effect of labour costs in the 1980s seems to be driven by an aggregate correlation between labour costs and investment activity.[15] 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.

Table 7 shows no significant effect of labour costs in medium-FDI industries in the 1970s and weak evidence for a negative effect in the 1980s, which is again not robust to the inclusion of time dummies. However, Table 8 shows a clear change in the effect of unit labour costs in high-FDI industries. While the effect is approximately zero for the 1970s, it is negative and highly significant in the 1980s in the dynamic specification, regardless of whether time dummies are included. In quantitative terms, the short-run effect of unit labour costs that are one percent higher is to reduce investment by about one percent. The long-run effect is substantially larger given the sizeable coefficient on the lagged dependent variable (which in fact is biased downwards).

The most important results in this section are that the effect of unit labour costs on investment has become more negative in German manufacturing, and that this change is

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[14] An alternative procedure is to let only the unit labour cost coefficients vary by FDI intensity while keeping all other coefficients the same These results are similar to those discussed in the text and are available on request.

[15] The investment rate and unit labour cost levels of the seven low-FDI industries show little trend during 1981-1985, but investment rose and unit labour costs fell substantially thereafter.

particularly clearly visible in high-FDI industries. It is possible that a similar change has also taken place in low-FDI industries, but this result is less robust to reasonable changes in the specification. Hence, the hypothesis that greater openness to FDI has increased the elasticity of investment and labour demand to labour costs, particularly in the most affected industries, seems to be consistent with the evidence.

The FDI results in the last section implied that, through the contribution of more open FDI, the elasticity of investment with respect to labour costs may have increased by between 0.3 and 0.7, and up to three times more in manufacturing if cost-induced relocation is mainly confined to that sector. A change of this magnitude is quite plausible on the basis of my domestic investment results, which imply that the long-run elasticity in (total) manufacturing seems to have increased by substantially more than unity.

6. Summary and Conclusion

This paper analyses the hypothesis that the liberalisation of foreign direct investment has made the effect of labour costs on domestic investment, and hence long-run labour demand, more negative. This hypothesis seems to underlie the popular notion that "globalisation" has made wage restraint more important for preserving employment. First, the paper demonstrates by way of a simple model that falling FDI barriers will tend to make the effect of production costs on domestic production more negative. Second, it shows that unit labour costs have a substantial positive effect on FDI flows between Germany and other EC countries. If net FDI contributes directly to domestic investment, the results imply that the opportunity to relocate has raised the elasticity of investment with respect to unit labour costs

by 0.3 to 0.7 (in absolute terms). Moreover, if relocation is mostly confined to manufacturing – an assumption which cannot be checked because of the aggregate nature of the data – the effect in manufacturing may be substantially larger. Third, 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. Moreover, this change is particularly clear in those industries where FDI plays a large role. Hence, the evidence seems to be consistent with the idea that FDI has increased the investment elasticity in an important way.

Under constant returns, investment, the capital stock, and labour demand are all proportional in the long-run. Hence, my results in Section 3 imply that the growing importance of FDI may have increased the long-run labour demand elasticity by between 0.3 and 0.7, and potentially more in manufacturing. My domestic investment results in Section 4 are consistent with such an estimate.

What is the significance of this paper in the context of the growing "globalisation" literature? Most authors argue that globalisation has lowered the demand for unskilled workers, or in other words shifted the demand curve for unskilled labour leftwards. The present paper shows that globalisation may also have altered the structure of the labour market by making the total labour demand curve flatter.

What are the general equilibrium implications of a flatter labour demand curve? Clearly, the bargaining power of workers falls, which is interesting in the context of the problems experienced by trade unions in many Western countries movement during the last 20

years. Moreover, Wes (1996) shows that an increase in the labour demand elasticity, brought about by trade liberalisation, lowers aggregate unemployment as the markup of bargained wages over prices falls. To be sure, this is an equilibrium effect which assumes that wage-setters have fully adjusted to the new labour demand environment. If wage-setting behaviour takes time to adjust to the new realities, a transition phase of higher unemployment is entirely possible. Germany's upward trend in unemployment during the past five years may partly reflect such a transition phase.

