M. T. Bohl, F. McDonald, H.-J. Tüselmann, S. Voronkova, P. Windrum

THE GERMAN MODEL OF CAPITALISM AND THE PERSISTENCE OF OUTWARD FOREIGN DIRECT INVESTMENT: EVIDENCE FROM GERMAN MANUFACTURING INDUSTRIES

Against the backdrop of critique on the German model of capitalism as to the ability to successfully adjust to rapid change and exogenous shocks in wake of economic globalisation, this paper investigates the degree of shock persistence in foreign direct investment (FDI) of ten German manufacturing industries for the period 1976 to 2003. Persistence in foreign direct investment time series data is established by applying various unit root tests. The results are robust to the potential presence of structural breaks in the data. The empirical analysis shows that German outward FDI in mature manufacturing industries, with one exception, exhibits a high degree of shock persistence. The results suggest, at least for mature German industries, the German model worked well in the past in times of crises and shocks.

1. Introduction

The German model of capitalism has been criticized to constraint companies and to hinder their ability to successfully adjust to rapid changes and exogenous shocks (Witt and Lewin, 2007). Against this background the paper investigates, within a time-series analysis, the degree of shock persistency of outward foreign direct investment (FDI) of 10 mature German manufacturing industries for the period 1976 to 2003. The focus of this paper is on the existence of structural breaks connected to shocks in the home economy that impact on outward FDI from manufacturing industries. The study focuses on mature manufacturing industries because there is long run data available for these industries that permits robust tests of shock persistency. The impact of exogenous shocks on outward FDI is an important but generally under-researched issue in the FDI literature, in contrast to other research fields. Research on random exogenous shocks has been conducted in areas such as radical technological innovation, for example, in endogenous growth theory (Aghion and Howitt, 1992) and real business cycles (Kydland and Prescott 1982; Backus, Kehoe and Kydland, 1992). The overwhelming body of empirical research on FDI is concerned with factors affecting the relative attractiveness of individual host nations (Enderwick, 2005). There have been some studies on the impact of exchange rate changes on FDI outflows (Aizenman, 1992) and also of uncertainty in economic conditions (Aizenman and Marion, 2004; Firoozi, 1997). These studies however have not been primarily concerned with changes in the home country. Therefore, factors affecting FDI arising in home nations have been relatively neglected. It is however in the home nations that the HQ activities of MNCs are located. Moreover, many MNCs conduct the bulk of their operations in their home country. Hence, it would be expected that shocks affecting home nations would influence FDI outflows. If home country shock effects do impact on outward FDI there should be a persistent effect on the total stock of FDI[1].

Industry specific factors are also often neglected in studies on the impact of exogenous shocks on FDI. There have been studies on total and manufacturing FDI (Agarwal, Gubitz and Nunnenkamp, 1991; Lipsey, 2001), but there have been no studies that investigate the industry effects. In this connection, there is an increasing appreciation that aggregate FDI figures may mask an industry-specific differential impact and associated FDI responses, which

[1] It is likely that FDI is influenced by both home and host shocks. However, this paper concentrates in the possible types of shocks in the home country. Nevertheless, the tests used in this paper do not distinguish between home and host country shocks.

in turn necessitates a disaggregated, industry level analysis. A growing body of literature highlights the importance of industry specific characteristics for FDI. These industry specific factors include the degree of global of exposure and the technology intensity of industries (Agarwal, 1997; Dunning, 2000; UNCTAD 2000). This paper examines German FDI outflows in 10 mature manufacturing industries to assess if there is evidence of industry level shock persistency.

