Foreign Direct Investment and International Business Cycle Comovement

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Abstract

This paper investigates the relationship between bilateral FDI positions and cross-country business cycle correlations in the period 1982–2001. We find that countries that have comparatively intensive FDI relations also have more synchronized business cycles during 1995–2001. Before 1995, we also find a positive association between FDI linkages and output comovement, but this may partly reflect the effects of trade relations. Moreover, more intensive FDI links are also associated with a greater vulnerability to lagged output spillovers from abroad, whereas trade links are not. Policy implications of our research are (1) that there is an underlying tendency for business cycles to exhibit greater comovement in the future, and (2) that policy makers need to incorporate the FDI linkage among economies in their models and analytical framework for policy analysis.

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1. Introduction

Business cycle behavior has been relatively synchronized since the mid-nineties. In 2001, the dispersion of economic growth rates across the industrialized economies even fell to its lowest level in over 30 years, as the global economy experienced a downturn that was unusually wide-spread across countries. Broadly speaking, the observed degree of output comovement reflects both the nature of the shocks that have occurred and the degree of economic interdependence. Output developments will be more correlated if common shocks happen to be predominant, while they will be more asymmetric if idiosyncratic shocks are most important.[1] Because of economic relations among economies, country-specific shocks may get transmitted to other countries, enhancing output comovement indirectly. The higher degree of output comovement in recent years has partly been driven by common shocks, such as large changes in crude oil prices, the rise and fall of the information technology boom and restrictive monetary policies (Peersman 2002). However, it is widely felt that common shocks are not the whole story, raising the question to what extent deeper economic linkages, and what kind of linkages, may have contributed to the more synchronized nature of economic fluctuations.

The rise in international economic interdependence has occurred along three dimensions. The first is international trade in goods and services, which is the 'traditional' channel through which economies may affect each other. Although imports and exports as a share of GDP have in general increased, there has been no marked across-the board acceleration of this trend recently. It is therefore unlikely that deeper trade interdependencies have contributed significantly to the recent rise in output correlations. The second type of link is provided by international trade in financial assets, such as equity and bonds, and cross-border credit relations. Cross-border holdings of portfolio assets have mushroomed in recent years. For example, foreign holdings of US long-term securities amounted to 42% of US GDP in March 2000, having tripled in less than 2½ years (Griever, Lee and Warnock 2001). Correlations between stock markets of the major countries have greatly increased over the last twenty years, with the exception of Japan (Goetzmann, Li and Rouwenhorst 2001, Berben and Jansen 2002). Financial markets have thus gained importance as a channel for the international transmission of shocks. The third dimension of interdependence is the internationalization of production through foreign direct investment (FDI). Foreign direct investment has grown at rates far beyond those of international trade or output since the late 1980s. Especially in the second half of the 1990s, firms were exceptionally active in cross-border mergers and acquisitions (M&A). The outstanding global stock of FDI more than doubled in ten years time from 8.3% of world GDP in 1990 to 17.5% in 2000 (UNCTAD 2002). At present, about 11% of world output is produced by foreign affiliates (UNCTAD

[1] For example, international output correlations were low in the first half of the 1990s, because the picture was dominated by two unusually large country-specific shocks, namely German reunification and the collapse of the stock market and real estate bubbles in Japan (IMF 2002).

2002). It is conceivable that the larger presence of FDI is partly responsible for the observed increase in cross-country business cycle comovement.

The empirical literature on the effects of FDI is often based on firm-level data and mainly deals with supply-side effects on host economies in the longer run, focusing on the transfer of technology, management techniques and business models.[2] This paper focuses on another aspect of FDI, namely the possible role FDI may play in the transmisssion of economic shocks across borders. Using aggregate data, we examine to what extent the rapid expansion of FDI and the internationalization of production can be related to the phenomenon of more synchronized business cycles. Our basic empirical question is: Do countries that have comparatively intensive FDI ties tend to have more synchronous business cycles? To our knowledge we are the first to investigate this issue. To preview the results, we find that before 1995 there is no strong evidence in favor of an independent role of FDI (next to foreign trade) in explaining cross-country business cycle correlation patterns. But after 1995, FDI linkages are much better able to explain the pattern of international business cycle linkages than foreign trade relations. Moreover, FDI is associated with the vulnerability to foreign output spillovers that occur with a lag, but international trade is not. This result holds for the complete sample as well as the more recent years.

The remainder of the paper is structured as follows. Section 2 briefly outlines the channels through which FDI may transmit disturbances across borders. Section 3 offers a short description of the main trends in FDI positions over the past 20 years and their geographical composition in a number of industrialized countries. It also presents some figures on the significance of foreign affiliates for host-economy output and employment. Section 4 investigates whether cross-country variation in (bilateral) output comovement measures bears a relation to cross-country variation in (bilateral) foreign direct investment positions. Section 5 looks into the role of international trade in this respect. Section 6 analyzes output spillovers that occur with a lag. Section 7 summarizes our main findings and draws some policy conclusions.

2. Foreign direct investment as a channel for international transmission of disturbances

Foreign direct investments are investments made by a resident of one economy (source economy) with the objective of establishing a lasting interest in a company located in another economy (host

[2] See Ewe-Ghee Lim (2001) for an overview. There is solid empirical evidence that positive spillover effects on economic activity exist, although opinions vary on the exact magnitude (Blomström, Globerman and Kokko 2000). For example, Barrell and Pain (1997) present evidence that technology transfers from foreign-owned firms has stimulated the rate of technical progress in the UK and Germany. Spillover effects may also go from affiliate to parent company if acquisition of operational efficiency is the main reason of the transaction (McGuckin and Nguyen 1995). Harris and Robinson (2002) found that the British plants selected by foreign multinational companies performed above-average compared to other manufacturing firms.

economy). With ‘lasting interest’ we mean both the existence of a long-term relationship and a significant degree of influence by the direct investor on the management of the foreign firm. In statistics, ownership of at least ten percent of the ordinary shares or voting stock is the criterion for the existence of a direct investment relationship. Ownership of less than ten percent is considered a portfolio investment. FDI comprises not only mergers and takeovers/acquisitions (brownfield investments) and new investments (greenfield investments), but also reinvested earnings and loans and similar capital transfers between parents and affiliates.