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Data Appendix

FDI is defined as real foreign direct investment as a percentage of the partner country's GDP. Two 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 German inward and outward FDI stocks vis-à-vis other OECD countries for the period 1984 to 1993. Inward flow and stock figures were deflated by the German capital formation deflator (OECD: *National Accounts*). Outward flow and stock series were converted into host-country currency using market exchange rates, deflated by the host-country gross capital formation deflator, and reconverted into deutschmarks at purchasing power parity to obtain FDI volume series. 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.[16] Inflows and outflows are pooled.

All other variables in the FDI equations are taken from the CEP-OECD data set described in Bell and Dryden (1996). Unit labour costs are the difference between log annual labour cost per worker, adjusted by the GDP deflator, and log trend real GDP per worker. The real exchange rate is defined as the log difference between the nominal exchange rate and the purchasing-power parity level.

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.

The industries are classified according to their FDI intensity by dividing the 1991 inward plus outward FDI stock (Deutsche Bundesbank, 1995) by 1991 gross domestic capital formation. 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.

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[16] 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 Outflows, FDI Inflows, and Unit Labour Cost Differences

	Outflows	Inflows	Outward stock change	Inward stock change	ULC difference
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 figures are measured relative to foreign GDP. The unit labour cost (ULC) figures are log differences between the foreign country and Germany. All figures are annual averages and refer to the period 1982 to 1993 (stock changes: 1984 to 1993).

Table 2: Foreign Investment, 1982-93 (dependent variable: FDI flows as a percentage of foreign GDP)

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Relative log unit labour cost (RULC)	0.157	--	--	--	--	--	--
	(0.091)						
European Community (EC)	--	-0.068	-0.068	-0.067	-0.067	-0.067	-0.067
		(0.194)	(0.184)	(0.197)	(0.186)	(0.195)	(0.186)
RULC*EC	--	0.295	0.362	0.297	0.376	0.335	0.383
		(0.123)	(0.359)	(0.123)	(0.360)	(0.140)	(0.362)
RULC*(1-EC)	--	-0.001	0.160	-0.001	0.169	0.081	0.315
		(0.135)	(0.277)	(0.135)	(0.278)	(0.140)	(0.293)
Demand index source	--	--	--	-0.668	-0.752	-1.110	-1.103
				(2.012)	(1.902)	(2.006)	(1.913)
Demand index destin.	--	--	--	0.759	0.842	1.201	1.194
				(2.012)	(1.902)	(2.006)	(1.913)
Relative days lost in strikes and lockouts	--	--	--	--	--	0.052	0.030
						(0.042)	(0.058)
Relative real long-term interest rate	--	--	--	--	--	-2.689	-2.423
						(1.124)	(1.678)
Dummies:							
Country	yes	yes	yes	yes	yes	yes	yes
Bilateral	no	no	yes	no	yes	no	yes
Time	yes	yes	yes	yes	yes	yes	yes
Adjusted R^2	0.088	0.091	0.188	0.087	0.184	0.100	0.186
N	358	358	358	358	358	358	358

Notes: All equations include a constant. Standard errors are given in parentheses.

Table 3: Foreign Investment, 1984-93 (dependent variable: change in FDI stocks as a percentage of foreign GDP)

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

Notes: All equations include a constant. Standard errors are given in parentheses.

Table 4: Average Industry Investment Rates and Unit Labour Costs, 1970-80 and 1981-91

Industry	Investment rate, 1970-80	Investment rate, 1981-91	Unit labour cost, 1970-80	Unit labour cost, 1981-91
Food (3110/3120)	17.9	14.9	57.2	60.0
Beverages (3130)	25.0	18.0	40.3	43.9
Tobacco (3140)	2.5	2.3	9.7	9.9
Textiles (3210)	17.0	12.0	66.8	70.8
Wearing apparel (3220)	5.1	4.9	78.6	73.0
Leather and products (3230)	8.1	6.9	60.3	68.2
Footwear (3240)	6.1	6.8	75.2	84.5
Wood products (3310)	16.8	12.1	64.4	71.7
Furniture and fixtures (3320)	7.9	8.7	72.6	79.3
Paper products (3410)	17.1	18.1	61.3	58.1
Printing, publishing (3420)	12.0	14.7	79.5	83.0
Industrial chemicals (3510)	32.5	16.9	49.7	62.0
Other chemicals (3520)	13.6	11.7	57.2	63.0
Petroleum refineries (3530)	6.2	6.9	10.4	11.8
Rubber products (3550)	15.7	14.1	100.0	82.7
Plastic products (3560)	19.1	17.6	88.9	77.6
Pottery and china (3610)	16.7	10.8	123.3	86.0
Glass and products (3620)	30.9	17.2	69.2	69.3
Non-metallic products (3690)	20.0	15.6	51.8	59.9
Iron and steel (3710)	22.6	13.1	75.2	77.1
Non-ferrous metals (3720)	14.7	10.9	71.2	70.1
Metal products (3810)	11.1	11.6	67.1	72.5
Non-electr. machinery (3820)	9.4	9.5	77.3	84.0
Electrical machinery (3830)	11.9	11.7	75.9	76.7
Transport equipment (3840)	12.1	15.8	76.6	73.9
Professional goods (3850)	18.7	15.1	61.8	74.8
Total	15.0	12.2	66.2	67.1