2. Background and Literature

The German economy was buffeted by various shocks in the 1976 to 2003 period. These included inter alia: the oil crises, German unification, collapse of communism in Eastern and Central Europe, EU enlargements, the EMS crises, the Single European Market programme, the introduction of the EURO, a number of technological shocks, extensive privatisation programmes in Germany and among her main trading partners, reforms in China. The level and development of German manufacturing outward FDI stock exhibit distinctive features in terms or regional and sectoral patterns. They are highly concentrated in a relatively small number of host countries and industries, and this concentration has become more accentuated over the years (Deutsche Bundesbank, 1978; 2005). The bulk of outward stock is concentrated in Western industrialised countries (2003 = 84%, 1976 = 75%), with the USA, UK, France, Belgium and the Netherlands (in descending order) accounting for over 65% of all German manufacturing outward stock in 2003 (1976 = 48%). The four large German export industries (electrical engineering, mechanical engineering, chemicals and motor vehicles) account for 67% of all manufacturing outward FDI in 2003 (1976 = 50%), the bulk of which is undertaken by the chemical and motor vehicle industries.

From a theoretical viewpoint, the literature on transaction costs and sunk cost and relatedly, hysteresis related to sunk costs suggest lumpiness of FDI and thus a considerable degree of shock persistency due to inter alia high entry and exit costs associated with high levels of asset specificity that is normally connected to FDI (Goldstein and Razin, 2003, Krugman, 1989). This view is challenged by the argument that financial sophistication of multinational companies (MNCs) makes FDI similar to portfolio investment (Albuquerque, 2003; Hausmann and Fernandez-Arias, 2000). Thus the ability of MNCs to finance and re-finance FDI from a multitude of sources in terms of countries and types of financial instruments reduces the lumpiness of FDI. This suggests that financial sophistication of MNCs reduces transaction costs and sunk costs of FDI, making them more similar to portfolio investment. In turn, FDI may not exhibit shock persistent properties. The empirical literature shows that there is less research in the FDI literature on the impact on shocks compared to other research, such as exogenous growth and real business cycle literatures. Within the FDI literature, a larger body of research exists in relation to inward FDI as compared to outward DFI. Most existing studies on outward FDI and shocks are conducted at aggregate level, either economy-wide or manufacturing at a whole. There is less emphasis on industry differential responses to shocks. However, studies on the stability of FDI suggest that it is more stable than portfolio investment (Mallampally and Sauvant, 1999). Several studies on German outward stock at aggregate level (total FDI or manufacturing sector as a whole) suggest inertia and shock persistency (Agarwal, Gubitz and Nunnenkamp, 1991; Klodt, 2001). Studies on inward FDI stocks at aggregate level in developing and emerging countries suggest that FDI is less volatile than other forms of inward financial investment in wake of shocks, such as the Latin American debt crisis in the 1980s, the 1997/98 financial crisis in East Asia or the Mexican currency crisis (Lipsey, 2001).

3. Econometric Methods

3.1. Augmented Dickey-Fuller and Kwiatkowski Unit Root Tests

The theoretical predictions discussed above can be analysed empirically with the help of unit root tests. Relying on this econometrical basis it can be decided whether a time series belongs to the group of trend stationary or difference stationary time series. In case a time series contains a deterministic linear time trend, the variable can be characterized as a trend stationary process. Fluctuations around the linear trend are considered to be mostly temporary and due to the transitory character of shocks, deviations return completely to the trend. In contrast, random walk processes can be characterized as difference stationary time series. The important property of these time series is that shocks have a permanent character. When the time series is shocked it never completely returns to its trend. Hence, unit root processes exhibit the shock persistence (Kennedy, 2003).

We apply the augmented Dickey-Fuller (1979, 1981) test and the approach proposed by Kwiatkowski et al. (1992), hereafter ADF and KPSS test. The ADF test is implemented using the regression:

$$\Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 t + \sum_{i=1}^{l} \gamma_i \Delta y_{t-i} + \varepsilon_t, \quad (1)$$

Δ denotes the first difference operator, y_t the time series under investigation, t a linear time trend and ε_t the error term. The ADF test analyses the null hypothesis of a unit root in the (log) level of the time series, i. e., $H_0 : \alpha_1 = 0$, versus the alternative hypothesis of trend stationarity. The critical values are MacKinnon's (1991) response surface estimates. The lag length l is determined implementing the general-to-specific procedure suggested by Hall (1994) starting with the lag $l = 3$.

