Foreign Direct Investment in Central Europe Since 1990: An Econometric Study

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1. Introduction

It is widely recognised that foreign direct investment (FDI) may have an important role to play in the transformation of the formerly centrally planned economies of Central and Eastern Europe. FDI provides a vital source of investment for modernising the industrial structure of these countries and for improving the quality and reliability of infrastructure. In addition new investments may also bring badly needed skills and technologies into the host economy. Evidence from joint ventures in Hungary (Lane, 1994) shows that such firms had a higher propensity to trade and invest than purely indigenous firms. Total FDI inflows into Hungary between 1991–93 were equivalent to 25 per cent of total fixed domestic capital formation (UNDTCI, 1995).

The growth in FDI in the transitional economies since restructuring began has been impressive, although the level of inward investment remains low compared to that in other developing economies, particularly in East Asia. On average over 1991–93 FDI inflows to the transitional countries accounted for only 2½ per cent of total world inflows, compared to 30½ per cent for developing countries overall (Agarwal, 1995). The pattern of FDI varies considerably amongst the Visegrád countries, with Hungary receiving over half of their inward investment between 1990 and 1992. The levels of investment in the Czech Republic and Slovakia and Poland have subsequently begun to grow more rapidly, although in per capita terms they remain below that in Hungary. [1]

The analysis of FDI to transitional countries is constrained by a lack of firm theoretical foundations. In conventional models multinational enterprises can be seen as arising from a combination of industrial organisation motives that result in a number of activities being placed under common ownership and control, and comparative advantage reasons that cause these activities to be placed in separate countries (Krugman, 1995). Whilst there is no reason to expect that the factors that ultimately determine the level of investment in Central Europe will differ from those that determine investment in other developing economies, much less is known about the factors that determine the initial level of investment in transitional economies.

There are few empirical studies of the determinants of FDI in Central Europe, reflecting both a lack of detailed sectoral data and incomplete and inconsistent time series data (Brewer (1994), UNECE (1994)). Thus the existing empirical literature consists largely of surveys (EBRD, 1994, Table 9.4). In general these conclude that the primary factors stimulating investment in the transitional economies have been the need to secure market access and the form of the privatisation process; differentials in production costs and tax incentives are not reported to have had an important influence.

This study aims to fill a gap in the current debate on the determinants of FDI in Central Europe by providing an econometric analysis of the factors affecting the pattern of investment in the Czech Republic, Slovakia, Hungary and Poland from OECD countries over the years 1991–93. We attempt to explain why foreign investors have moved into these markets so rapidly and why Hungary and the Czech Republic have attracted more FDI than Poland. We focus in particular on the organisation of the privatisation process in these economies and the trade linkages between them and those countries that have invested in the region. We also investigate whether there is any evidence that some investments in Central Europe may have been diverted from alternative low-cost locations on the periphery of the European Union (EU).

The article is organised as follows. In Section 2 we examine the pattern of FDI in these transitional economies, looking at the dominant investors and the sectoral structure of investment. The following section looks at the major factors determining flows of FDI in Central and Eastern Europe. Here we also look at some of the existing literature. Section 4 presents our econometric analysis and we conclude with some policy implications.

2. The pattern of FDI in Central Europe

FDI has become an important source of external finance for several transitional economies, particularly those in Central Europe, many of whom are in a relatively

Table 1. FDI flows into the transitional economies

(US$ million, cash basis)

	Annual net flows[a]					Cumulative total[b]	FDI per capita[c]	FDI stock/GDP [d](%)
	1990	1991	1992	1993	1994			
Czech Republic	180	511	983	517	779	3319	319	10.2
Hungary	311	1459	1471	2328	1097	6941	670	14.5
Poland	88	117	284	580	527	1602	42	
Slovakia	18	82	100	144	79	434	102	3.8
All Transitional economies	605	2406	4220	5041	4308	19041	58	5.2
Memorandum: Balance of Payments Data								
Poland	89	298	665	1697	1392	4288	112	3.6

Sources: UNECE (1995, Table 3.7.5), UNDTCI (1995, Tables II.11, A1-3).
Notes: (a): Net of inward foreign investment and investment made abroad. (b) Cumulative total in 1994 of inward FDI from 1988.(c) FDI per capita in 1994 (dollars per head). (d) 1993 estimates.

advanced state of transition and may be considered by Western firms as being more stable and safer locations for investment than the former Soviet states. Since 1988 around 70 per cent of FDI in the transitional economies has been channelled into the Central European countries. The pattern of foreign direct investment is reported in Table 1. Some care is required in interpreting this data as the figures are on a cash basis, and exclude reinvested earnings and investment in kind (UNECE, 1994). As the separate annual data taken from Poland's balance of payments statistics indicate, there can be considerable differences between alternative data sources, at least in terms of the level of investment if not the relative pattern over time.[2]

The data on a cash basis for 1994 indicate that the level of new direct investment in Central Europe fell from the peak level of 1993, possibly reflecting a slowdown in the rate of new privatisations. In contrast the level of new investment continued to rise in the other transitional economies, particularly in the Baltic states. Provisional estimates suggest that new flows of investment in Hungary and the Czech Republic were much stronger in 1995 (Csáki et al., 1996).[3]