Notes: All figures are in percent. The investment rate is defined as gross capital formation over value added. Real unit labour costs are annual labour costs over value added.

Table 5: Log Investment (All Industries)

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		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	-0.047	-0.052	0.138	-0.053	-1.012	-0.443	-0.330	-0.203
	(0.140)	(0.133)	(0.114)	(0.135)	(0.231)	(0.191)	(0.195)	(0.197)
ULC [t-1]	--	0.123	--	0.102	--	-0.631	--	-0.614
		(0.115)		(0.115)		(0.213)		(0.213)
Demand	0.783	0.700	-0.005	0.410	1.889	1.104	1.268	0.865
	(0.320)	(0.223)	(0.331)	(0.282)	(0.369)	(0.239)	(0.329)	(0.260)
p-Value ULC	0.740	0.574	0.229	0.694	0.000	0.000	0.091	0.000
Fixed effects:								
Industry	yes	yes	yes	yes	yes	yes	yes	yes
Time	no	no	yes	yes	no	no	yes	yes
Adjusted R^2	0.957	0.981	0.973	0.983	0.971	0.988	0.982	0.990
N	286	260	286	260	286	260	286	260

Notes: ULC denotes unit labour cost. Standard errors are given in parentheses. "P-value ULC" gives the marginal significance level for a zero total effect of unit labour costs.

Table 6: Log Investment (Low-FDI Industries)

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		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	-1.112	-0.590	-0.785	-0.793	-4.078	-1.310	-0.552	-0.472
	(0.272)	(0.380)	(0.272)	(0.310)	(0.637)	(0.584)	(0.548)	(0.543)
ULC [t-1]	--	0.155	--	0.126	--	-1.411	--	-0.093
		(0.344)		(0.301)		(0.641)		(0.612)
Demand	2.395	1.536	0.387	0.660	3.122	1.218	1.094	0.927
	(0.449)	(0.480)	(0.558)	(0.526)	(0.886)	(0.622)	(0.727)	(0.648)
P-value ULC	0.000	0.198	0.006	0.041	0.000	0.000	0.318	0.349
Fixed effects:								
Industry	yes	yes	yes	yes	yes	yes	yes	yes
Time	no	no	yes	yes	no	no	yes	yes
Adjusted R^2	0.941	0.954	0.968	0.974	0.918	0.964	0.969	0.976
N	77	70	77	70	77	77	77	77

Notes: see above.

Table 7: Log Investment (Medium-FDI Industries)

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		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	0.101	-0.054	0.348	-0.124	-0.428	0.115	0.103	0.310
	(0.293)	(0.264)	(0.230)	(0.304)	(0.373)	(0.363)	(0.307)	(0.360)
ULC [t-1]	--	0.165	--	0.338	--	-0.752	--	-0.529
		(0.242)		(0.277)		(0.378)		(0.368)
Demand	0.454	1.110	0.297	0.941	2.693	1.733	1.357	1.045
	(0.654)	(0.431)	(0.672)	(0.591)	(0.690)	(0.378)	(0.671)	(0.567)
P-value ULC	0.731	0.620	0.134	0.345	0.254	0.027	0.738	0.445
Fixed effects:								
Industry	yes	yes	yes	yes	yes	yes	yes	yes
Time	no	no	yes	yes	no	no	yes	yes
Adjusted R^2	0.904	0.965	0.945	0.967	0.958	0.978	0.974	0.982
N	99	90	99	90	99	99	99	99

Notes: see above.