In contrast to the ADF test, the KPSS test investigates the null hypothesis of trend stationarity against the alternative of a unit root. Let $\hat{u}_t$, $t = 1, 2, ..., T$, the estimated residuals from the regression:

$$y_t = \beta_0 + \beta_1 t + u_t. \quad (2)$$

The KPSS test statistic is defined as:

$$LM = \sum_{t=1}^{T} S_t^2 / \hat{s}_{Tl}^2, \quad (3)$$

where $S_t = \sum_{i=1}^{t} \hat{u}_t$, , $t = 1, 2, ..., T$ and

$$\hat{s}_{Tl}^2 = T^{-1} \sum_{t=1}^{T} \hat{u}_t^2 + 2T^{-1} \sum_{\tau=1}^{l} (1 - \frac{\tau}{l+1}) \sum_{t=\tau+1}^{T} \hat{u}_t \hat{u}_{t-\tau}, \quad (4)$$

where l is a truncation lag. Sephton (1995) provides response surface estimates of approximate critical values for the LM test statistic. The maximum truncation lag is set to $l = 2$.

Due to the different null hypotheses of the ADF and the KPSS test, we can implement a simple confirmatory analysis, to confirm our conclusions about unit root (Maddala and Kim 1995; Kwiatkowski et al. 1992; Choi, 1994). It is generally agreed that using both tests gives the most reliable results (Amano and van Norden, 1992). If the ADF test cannot reject the null hypothesis of a unit root in the log level of the time series and the KPSS test rejects the null hypothesis of trend stationarity, we have found confirmation for the difference stationarity and the persistence of shocks of the FDI time series.

3.2. Zivot and Andrews Unit Root Test

Occurrence of an exogenous shock may have permanent effect on the level of variables. In statistical terms, this may result in under-rejection of the null hypothesis of a unit root (Perron, 1990); Zivot and Andrews, 1992), when a trend stationary process with a break in its parameters is erroneously concluded to be a unit root (non-stationary) process. The likelihood of occurrence of a structural break increases with the data span. Since our dataset covers 28 years of data, we perform additional unit root test suggested by Zivot and Andrews (1992) that assumes a trend stationary process with a break under alternative hypothesis.[1] The advantage of this test over the one of Perron (1990) is that the break point is endogenous, i. e., it is estimated from the data rather then assumed based on the history of macroeconomic effects. This feature of the Zivot-Andrews test avoids a potentially erroneous assumption regarding the date of the break.

The Zivot-Andres unit root test is formulated as follows. Under the null hypothesis of a unit root the time series is assumed to follow a process given by:

$$y_t = \mu + y_{t-1} + u_t. \quad (5)$$

Under the alternative hypothesis, the series is assumed to follow a trend stationary process with a structural break in parameters. Since the break may occur both in intercept and slope of the data, Zivot and Andrews suggest three model specifications under the alternative hypothesis:

$$y_t = \mu^A + \theta^A DU_t(\lambda) + \beta^A t + \\ + \alpha^A y_{t-1} + \sum_{j=1}^{k} c_j^A \Delta y_{t-j} + u_t, \quad (6)$$

$$y_t = \mu^B + \beta^B t + \gamma^B DT(\lambda) + \\ + \alpha^B y_{t-1} + \sum_{j=1}^{k} c_j^B \Delta y_{t-j} + u_t, \quad (7)$$

$$y_t = \mu^C + \theta^C DU_t(\lambda) + \\ + \beta^C t + \gamma^C DT(\lambda) + \alpha^C y_{t-1} + \\ + \sum_{j=1}^{k} c_j^C \Delta y_{t-j} + u_t. \quad (8)$$