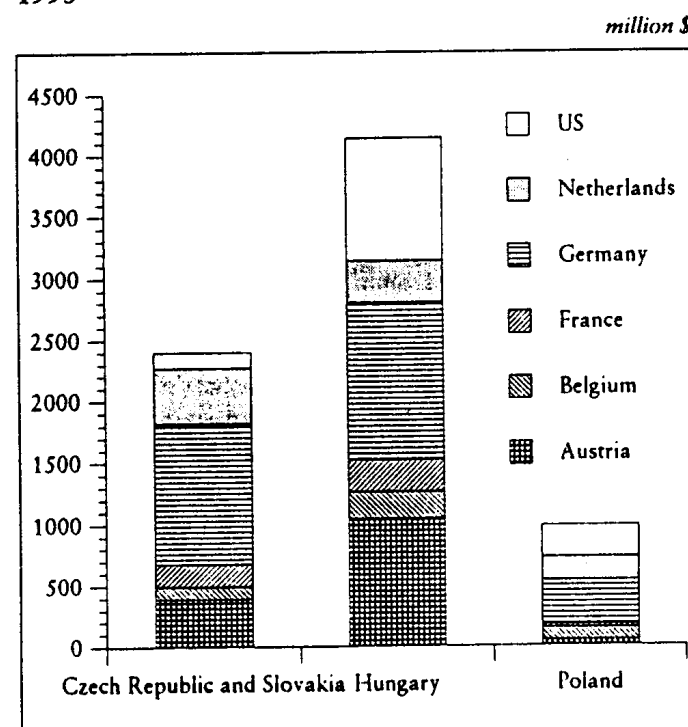### FDI flows by investing country

It is also possible to estimate the level of direct investment in Central Europe using disaggregated source country data on the investments made by OECD countries.[4] These figures suggest that Germany has been the largest single investor in Central Europe (Chart 1). At the end of 1993 around 30, 28 and 46 per cent of the stocks of FDI in Hungary, Poland and the Czech Republic and Slovakia respectively were held by German firms. The other major investors were Austria, particularly in Hungary and the Czech Republic and the USA. Overall, a considerable proportion of direct investment has come from neighbouring countries.[5] Historical ties and existing business

linkages may help to account for the primary sources of FDI flows to Central Europe.

FDI flows by sector

In many primary and service sectors there is often little scope for investors to choose between host countries. However, within manufacturing, demand in specific markets can usually be satisfied by trade and thus a number of factors may influence potential investors. Such factors may also influence some non-manufacturing investments, particularly in 'downstream services'. Data

Chart 1. Stock of FDI by investing countries in the end of 1993

million $

Legend: US, Netherlands, Germany, France, Belgium, Austria

Categories: Czech Republic and Slovakia, Hungary, Poland

Source: OECD (1995a).

on the sector structure of FDI stocks (Agarwal, 1995) indicate that the primary sector has received only a minor share of foreign investment, although this is more likely to reflect political resistance to foreign investors taking control of monopoly industries rather than an inherent absence of natural resource endowments. Investors may also be deterred by the past environmental problems of some primary sector industries in the transitional economies and the potential liabilities associated with future environmental legislation.

Up until the latter half of 1993 the vast majority of investments in Central Europe were in the manufacturing sector, partly reflecting large individual investments such as the takeover of Skoda by Volkswagen in 1991. Relatively little investment was channelled into traditional labour intensive industries such as textiles, leather and clothing, and consumer electronics. This provides some informal evidence that investors have not solely been attracted to Eastern Europe by differentials in unit labour costs. There have been a number of large investments in food processing in Poland, possibly reflecting the relative importance of the agricultural sector.

More recently, the level of investment in a number of service sectors has begun to rise significantly, partly as a result of privatisations in sectors such as telecommunications. Some investment in services also supports trade linkages, and can thus be expected to increase as the markets of these Eastern European countries open up further. There has also been significant inward investment in financial services in Poland, accounting for 19 per cent of the total inward investment stock at the end of 1994 (Pac, 1996).

3. The determinants of FDI

In general it might be expected that that FDI is more likely to flow from developed countries into developing economies that are politically stable and have access to large, regional markets. Other important factors are likely to include human capital endowments and long-term trading links (Markusen, 1995). Such factors can be expected to be equally relevant for investment in the transitional economies. In the short term the experience of East European countries suggests two additional factors that influence the timing and level of investment. First, there is a considerable risk associated with investments in the transitional economies due to the relatively unknown and unpredictable economic and social environment. Factors such as the tax regime and the structure of property rights may be particularly important. Secondly, there may be an important role for expectations, with investments during the transitional period being dependent on estimates of potential economic growth, the long-run level of the real exchange rate and

the impact of market competition on newly privatised companies.

Privatisation

In a number of transition countries inward investment has largely been in joint-ventures, many of which have been able to negotiate favourable trading conditions. The privatisation programs in these economies have therefore been an important factor in stimulating inward FDI, even during a period of recession (Hunya, 1992). Such programmes act as a signal of the authorities' commitment to private ownership. Although all the Central European economies have introduced privatisation programmes, differences in the form and timing of their schemes may help to account for the differences in the pattern of inward investment. Two basic forms of privatisation can be distinguished—the 'standard' method (direct sales and a search for strategic investors), which simply provides a source of cash revenues to government, and the 'transitional' method (restitution of property and voucher privatisation), the initial purpose of which is to re-establish private property rights.