Table 8: Log Investment (High-FDI Industries)

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		1970-1980				1981-1991		
Log inv. [t-1]	--	0.607	--	0.602	--	0.727	--	0.722
		(0.072)		(0.092)		(0.063)		(0.061)
ULC	0.061	-0.034	-0.001	-0.095	-0.671	-0.532	-0.410	-0.325
	(0.183)	(0.179)	(0.152)	(0.180)	(0.292)	(0.221)	(0.295)	(0.217)
ULC [t-1]	--	0.113	--	0.028	--	-0.476	--	-0.742
		(0.144)		(0.141)		(0.259)		(0.250)
Demand	0.436	0.374	0.112	0.450	1.306	0.922	1.136	0.591
	(0.472)	(0.337)	(0.469)	(0.392	(0.442)	(0.276)	(0.473)	(0.278)
P-value ULC	0.739	0.661	0.991	0.708	0.024	0.000	0.169	0.000
Fixed effects:								
Industry	yes	yes	yes	yes	yes	yes	yes	yes
Time	no	no	yes	yes	no	no	yes	yes
Adjusted R^2	0.977	0.989	0.985	0.991	0.987	0.995	0.988	0.996
N	110	100	110	100	110	110	110	110

Notes: see above.

Chart 1: Real FDI Outflows and Changes in Outward FDI Stocks

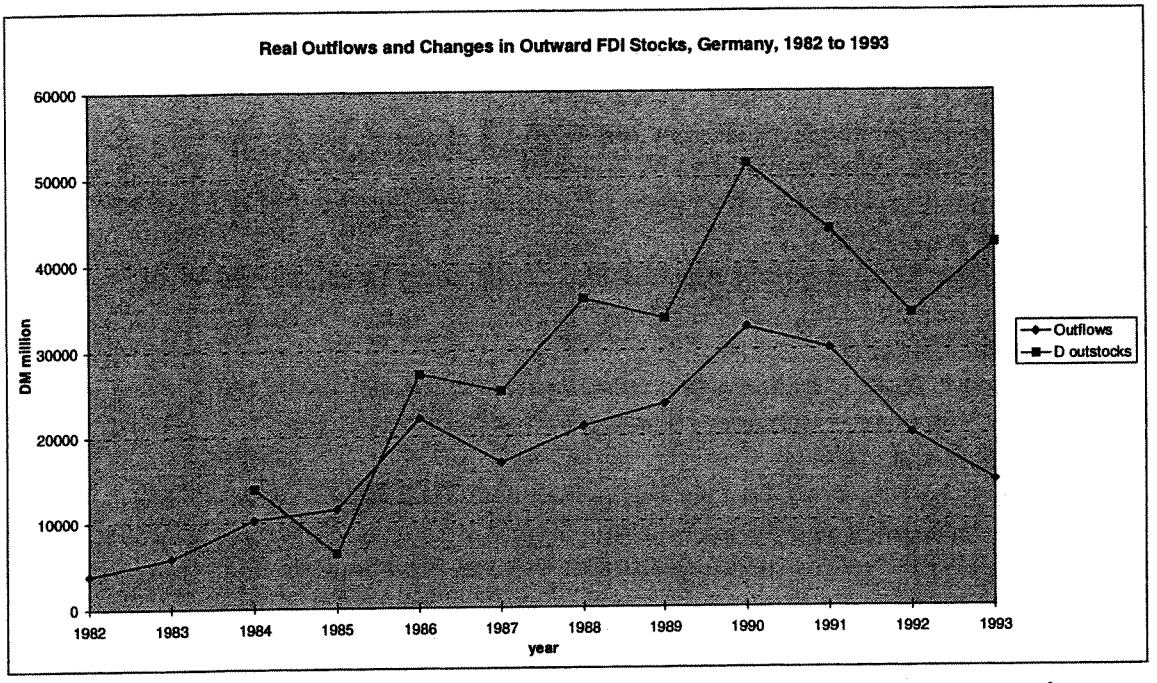

Chart 2: Real FDI Inflows and Changes in Inward FDI Stocks