[1] Related work includes studies by Rappoport (1990) and Banerjee et al. (1990). However, it is not the purpose of this paper to exploit the variety of unit root tests available and we choose Zivot and Andrews test based on its popularity in empirical financial research. The latter resulted in the full version of the Zivot and Andrews (1992) original article being reprinted in the 20th anniversary issue of the Journal of Business and Economic Statistics (2002) (see Vol. 20(1) pp. 25-44).

where $\lambda = \frac{T_B}{T}$ is the estimated time of the break (measured as a fraction of a sample), $DU_t(\lambda) = 1$ if $t > T_B$ and 0 otherwise; $DB_t(\lambda) = t - T_B$ if $t > T_B$ and 0 otherwise, and k is the lag length. Dummy variables DU_t and DT_t model break in intercept and slope, respectively.

The estimation of an endogenous timing of the break λ is performed by running a series of regressions with different date T_B. Namely, T_B is set to all the sample dates and regressions (6)–(8) are estimated with all the possible break points. For practical purposes however, TB is assumed to belong to the interval [0.1T; 0.9T]. As a result, a series of t-statistics for α^i coefficient is obtained, where $i = A$, B, C. The ultimate test statistic for a given model specification is the one constituting the strongest evidence against the null hypothesis, i. e., the smallest statistic in this series:

$$t_{\alpha^i}[\lambda^i_{\inf}] = \inf_{\lambda \in [0.1T; 0.9T]} t_{\alpha^i}(\lambda). \qquad (9)$$

The asymptotic distribution and critical values for the statistic (9) for the models A, B, and C are provided in Zivot and Andrews (1992).

4. Data

In our analysis we use data on German outward FDI, measured across industries of German investors. The annual data on the stock of German industrial FDI was extracted from the Deutsche Bundesbank publications Kapitalverflechtung mit dem Ausland, for the period 1976 to 2003. Prior to 1995, the Bundesbank defined industries using the German industrial classification. After 1995 it adopted the European Union NACE (Rev. 1) industrial classification (Deutsche Bundesbank, 1997). The identification of industry in official Bundesbank data uses the two digit NACE classification. For the purpose of consistent identification for the duration of the sample, the FDI data prior 1995 have been reclassified using the NACE (Rev. 1) classification. However, for a number of industries such re-classification was not possible and some industries had to be amalgamated in order to achieve consistency to the pre-1995 classification scheme. The final sample includes the following ten manufacturing industries (NACE codes in brackets)[1]:

1. Food and Beverages (15)
2. Textiles (17)
3. Clothing and Leather (18, 19)
4. Wood, Paper, Publishing Printing (20, 21, 22)
5. Chemicals (24)
6. Rubber and Plastics (25)
7. Glass, Ceramics and Cement (26)
8. Metals and Metal Products (27, 28)
9. Machinery and Equipment (29)
10. Motor Vehicles (34)

The sample accounted for 88% of all German manufacturing outward stock in 2003 (77% in 1976) (Deutsche Bundesbank, 1978, 2005). With the exception of the pharmaceutical industry, which is contained in the two digit chemical industry, the sample consists of mature industries. The Bundesbank does not provide industry data for FDI stocks at the three digit NACE code therefore it was not possible to separate out this high tech industry[2]. In the Deutsche Bundesbank publications the FDI data prior to 1999 is reported in millions of Deutschmarks and in millions of Euro afterwards. The data therefore were converted into Euro using the fixed exchange rate between Euro and Deutschmark as provided by the European Central Bank (http://www.ecb.int/home/html/index.en.html). To account for the impact of inflation on FDI valuation, the data has been deflated using the German consumer and produced price indices (CPI and PPI respectively). The data on CPI and PPI have been extracted from the Deutsche Bundesbank Monatsbericht.

5. Empirical Results and Discussion

Table 1 contains the empirical findings on the unit root tests for the FDI time series deflated by the PPI.[3]

For all time series the ADF tests cannot reject the null hypothesis of a unit root. The findings of the KPSS tests are broadly in line with this result. With only a few exceptions the KPSS tests reject the null of trend stationarity. Hence, the empirical evidence on the stochastic properties of German FDI time is in favour of the shock persistence property.