In Hungary preference was given to the standard method, with a programme of privatisation for cash through auctions or direct tender. Although there was a voucher scheme, it only affected around 10 per cent of the population, and consequently foreign investors could bid directly for a relatively large portion of state property. In contrast the transitional approach was followed in the CSFR, with vouchers issued to enable private citizens to purchase public assets. Some 62 per cent of earmarked state property was transferred into the private sector, with the remainder kept in the state sector in order to protect key industries and to search for strategic investors in public tenders. Foreign investors were only able to purchase shares from domestic investors once the initial privatisation process was complete. As a direct result of the method chosen, the majority of state enterprises became joint-stock companies which subsequently attracted foreign capital either directly through FDI or through the issuing of shares in state enterprises on the Prague Stock Exchange. In Poland privatisation has largely taken place through competitive tender, but the speed of the process has generally been slow and unpredictable after the initial sales in 1990–91. In some cases, buyouts resulted in majority owned worker/manager enterprises. This restricted further sales of the remaining, usually minority, share of such enterprises to foreign investors since foreign firms would have little direct control over the company.[6]

Figures for the private sector share of GDP demonstrate the consequences of the different privatisation strategies adopted (Table 2). In comparison to the CSFR and

Table 2.   Share of private sector in GDP

per cent

Year	Hungary(a)	Poland	Czech Republic	Slovakia[a]
1989	14.9	28.6	11.2	
1991	33.0	45.3	17.3	
1992	44.0	48.2	27.7	22.0
1993	52.4	53.5	45.1	24.6
Mid-95	60	60	70	60

Source: EBRD Transition Report 1995, Chapter 2. The 1995 figures are estimates.

Notes: (a) Excludes cooperatives.

Hungary where there was a rapid expansion in the private sector share, that in Poland remained relatively stable, albeit from a high initial level. We anticipate that the timing of the respective privatisation schemes has been an important factor behind differences in the observed pattern of inward FDI.

Tax incentives and the legal framework

In contrast to some transitional economies, the Central European countries all offer a legal framework conducive to foreign investment (UNECE, 1994). Foreign investment laws were passed at a relatively early stage of transition—1988 in Hungary and 1991 in the Czech Republic and Poland—and a number of bilateral investment protection agreements and tax conventions have been established. Agreements with foreign investors can be largely undertaken without prior government approval, although there are some remaining restrictions, particularly in the primary sectors, and there are few restrictions on the repatriation of profits. Marton (1993) provides a detailed overview of government policies towards FDI in Hungary.

Potential foreign investors have also been offered various government incentives. Hungary, Poland and the Czech Republic have all established special economic zones for foreign investors, with various exemptions from custom duties; in the Czech Republic for example, foreign investors with an equity stake greater than 30 per cent are entitled to a one year exemption from duties.[7] Although corporate taxes are not especially high in any of the countries (42% in the Czech Republic, 40% in Poland and 36% in Hungary in 1994), there are some special treatments offered to fully foreign enterprises. In the Czech Republic most tax exemptions for foreign investors were abolished in 1993, although negotiable tax contracts remain available in certain priority sectors such as electricity plants and consulting services. In Poland a 3–6 year tax exemption was granted in priority sectors for large investments made before December 1993.

In Hungary automatic tax holidays were abolished in 1994, but certain priority investments, both domestic and foreign, may be entitled to preferential treatment and fully foreign owned offshore companies can, under certain conditions, obtain a 85 per cent tax 'holiday' for a limited period of time.

However we do not attempt to include a direct measure of investment incentives in our empirical work below. Existing survey evidence suggests that the fiscal privileges available in the early stages of transition had little effect on the decisions of potential investors (EBRD, 1994). This may be one factor behind the present moves to phase out such measures.

Other Eastern European economies that attracted little inward investment have very different institutional frameworks (EBRD, 1994). For example, the countries of the former USSR passed their laws on foreign direct investment later in 1992 or 1993, their mass privatisation programs had by and large only reached the planning stage by 1993, and convertibility of domestic currency was quite restricted.

Macroeconomic stability

It can also be argued that the perceived risks of investment within the Central European economies may have been reduced by an expectation that they would eventually integrate fully with Western Europe, helped by measures to ensure preferential market access. The Czech Republic and Hungary have already become members of the OECD. Furthermore the macroeconomic stability of these economies has been relatively high in comparison to the other Eastern European economies. Recent movements in international credit ratings are summarised in European Commission (1996), with the Czech Republic consistently having the highest credit rating of the Visegrád economies.[8]

This may reflect important distinctions in the macroeconomic programmes followed by the different countries. The CSFR authorities pursued a successful stabilisation programme in which the exchange rate was pegged to a basket of foreign currencies, following three large devaluations in 1991. The government deficit declined to zero, foreign exchange reserves were accumulated and inflation stabilised at around 10 per cent in 1994 and 1995. The Hungarian and Polish authorities adopted a more flexible exchange rate regime, and both have had consistently higher inflation and a weaker fiscal position (Table 3). Whilst it is probable that the perceived risks of investing in Central Europe will reflect developments such as those possible shown in the indicators in Table 3, it is not practicable to include all indicators in the empirical analysis as they are closely correlated with one another. We therefore use a single constructed

Table 3. Potential indicators of macroeconomic stability

	Hungary	Poland	Czech Republic and Slovakia
Net debt/exports ratio			
1991	157	312	86
1992	124	267	60
1993	157	273	32
Import/reserves ratio			
1991	0.26	0.32	1.11
1992	0.28	0.40	1.25
1993	0.19	0.40	0.32
Government deficit/GDP ratio			
1991	2.1	1.9	1.0
1992	6.2	4.9	1.5
1993	5.4	2.3	-0.1
Inflation			
1991	32.0	60.0	52.0
1992	22.0	44.0	13.0
1993	21.0	38.0	18.0

Sources: Transition Report (1994), EBRD and International Financial Statistics (1995), IMF.

indicator for risk based on the (first) principal component of the series in Table 3.[9]