Findings of the Zivot-Andrews unit root test that assumes stationarity with a structural break under the alternative hypothesis are presented in Table 2 For all the series of industrial FDI, apart from chemical industry, the null hypothesis of a unit root cannot be rejected. This result is generally in line with the findings of both ADF and KPSS tests. It pro-

[1] Time series for tobacco was not included in the calculations because of missing values.

[2] Based on the OECD categorization of technology intensity of industries (OECD, 1997).

[3] Deflation of time series with CPI produced qualitatively similar results.

Table 1

Results of Unit Root Tests

	ADF		KPSS		
Food and Beverages	2.50	0	0.31***	0.21**	0.17**
Clothing and Leather	2.60	0	0.34***	0.22***	0.17**
Pulp, Paper and Paper Products; Publishing and Printing	1.01	0	0.59***	0.34***	0.25***
Rubber and Plastic Products	2.86	2	0.19**	0.11	0.08
Non-Metallic Mineral Products: Glass, Ceramics, etc.	2.34	0	0.28***	0.17**	0.13*
Metals and Metal Products	2.23	0	0.39***	0.24***	0.19**
Machinery and Equipment	1.30	0	0.45***	0.28***	0.23***
Vehicles and Vehicle Parts	1.50	0	0.38***	0.21**	0.15**
Textiles	0.42	0	0.47***	0.27***	0.20**
Chemicals	0.38	2	0.47***	0.30***	0.25***

Notes. ***, **, * denote significance at 1, 5, and 10 % respectively. denotes the value of the ADF test statistics; l denotes the number of lags used for estimation of equations (1) and (4). Critical values for the ADF tests are from MacKinnon (1991) and for the KPSS tests are from Sephton (1995).

Table 2

Results of Zivot-Andrews Unit Root Test

Industry	**Minimum *t*-statistics**	**Lag (*k*)**	**Estimated date of the break**
Food and Beverages	–3.31	0	1999
Clothing and Leather	–3.69	0	1994
Pulp, Paper and Paper Products; Publishing and Printing	–2.18	2	1998
Rubber and Plastic Products	–3.64	0	1995
Non-Metallic Mineral Products: Glass, Ceramics, etc.	–2.86	0	1992
Metals and Metal Products	–4.83	0	1986
Machinery and Equipment	–3.52	0	1986
Vehicles and Vehicle Parts	–4.78	2	1995
Textiles	–2.09	0	1999
Chemicals	–5.19*	2	1994

Notes. The table reports test statistics for Zivot and Andrews (1992) unit root test. The null hypothesis of a unit root is tested against the alternative of stationarity with a structural break of unknown timing. Zivot and Andrews (1992) allow three model specifications: break in intercept only, break in a trend and break in both intercept and trend. We estimated all three model specifications. Reported results are for model allowing for the break in both intercept and a trend, since this model is least restrictive: where DU and DT are dummy variables modelling break and is the assumed date of the break. The number of lags k is chosen based on the values of the relevant t-statistic. * denotes significance at the 5% level.

vides additional evidence in favour of the persistence of shocks in the FDI series and this evidence is robust to the possible presence of structural break of the parameters of the underlying process.

The results provide support for the view that German FDI displays shock persistency that was suggested in studies on total German FDI and for the manufacturing sector as a whole (Agarwal, Gubitz and Nunnenkamp, 1991; Hubert and Pain, 1998; Jost and Nunnenkamp, 2002). This study provides evidence that there is no industry specific differential response to shocks in the period 1976 to 2003, with the exception of the chemical industry. Mature German manufacturing industries, exclusive of the chemical industry and other manufacturing industries that could not be included in this sample, constitute two-third of all German manufacturing FDI stock (Deutsche Bundesbank, 2005). This study therefore confirms, for mature German industries, the general impression of existing aggregate level studies that outward German FDI is shock persistent.

The results do not provide support for the view that in general the trend of FDI outflows are less prone to shocks than other types of investments. The results therefore challenge, at least for most German mature manufacturing industries, studies that support the view that FDI is not shock persistent (Aizenman and Marion, 2004; Albuquerque, 2003; Desai et al, 2004; Firoozi, 1997; Frankel and Rose, 1996; Fernandez-Arias, 2001; Levchenko and Mauro, 2006). The findings support the view that high transaction and sunk costs lead to lumpy FDI which is prone to shock persistency. However, the German chemical industry does not seem to be shock persistent. This could be due to a number of industry-specific factors and/or a combination of such factors.

Studies on outward German investment have shown that fundamental structural changes induced by the Single European Market programme, the collapse of communism in Central and Eastern Europe have been most frequent in the chemical industry (Hubert and Pain, 2002). Furthermore, the chemical industry at the two digit NACE code includes different types of industries at the three digit NACE codes in terms of technology intensity, risk exposure, etc., such as bulk chemicals, petro-chemicals and pharmaceuticals. It may therefore be possible that non-shock persistency of the chemical FDI may be accounted for by certain industries within the chemical sector. The petro-chemical industry can be expected to have been particularly affected by oil crises, monetary shocks and currency crises. The high-tech pharmaceutical industry will have been particularly affected by technological shocks. In periods of rapid technological advances, liberal market economies, such as the US with innovation systems that encourage rapid innovations, are thought to become attractive locations for German pharmaceutical MNCs (and other German MNCs in high-tech industries) relative to the German location, where the innovation system is thought to lend itself better for incremental innovations, which have underpinned the competitive advantages of German MNCs in the medium and medium-high tech industries (Hall and Sosckice, 2001; Hall and Gingerich, 2009). Indeed, studies highlight the increased significance of outward FDI of German pharmaceutical companies to the USA since the mid 1990s, in terms of both the lead market function of the US pharmaceutical market and the attractiveness of the US R&D environment for this industry (Klodt, 2001; Belitz, 2002). One possible scenario could be that the non-shock persistency of the chemical sector time-series is accounted for by the high tech industries, whilst the mature industries in the chemical sector may well have been shock persistent, but with the effect of the former being of a magnitude that induced non-shock persistency for the aggregate chemical sector. However the limitations of the data prevented tests to be performed at the three digit NACE code for the chemical sector and on other German industries, including service industries and some of the other newer and more high technology based industries.

Moreover, it is possible that the nature of German MNCs and the characteristics of German financial institutions limit the ability of German MNCs to adopt the kind of sophisticated financial arrangements that would make FDI more like portfolio investment. It is however difficult to imagine that German MNCs behaviour is very differently from MNCs that are based in other countries. However, to investigate these issues and the issues in the preceding paragraph further, as well as providing further tests of the conflicting views on the shock persistency of FDI requires more disaggregated industry data and data from a variety of countries.

6. Concluding Remarks

Although the German economy was buffeted by a variety of shocks in the period 1976–2003, including fundamental structural change, our disaggregated industry level study confirmed for mature German manufacturing industries the general impression of existing aggregate level studies that outward German FDI is shock persistent. Although the study does not allow drawing direct inferences in relation to public policy, it would seem reasonable to propose that at least in mature manufacturing industries the relationship between public policy and company FDI strategies seems to have worked well in times of shocks.

However, an important issue is whether the relationship between public policy and FDI strategies of companies works well in times of crisis and rapid change in relation to newer high tech manufacturing industries and knowledge intensive service industries remains, due to limitations in official German FDI data, unanswered. If the non-shock persistency of the chemical sector outward FDI were indeed attributable to the high tech pharmaceutical industry, rather than the medium tech chemical industries within the broad chemical sector, and if this were also the case for a significant number of the other newer industries, there may be grounds for more far reaching changes in public policy and in the German variety of capitalism. However, the crux of any such reform policies would be to strike a delicate balance between sufficiently enhancing the adjustment potential of the German model without destabilising the fundamentals of the model as these have worked well for the mature German industries in times of shocks.