Trade linkages

A number of studies have suggested that investment in developing economies is positively associated with indicators of 'openness', typically measured by the ratio of total trade (imports plus exports) to GDP (Harrison and Revenga (1995), Hufbauer et al.(1994)). Such findings may suggest that investors prefer countries with relatively liberal trade regimes, possibly within regions with

wider free trade agreements.[10] Some initial investment may also be in marketing affiliates, designed to support exports by the parent firm. There is also considerable evidence that geographical proximity is an important factor in observed trade and investment patterns, judging by the findings from gravity-type models (Leamer and Levinsohn (1995), Thomsen and Woolcock (1993)). Knowledge of the local market and existing business linkages may help particular foreign firms to take advantage of the opportunities presented by a rapidly evolving market structure. To investigate whether the level of investment by individual countries in Central Europe is influenced by trade linkages, we use a measure defined as the share of trade in each of the host economies accounted for by trade with the investing economy.

There has been a marked geographical change in the trade patterns of the Visegrád economies in recent years, as shown in Table 4. Trade has been increasingly reorientated towards the EU economies since the end of the 1980s, with shipments to the 15 EU member states accounting for over 60 per cent of merchandise exports in 1994, approximately twice the proportion of 1988. To the extent that trade linkages influence investment decisions, some increase in inward investment from the EU economies would be expected given the change in trade patterns.

Labour costs

The cost of labour in the host country is potentially a major factor in the location decision, particularly for firms seeking to produce labour intensive products for export. Wages in the transitional economies are amongst

Table 4. Geographical breakdown of Central European exports

per cent

	1988	1990	1992	1994
Czech Republic and Slovakia[a]				
EU 12	24.2	32.0	49.5	61.7
Austria, Finland & Sweden	5.6	8.0	8.7	11.2
Central & Eastern Europe	54.5	43.0	24.1	15.4
Other	15.7	17.0	17.7	11.7
Hungary				
EU 12	22.5	35.4	49.4	48.5
Austria, Finland & Sweden	7.8	9.9	12.6	11.9
Central & Eastern Europe	47.6	33.0	22.9	25.9
Other	22.1	11.7	15.1	13.7
Poland				
EU 12	30.3	46.8	56.1	55.4
Austria, Finland & Sweden	6.7	8.0	7.4	6.4
Central & Eastern Europe	44.2	23.7	15.5	16.8
Other	18.8	21.5	21.0	21.4

Source: IMF Direction of Trade Statistics.
Notes: (a) For 1994 constructed using Czech and Slovak Republic data, excluding cross border trade between the two, plus discrepancy between exports from Czech Republic and Slovakia in Hungary import data and exports to Hungary in the Czech and Slovak trade data.

the lowest in Europe. In 1993, average monthly wages in Hungary are estimated to have been $296 (EBRD, 1995, Table 11.2), approximately one-ninth of the level in West Germany. In the Czech Republic and Poland monthly wages in 1993 were $200 and $221, respectively.[11] Wage levels reveal only part of the story; what matters to the firm are differences in unit costs, taking account of the productivity of labour as well as wage levels.

In the empirical work below we investigate two measures of relative unit labour costs. The first tests whether differentials within Central Europe affect the location of investments within the region. The second investigates whether cost differentials between Central Europe and Spain and Portugal affect the share of OECD investment entering Central Europe (Martin and Gual, 1994). The latter measure may be important if Central European countries are competing with countries in Southern Europe for foreign investments designed to serve the European wide market.

Indices of unit labour costs in Central Europe are reported in Table 5. In Hungary and Poland the economic and social reforms were initially associated with sharp increases in unit labour costs, whilst in the Czech Republic unit costs fell until 1992. The labour cost competitiveness of Hungary and Poland subsequently improved in 1993 and 1994, partly as a result of currency devaluations.

Structural Characteristics

There are a number of country-specific factors that may influence the location of foreign investments. These include human capital, technological endowments and economic infrastructure. We briefly review the available evidence on each of these.

Finding an appropriate measure of human capital, or skill levels, can be a major problem in empirical analysis. Even within a country, measures based on whether an employee is classified as manual or non-manual, or on educational attainment can be misleading. These problems are further enhanced when making comparisons across countries. Evidence from education patterns suggests that the workforce in most Central and East European countries has, on average, a broadly comparable standard of qualifications to that in most Western European countries (Table 6a), and a slightly better standard than in possible competing locations such as Bulgaria and Spain. In view of the relatively low wage levels in the Visegrád economies, this could have encouraged flows of FDI following economic restructuring. There are also some distinctions in skill levels within Central Europe, with a greater proportion of the Hungarian workforce having higher qualifications. It is possible that such differences may have influenced the observed differences in flows of FDI in these three countries.

Multinational companies may also seek to locate in host countries with a well established research base (Cantwell, 1995). It is generally agreed that innovation patterns can either be measured *ex ante* by expenditure on research and development or *ex post* by the number of patents. There are many sources for such data; the most widely used figures are derived from US Department of Commerce data, since most innovations are typically registered in the US. These record the number of patents granted each year in broad industrial sectors. It is possible to establish a measure of the stock of innovation by cumulating the flow of patents over time.[12] In general international comparisons suggest that patenting activity in the Eastern European countries in the 25 years to 1987 lagged behind the West (Ray, 1991), although there was evidence of considerable expertise in R&D in particular areas, such as chemicals in Hungary and engineering in the former CSFR. Within Eastern Europe more recent data indicates that patenting activity in Hungary has continued to outpace that of other countries (Table 6b).

Differences in the quality and reliability of infrastructure may also be able to explain why some developing economies have been able to attract larger shares of FDI than others (Wheeler and Mody, 1992). One of the main impediments to FDI in Poland has been the lack of investment in infrastructure, particularly in updating rail and road links and telecommunications (Hany, 1995). There are a number of infrastructure indicators that can be used in any empirical analysis. In this paper we investigate a measure based on electricity consumption per capita in the respective host economy relative to an average of that in the other two potential hosts. It is possible that a simple measure of the level of infrastructure may fail to fully reflect the importance of this factor in determining the location of investments, since the quality and reliability of that infrastructure is likely to be of equal importance to potential investors.

Strategic motives

The reforms in Central and Eastern Europe have opened up a large and potentially growing market for the

Table 5. Unit labour costs in manufacturing

US$, 1989=100

	Czech Republic	Hungary	Poland
1989	100.0	100.0	100.0
1990	82.7	114.2	91.1
1991	70.5	153.4	151.7
1992	93.6	163.2	138.5
1993	117.7	148.5	126.3
1994	128.9	142.0	120.5

Source: Authors calculations based on EBRD (1995).

Table 6a.   Indicators of educational attainment

per cent of total labour force

	Year	Basic or less	Vocational	Secondary	Higher	Other[b]
Czech Republic & Slovakia	1989	26.0	21.0	43.8	9.2	
Hungary	1990	38.4	23.1	26.9	11.6	
Poland	1988	34.2	29.5	27.9	8.4	
Bulgaria	1990	44.6	15.8	30.0	9.6	
Austria[a]	1990	28.8	57.8	6.3	7.1	
France	1989	35.3		46.0	14.6	4.0
Italy	1990	26.6		66.2	7.2	
Netherlands	1989	12.6		61.3	19.7	6.5
Spain	1990	48.4		46.1	5.5	

Source: Boeri and Keese (1992, Table 2).
Notes: (a) The category 'vocational' for Austria includes those who have received vocational training at the level of 'higher' education. (b) This category includes those people who are currently studying.

Table 6b.   Number of patents granted to Eastern European countries in the United States 1989–93

	1989	1990	1991	1992	1993
Bulgaria	15	26	10	5	4
Czech Rep. and Slovakia	34	38	28	18	12
Hungary	131	94	86	86	52
Poland	17	19	11	7	8
Romania	0	1	1	0	3
Former USSR	161	176	178	69	59

Source: OECD (1995b).

products of Western firms and survey evidence suggests that national and regional market access is one of the major factors that has influenced potential investors (EBRD, 1994).[13] Some firms may have made investments for strategic reasons in order to beat competitors and secure a dominant market share (Buigues and Jacquemin, 1994). Although the size of many of these transitional countries is small relative to many West European markets, the CSFR, Hungary and Poland have a combined population of around 60 million, and regional trade barriers are gradually being dismantled as a result of the Central European Free Trade Agreement.

Gaining new markets is not the only strategic reason for foreign investors to enter transitional markets. Foreign firms may invest directly in a transitional economy in order to try and protect their own market share gained under the previous regime and gain preferential access to incentives available to foreign investors. Since the opening up of transitional markets may increase competition in certain sectors, firms may feel that by being 'on site' they are in a better position to maintain their market share than through exports (EBRD, 1995). We do not include an explicit variable to try and pick up such factors. However it is possible that the variables for the private sector share and trade linkages may help to 'explain' investments prompted by strategic considerations.

4.   Empirical analysis

Until recently the primary constraint on undertaking empirical work on foreign direct investment in Central and Eastern Europe has been the availability of consistent data over the transitional period. In many of these economies there has been little inward investment in the past. One interesting exception is Hungary, where (limited) FDI has been undertaken for a number of years. Wang and Swain (1995) report an econometric analysis of the factors that have influenced investment in Hungary and China since the late 1970s. Their results suggest that FDI is positively determined by the size of the host country and negatively determined by the cost of capital and political stability. Labour costs also appeared to be an important factor for China, but not for Hungary.

The relative scarcity of annual data on total direct investment in Central Europe obviously serves to constrain any econometric analysis. We therefore use a panel data set, with data for investment by 14 separate OECD countries in the three separate host economies over 1991–93.[14] This gives us a total panel size of 126 observations, permitting a more detailed specification search. The investment data were obtained from OECD (1995a). We are not able to separately distinguish investment in the manufacturing and non-manufacturing sectors as such a split is not always available within the home country data.[15] Our main objective is to investigate the factors that have affected the relative levels of investment in the three host economies over the transition period. In estimation we allow for country-specific fixed-effects within the home (OECD) countries, but not within the host economies. Much of the interesting variation in the data is across host countries, and reflects conditions which evolve slowly over time. Use of additional fixed-

effects for the host economies would remove most of this variation, given the short time dimension to our panel (Wheeler and Mody, 1992).

The general model we estimate can be summarised as:

$$FDI_{ijt} = a_i + a_1 PRIV_{jt} + a_2 TRADE_{ijt} + a_3 PATENTS_{jt}$$

$$+ a_4 RISK_{jt} + a_5 COST_{jt} + a_6 ENERGY_{jt} + v_{ijt}$$

where FDI_{ijt} denotes the flow of FDI into country j from country i at time t, PRIV is the private sector share of GDP, TRADE is the ratio of total trade between country i and country j to the total trade of country j, PATENTS denotes the relative stock of patents granted to residents of the host economy, RISK is a proxy for risk, COST denotes unit labour costs in the host country relative to other potential hosts in Central Europe and ENERGY is relative energy consumption in the host economy. The country specific fixed effects a_i allow for unobserved influences that remain constant over time. All other influences will be contained in the disturbance term v_{ijt}. Further details on the variables used are given in the Data Appendix.