To shed further light on the shock persistency of German FDI and the issues raised in this paper requires further longitudal studies based on more fine-grained industry classifications to better capture high tech and knowledge intensive industries in manufacturing and service sectors. However, there are official data limitations. Comparative longitudal studies along the lines of this study that include other major FDI home countries, as well as incorporating institutional variables that adequately proxy national business models and their dynamics pose numerous data and conceptual challenges. Nevertheless, such research would enhance our understanding of the links between shocks, institutional systems and their dynamics and MNC FDI strategies in Germany and would also provide a methodological approach to study these links in other countries.

References

1. *Agarwal, J., Gubitz, A. and Nunnenkamp, P.* (1991) 'Foreign investment in developing countries — the case of

Germany', Kieler Studien, No. 238, Kiel: Institute of World Economics.

2. *Aghion, P. and Howitt, P.* (1992) 'A model of growth through creative destruction', Econometrica, Vol. 60, No. 2, pp. 323-351.

3. *Aizenman, J.* (1992) 'Exchange Rate Flexibility, Volatility, and Patterns of Domestic and Foreign Direct Investment, NBER Working Paper, No. 3953.

4. *Aizenman, J. and Marion, N.* (2004) 'The Merits of Horizontal versus Vertical FDI in the Presence of Uncertainty', Journal of International Economics, Vol., 62, pp.125-148.

5. *Amano, R. A. and van Norden, S.* (1992) 'Unit Root Tests and the Burden of Proof', Bank of Canada Working Paper, No. 92-97.

6. *Albuquerque, R.* (2003) 'The Composition of International Capital Flows: Risk Sharing through Foreign Direct Investment', Journal of International Economics, Vol. 61, pp. 353-383.

7. *Backus, D. K., P. J. Kehoe, and Kydland, F.* (1992) 'International Real Business Cycles, Journal of Political Economy' Vol. 100, pp. 745-775.

8. *Baldwin, R.* (1989) 'Hyseresis in import prices; the beachhead effect', American Economic Review, Vol. 78, No. 4, pp. 773-785.

9. Deutsches Institut für Wirtschaftsforschung: DIW Wochenbericht, No. 16.

10. *Choi, I.* (1994) 'Residual-Based Tests for the Null of Stationary with Application to US Macroeconomic Time Series', Econometric Theory, Vol. 10, pp. 720-746.

11. Deutsche Bundesbank (1978), Kapitalverpflechtung mit dem Ausland, Frankfurt a.M.

12. Deutsche Bundesbank (1997), Bestimmungsgründe grenzüberschreitender

13. Direktinvestitionen, Montatsberich August, Frankfurt a.M.

14. Deutsche Bundesbank (2005). Kapitalverpflechtung mit dem Ausland, Frankfurt a.M.

15. *Dickey, D. and Fuller, W.* (1979) 'Distribution of Estimators for Autoregressive Time Series With a Unit Root', Journal of the American Statistical Association, Vol. 74, pp. 427-431.

16. *Dickey, D. and Fuller, W* (1981) 'The Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root', Econometrica, Vol. 49, pp. 1057-1072.

17. *Dunning, J.* (2000) 'The eclectic paradigm as an envelope for economic and business theories of MNE activity', International Business Review, Vol. 9, pp.163-190.

18. *Enderwick, P.* (2005) 'Attracting "desirable" FDI: Theory and Evidence', Transnational Corporations, Vol. 14, pp. 95-119.

19. *Frankel, J. and Rose, A.* (1996) 'Currency Crashes in Emerging Markets: An Empirical Treatment', Journal of International Economics, Vol. 41, pp. 351-366.

20. *Firoozi, F.* (1997) 'Multinationals FDI and Uncertainty: an Exposition', Journal of Multinational Financial Management, Vol. 2, pp. 34-49.