The dependent variable is defined as the flow of FDI from each of the 14 investing countries to each of the three host countries, relative to total OECD foreign direct investment flows. This has implications for the form of many of the variables included in our model. In particular, indicators such as patents and energy consumption which can trend upwards without bounds have to entered in relative rather than absolute form.

Results

Table 7 summarises the main empirical results. Home country fixed effects were included, but are not reported here. The first column (7.1) reports the parameter estimates obtained for the basic model. All the parameters appear to have the signs that might be expected, although only two are statistically significant at conventional levels, and the model appears to have reasonable explanatory power. Past trade linkages, innovation, infrastructure and the privatisation programme are all found to have a positive impact on the level of inward investment.

The next two regressions drop the risk and infrastructure variables respectively, as they are not individually significant.[16] Our preferred equation is equation (7.3). These results confirm the widely held belief that the observed pattern of direct investments within Central Europe has been affected by differences in the timing and form of privatisation programmes. This helps to account for the relatively high level of investment within Hungary. However other factors are also important; the significance of the patents measure suggests that, other things being equal, investors may seek to locate within Hungary to take advantage of its relatively advanced research base, especially as compared to Poland. In contrast, the relative improvement in the cost competitiveness of the Czech Republic in 1991 and 1992 may have helped to stimulate inward investment before the privatisation programme was fully underway. The trade variable suggests that the relatively high level of inward investment by German and Austrian companies in Central Europe is partly a reflection of long-standing business linkages. An imposition of common intercepts for all the home countries was rejected by the data [$F(13,108)=2.72$], suggesting that significant country-specific effects are present.

The implied elasticities from (7.3) will vary over time and for both home and host economies.[17] Weighting together the implied effects (using home economy investment shares as weights) and using 1992-3 sample means implies that a one per cent rise in the private sector share in all three Central European economies will raise direct

Table 7. The determinants of FDI in Central Europe

Dependent variable: FDI_{ijt} Sample period 1991-93

	(7.1)	(7.2)	(7.3)	(7.4)	(7.5)
PRIV$_{jt}$	0.00165 (1.7)	0.00133 (2.3)	0.00121 (2.3)	0.00113 (1.8)	0.00131 (2.2)
TRADE$_{ijt}$	0.67195 (2.3)	0.68071 (2.4)	0.66536 (2.4)	0.67355 (2.4)	0.64002 (2.2)
PATENTS$_{jt}$	0.01495 (4.4)	0.01442 (4.6)	0.01463 (4.7)	0.01457 (4.7)	0.01381 (4.5)
RISK$_{jt}$	-0.00396 (0.3)				
COST$_{jt}$	-0.05568 (1.6)	-0.05215 (1.6)	-0.06611 (2.8)	-0.08258 (1.3)	
ENERGY$_{jt}$	0.02082 (0.7)	0.01563 (0.6)			
COST1$_{jt}$				0.03088 (0.3)	-0.10202 (2.5)
$\bar{R}^2$	0.5367	0.5404	0.5430	0.5391	0.5360
SE	0.0524	0.0522	0.0520	0.0522	0.0524

Note: t-statistics in parentheses. See appendix for variable definitions.

investment inflows by 1.08 per cent. A one per cent rise in the stock of patents will raise inflows by 0.59 per cent.

These results are in marked contrast to what might be expected given early survey evidence on the reasons for inward investment. Whilst the significance of the privatisation indicator may reflect strategic investments prompted by a one-off opportunity to gain market power, other variables such as relative costs and indigenous technological indicators might be found in any study of the determinants of investment in developing economies.

As our dependent variable is scaled by total flows of direct investment from the OECD economies, it is possible that the home country fixed effects could be capturing factors which have prompted a rise in the share of total investment located in Central Europe. Standard theories of FDI suggest the importance of relative costs in location decisions, and a number of studies have noted the possibility of a diversion of regionally orientated investments from Southern to Eastern Europe (Martin and Gual, 1994). To investigate this we include a variable (denoted COST1) in (7.4) which is defined as unit labour costs in the respective host economies relative to a weighted average of unit labour costs in Spain and Portugal. We would expect to find a negative coefficient on this variable if firms have diverted investments into Central Europe. In fact it is difficult to discriminate between this measure and relative unit labour costs within Central Europe, as the two are collinear. As (7.5) shows, if COST1 is included alone it becomes statistically significant and correctly signed. Overall, these results suggest that relative labour costs are an important factor behind the observed levels of investment in the Central European economies.

We have also estimated comparable models using data on the stocks of direct investment rather than the flows. Our use of flows largely reflects an interest in the timing of investment in the initial transition period. Ultimately, it may be more appropriate to use stock data, since standard supply-side theories of investment relate to stocks rather than flows. Over the transition period from 1991–93 the time pattern of the flow data is little different from that of the stock data. This was reflected in the empirical results with the size and significance of the main explanatory factors remaining close to the results in Table 7.

5. Conclusions

Our empirical results support and extend the findings from earlier surveys of investment in Central Europe. Whilst it is clear that the timing and form of privatisation programmes have had a marked influence on the pattern of inward investment, we also find a significant effect from relative labour costs and an indicator of research intensity. The latter findings are consistent with those from many other studies of investment in developing economies. This evidence is consistent with the notion that some investors have been attracted to Central Europe by a combination of relatively low labour costs and the availability of skilled workers in particular sectors and countries. In the short term, the continued strength of inward investment in these economies is likely to depend heavily on the continuation and expansion of privatisation programmes. Post-privatisation investments, which have already begun in some economies (UNDTCI, 1995, pg.103), are more likely to depend on market growth and costs relative to those elsewhere in Europe.

We also obtain evidence which indicates that, on average, investment is more likely to originate from those economies with strong, existing trade linkages with Central Europe. This has interesting implications for the future pattern of investment in this region, since trade is increasingly reorientated towards the EU economies. Evidence from the recent pattern of outward investment by Japanese and German corporations suggests that the location of such investments is affected by regional trading arrangements and trade policy instruments. Barrell and Pain (1996) illustrate the extent to which contingent protection has driven Japanese FDI within the EU and the US. There is also evidence of significant differences between the factors determining foreign direct investment from German firms within the EU and other Northern Hemisphere economies with separate free trade agreements (Barrell, Pain and Hubert, 1996). This tendency appears to have been exacerbated by the EC Internal Market Programme, which has acted to divert some direct investment away from non-EU economies (Baldwin *et al*, 1995). The continuing need to attract and retain foreign investment aimed at serving Western European markets is thus likely to reinforce the desire of many Central European economies for ever closer linkages with the EU.

DATA APPENDIX

$COST_i$ = unit labour costs in host country relative to a weighted average of those in the other two host countries, with both having a weight of 50 per cent (US$, 1989=100, calculated using EBRD Transition Report Update, 1995). For the CSFR we use the Czech Republic series reported in Table 5.

$COST1_i$ = unit labour costs in host country relative to a weighted average of those in Spain (70 per cent) and Portugal (30 per cent) (US$, 1989=100, calculated using EBRD Transition Report Update, 1995 and OECD National Accounts).

$ENERGY_i$ = Consumption of electricity per head in host country relative to a weighted average of that in other two potential hosts (kWh, UN Energy Statistics Yearbook).

FDI_{ij} = Annual flows of FDI from the ith investor country to the jth host country as a percentage of total OECD flows, multiplied by 100 (calculated from data in International Direct Investment Statistics Yearbook (1995), OECD).

$PATENTS_i$ = cumulated five-year moving average of patents granted to host country relative to a weighted average of patents granted to the other two potential hosts (US Department of Commerce).

$PRIV_i$ = private sector share of GDP in the host country (EBRD Transition Report, 1995).

$RISK_i$ = principal component of four host country series; inflation, government debt stock, government deficit and the inverse of the reserve cover ratio. Calculated using the data for 1991–93 reported in Table 3.

$TRADE_{ij} = (M_{ij}+X_{ij})/(M_i+X_i)$, where M_{ij} is a monthly average value of imports from the ith investor country into the jth host country and X_{ij} is a monthly average value of exports from the ith investor country to the jth host country, and M_i and X_i are the total value of exports and imports in the host country (Monthly Statistics of Foreign Trade (1994), OECD).

NOTES

(1) In this article we also use the term CSFR when referring to the former Czechoslovakia. The Visegrád economies are the CSFR, Hungary and Poland.

(2) The balance of payments estimates of inward direct investment in the CSFR and Hungary are much closer to the cash figures in Table 1.

(3) The authors estimate that, on a cash basis, inflows of foreign direct investment into Hungary in 1995 were around $4.4 billion, helped by privatisations in the energy sector. In the Czech Republic new investment was raised by the partial privatisation of the SPT telecom company.

(4) Brewer (1994) suggests that the source country data produced by the OECD are the best available for most analytic tasks, because of their relative accuracy and comprehensiveness.

(5) This is also the case for other transitional countries; for example nearly half of the foreign direct investment in Estonia comes from Sweden and Finland.

(6) However having found this whole process slow, Poland has now adopted the voucher method.

(7) In contrast to the other Central European economies, foreign owned firms can set up their own customs-free areas within Hungary under Customs Service supervision (Csáki et al, 1996). Firms are treated as foreign in such zones and are free from exchange control and trade regulations.

(8) The Commission reports the rankings from the two major international rating agencies, Moody's and Standard and Poor's, as well as the rankings in the *Euromoney* and *Institutional Investor* journals.

(9) Principal components are a set of indicators constructed to capture as much of the variance of the original series as possible. By definition such components are likely to give relatively little weight to series that do not vary over time. Hence differences between variables such as inflation rates, which may be stable within countries but vary across countries, may not be fully reflected in the respective national principal components.

(10) The Central European economies have all signed association agreements with the European Community, the so-called 'Europe Agreements' (Martin and Gual, 1994). This has improved market access within the EU for some goods produced in Central Europe.

(11) The estimates are gross of income tax, but net of social security taxes.

(12) We use a five year cumulative moving average in our empirical work. This serves to take account of any time lag before the full commercial potential of a patent can be realised.

(13) It is difficult to test this hypothesis, since we do not have any data on expectations of market growth. We cannot simply use actual market growth, since GDP fell in all of the transitional economies up until 1994.

(14) The 14 investing countries are Austria, Belgium, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Spain, Sweden, Switzerland, the UK and the US. The remaining OECD countries are excluded as data are not available. Consistent data are not yet available for all these countries in 1994. For 1993 we use data on the combined level of investments in the Czech Republic and the Slovak Republic.

(15) Although there may be some inconsistencies in the national data of the OECD economies, this may be less than that in the data for inward FDI published by the Visegrád economies (Brewer, 1994). In particular, the available data from Hungary may include portfolio as well as direct investments (UNECE, 1994).