21. *Goldstein, I. and Razin A.* (2003) 'An Information-Based Trade Off Between Foreign Direct Investment and Foreign Portfolio Investment: Volatility, Transparency, and Welfare', NBER Working Papers, No. 9426.

22. *Hall, P. and Soskice, D.* (Eds.) (2001) Varieties of Capitalism: The Institutional Foundations of Comparative Advantage, Oxford: Oxford University Press.

23. *Hall, P. and Gingerich, D.* (2009) 'Varieties of Capitalism and Institutional Complementarities in the Political Economy: An Empirical Analysis', British Journal of Political Science, Vol. 39, pp. 449-482.

24. *Hausmann, R. and Fernandez-Arias, E.* (2000) 'Foreign Direct Investment: Good Cholesterol?', Paper presented at Seminar The New Wave of Capital Inflows: Sea Changes or Just Another Tide, Annual Meeting of the Board of Governors, Inter-American Development Bank and Inter-American Investment Corporation.

25. *Hubert, F. and Pain, N.* (2002) 'Fiscal Incentives, European Integration and the Location of Foreign Direct Investment', NIESR Discussion Papers, London: National Institute of Economic and Social Research.

26. *Jost, T. and Nunnenkamp, P.* (2002) 'Bestimmungsgründe deutscher Direktinvestitionen in Entwicklungs- und Reformländern — Hat sich wirklich was verändert?' Kieler Arbeitspapier, No. 1124, Kiel: Institut für Weltwirtschaft.

27. *Kennedy, P.* (2003) A Guide to Econometrics, 5th Edition, Cambridge, Massachusetts: MIT Press.

28. Klodt, H. (2001) 'Direktinvestitionen, Fusionen und Strukturwandel', Kieler Arbeitspapiere, November, Kiel: Institut für Weltwirschaft.

29. *Krugman P.* (1989) Exchange Rate Instability, Cambridge, Massachusetts: MIT Press.

30. Kydland, E. and Prescott, E. (1982) 'Time to Build and Aggregate Fluctuations,

31. Econometrica, Vol. 50, pp. 1345-70.

32. *Kwiatkowski, D., Phillips, P., Schmidt, P. and Yongcheol, S,* (1992) 'Testing the Null Hypothesis of Stationarity Against the Alternative of a Unit Root', Journal of Econometrics, Vol. 54, pp. 159-178.

33. *Levchenko, A. and Mauro, P.* (2006) 'Do some forms of financial flows help protect from sudden stops?' IMF Working Paper, WP/06/2002, Washington DC.

34. *Lipsey, R.* (2001) 'Foreign Direct Investors in Three Financial Crises', NBER Working Papers, No. 8084.

35. *MacKinnon, J.* (1991) Critical Values for Cointegration Tests, in: R. F. Engle and C. W. J. Granger (Eds), Long-Run Economic Relationships, Oxford: Oxford University Press.

36. *Mallampally, P. and Sauvant, K.* (1999) 'Foreign direct investment in developing countries', IMF Finance & Development, Vol. 32, pp.1259-1267.

37. OECD (1997) Internationalisation of industrial R&D: patterns and trends, Paris: OECD.

38. *Sephton, Peter S.* (1995) 'Response Surface Estimates of the KPSS Stationarity Test', Economics Letters, Vol. 47, pp.255-261.

39. UNCTAD (2000) World Investment Report 2000, Geneva and New York: United Nations.

40. *Witt, M. and Lewin, A.* (2007) 'Outward foreign direct investment as escape response to home country institutional constraints', Journal of International Business Studies, Vol. 38, pp. 579-594.

41. *Zivot, E. and Andrews, D.* (1992) 'Further Evidence on the Great Crash, the Oil-Price Shock, and the Unit-Root Hypothesis' Journal of Business and Economic Statistics, Vol. 10, pp. 251-270.

UDC 338.45 (430)

keywords: Germany, foreign direct investment, shock persistence, structural breaks, hysteresis, public policy