(16) These two variables are jointly insignificant $[F(2,106)=0.26]$.

(17) Although it is feasible to estimate our model in a logarithmic form over this sample period, since all investment flows are non-negative, we consider the implied assumption of constant elasticities to be a strong one.

REFERENCES

Agarwal, J.P. (1995), 'Implications of FDI flows into the European transition economies for developing countries', paper presented at the European Economic Association Conference, Prague.

Baldwin, R., Forslid, R. and Haaland, J. (1995), 'Investment creation and investment diversion: simulation analysis of the Single Market Programme', CEPR Discussion Paper no.1308.

Barrell, R. and Pain, N. (1996), 'Trade restraints and Japanese direct investment flows', *European Economic Review*, forthcoming.

Barrell, R., Pain, N. and Hubert, F. (1996), 'Regionalism, innovation and the location of German foreign direct investment', presented at 1996 Royal Economic Society Conference, NIESR Discussion Paper no. 91.

Boeri, T. and Keese, M. (1992), 'Labour markets and the transition in Central and Eastern Europe', *OECD Economic Studies*, 18, pp. 133–163.

Brewer, T.L. (1994), 'Indicators of foreign direct investment in the countries of Central and Eastern Europe: a comparison of data sources', *Transnational Corporations*, 3, pp. 115–126.

Buigues, P. and Jacquemin, A. (1994), 'Foreign direct investment and exports to the European Community', in Encarnation D.J. and Mason M. (eds.) *Does Ownership Matter? Japanese Multinationals in Europe*, Oxford.

Cantwell, J. (1995), 'The globalisation of technology: what remains of the product cycle model?', *Cambridge Journal of Economics*, 19(1), pp. 155–74.

Csáki, G., Sass, M. and Szalavetz, A. (1996), 'Reinforcing the modernization role of foreign direct investment in Hungary', presented at workshop organised by the Institute for World Economics of the Hungarian Academy of Sciences, Budapest, March 1996.

Drábek, Z. and Smith, A. (1995), 'Trade performance and trade policy in Central and Eastern Europe', CEPR Discussion Paper no. 1182.

EBRD (1994), 'Foreign direct investment', *Transition Report*, Chapter 9, European Bank for Reconstruction and Development.

EBRD (1995), *Transition Report*, European Bank for Reconstruction and Development.

European Commission (1996), 'The improvement in the external position of Central and Eastern European Economies', *European Economy*, Supplement A, no. 2.

Hany, C. (1995), 'Foreign direct investment in Central Eastern Europe: some lessons for Poland from Hungary', *Intereconomics*, 30, pp.36–43.

Harrison, A. and Revenga, A. (1995), 'The effects of trade policy reform: what do we really know?', NBER Working Paper no. 5225.

Hufbauer, G., Lakdawalla, D. and Malani, A. (1994), 'Determinants of direct foreign investment and its connection to trade', *UNCTAD Review 1994*, pp.39–51.

Hunya, G. (1992), 'Foreign direct investment and privatisation in Central and Eastern Europe', *Communist Economies and Economic Transformation*, 4(4), pp. 501–511.

Krugman, P.R. (1995), 'International trade theory and policy', in G.Grossman and K.Rogoff (eds.) *Handbook of International Economics Volume III*, Elsevier, North Holland.

Lane, S.J. (1994), 'The pattern of foreign direct investment and joint ventures in Hungary', *Communist Economies and Economic Transformation*, 6(3), pp. 341–65.

Leamer, E.E. and Levinsohn, J. (1995), 'International trade theory: the evidence', in G.Grossman and K.Rogoff (eds.) *Handbook of International Economics Volume III*, Elsevier, North Holland.

Markusen J.R. (1995), 'The boundaries of multinational enterprises and the theory of international trade', *Journal of Economic Perspectives*, 9, pp.169–189.

Martin, C. and Gual, J. (1994), 'Trade and foreign direct investment with Central and Eastern Europe: its impact on Spain', CEPR Discussion Paper no. 1006.

Marton, K. (1993), 'Foreign direct investment in Hungary', *Transnational Corporations*, 2, 111–134.

OECD (1995a), *International Direct Investment Statistics Yearbook*, OECD, Paris.

OECD (1995b), 'Review of recent developments in science and technology in Hungary', OECD Working Papers Vol.III. no. 81.

Pac, R. (1996), 'Investment opportunities in Poland', presented at workshop organised by the Institute for World Economics of the Hungarian Academy of Sciences, Budapest, March 1996.

Ray, G.F. (1991), *Innovation and Technology in Eastern Europe: An International Comparison*, National Institute Report Series no. 2.

Thomsen S. and S.Woolcock (1993), *Direct Investment and European Integration: Competition Among Firms and Governments*, Pinter Publishers, London.

UNDTCI (1995), *World Investment Report 1995: Transnational Corporations And Competitiveness*, United Nations Conference on Trade and Development, Division on Transnational Corporations and Investment, United Nations, Geneva.

United Nations Economic Commission for Europe (1994), 'Foreign direct investment in the transition economies 1990–1994', *Economic Bulletin for Europe*, 46, pp. 117–131.

Wang, Z.Q. and Swain, N. (1995), 'The determinants of foreign direct investment in transforming economies: empirical evidence for Hungary and China', *Weltwirtschaftliches Archiv*, 131(2), pp. 359–382.

Wheeler, D. and Mody, A. (1992), 'International investment location decisions: the case of US firms', *Journal of International Economics*, 33, pp.57–76.