Industrial countries typically act both as host to FDI projects in their own country and as participant in investment projects in other countries. A country’s inward FDI position is made up of the hosted FDI projects, while the outward FDI position consists of the FDI projects owned abroad. Both larger inward and outward FDI positions may make the domestic economy more sensitive to economic disturbances abroad in the short run.

As the inward position represents imported capital, the host country always runs the risk that foreign investors, for whatever reason, may want to withdraw their money. More generally, a deterioration of the economic conditions in the foreign investor’s home country may weaken the financial health of the parent company, which in turn may lead to cutbacks in employment, wages and investment in the host countries. International rent sharing within multinational companies may be at the root of this type of vulnerability. Within a multinational corporation, firm-specific assets are a joint input, giving economics of scale at the company level rather than at the level of the individual plant. Global profits may be shared (with a lag) with affiliates and their workers. Due to the trend towards internationalization of production, domestic wages and employment may thus increasingly reflect international factors in addition to local economic conditions; see also Blanchflower, Oswald and Sanfey (1996). Budd and Slaughter (2000) provide evidence of cross-border profit sharing between American and Canadian firms. Budd, Konings and Slaughter (2002) found that foreign-affiliate wages were positively related to parent profit per worker for a sample of European firms.

The macroeconomic risks related to the outward FDI position have to do with the consequences that disturbances abroad may have for the financial position of the investing firms. Unfavorable developments in the host countries may reduce the value of the investment projects abroad, and thus the value of domestic firms. This reduction of net worth may lead to lower stock prices and greater difficulties for domestic firms in securing external finance for planned domestic investment projects, both in the capital market and with banks. Domestic investment may thus be hurt via the balance sheet

channel and the stock market channel (Tobin's q).[3] The fall in stock prices, at home and abroad, may adversely affect domestic consumption via wealth effects, balance sheet effects and confidence effects.[4]

In addition the type of FDI (horizontal or vertical) may be relevant. Horizontal FDI is motivated by the desire to be close to customer markets due to high trade costs. The firm then runs similar operations at different locations, producing and selling in the same country (or nearby countries). This type of FDI is thus a substitute for international trade relations. Vertical FDI arises when firms want to take advantage of international differences in factor prices. The firm then splits up the production process, allocating the parts over different countries on the basis of cost efficiency. The firm services its markets by exporting from a single location. Hence, this type of FDI creates trade, both of intermediate and final goods. The FDI transmission channel outlined above applies to horizontal FDI. In case of vertical FDI, the transmission channel becomes even stronger, because some production decisions become directly linked across countries. If the parent company decides to cut output, output in affiliates producing intermediate goods and parts will also be reduced. Most empirical work tends to conclude that most real-world FDI is horizontal (Brainard 1997; Carr, Markusen and Maskus 2001).[5] As we focus on FDI relations among highly industrialized countries, this is likely to be true for our data as well.

3. Some facts on FDI and its significance for the host economies

Stocks and flows of FDI have grown rapidly across the OECD area since the mid-1980s, with a marked acceleration since 1995. FDI has also increased faster than international trade. The outward FDI position of Germany and France is currently around 25% of GDP, four to five times the level of 1985. For traditional investor countries like the UK and the Netherlands, positions are much larger, 55% and 80% respectively. The outward investment position of the US increased from 5% of GDP in 1985 to 13% in 2000. As outward and inward FDI positions tend to move in tandem over time, gross positions have grown much faster than net positions. The increase in FDI ties among the industrialized countries can thus be characterized as a process of diversification. The Japanese experience does not fit in with the general picture. Japanese corporations even reduced their presence abroad in the second half of the 1990s, while Japan's stock of inward FDI is very small (1% of GDP in 2000).

[3] See Barnett and Sakellaris (1998), Bernanke, Gertler and Gilchrist (1999), Cummins, Hassett and Hubbard (1996) and Gilchrist, Himmelberg and Huberman (2002) for a discussion of the link between investment and the stock market.
[4] See Boone, Giorno and Richardson (1998), Boone, Girouard and Wanner (2001), Poterba (2000) and Starr-McCluer (2002) for estimates of the wealth effect on consumption. Otoo (1999) and Jansen and Nahuis (2003) present evidence on the link between the stock market and consumer confidence.
[5] However, this view is not going unchallenged. Hanson et al. (2001), Braconier, Norbäck and Urban (2002) and Slaughter (2003) all make the point that vertical FDI is more important than is generally believed.

To gain some insight into where countries undertake FDI projects, Table 1 presents data on the geographical distribution of the stocks of inward and outward FDI for Canada, France, Germany, the Netherlands, the UK and the US for the years 1985 and 2000. The most intensive FDI link is that between Canada and the US. In 1985 75% of total Canadian inward FDI originated from the US, while in 2000 this was still 63%. In general, the US is a major source and destination of FDI. In 2000, the UK was the largest direct investor in the US (17.6% of the US total), followed by Japan (13.5%) and the Netherlands (12.1%). The UK, Canada and the Netherlands received the largest amounts of American FDI. France, Germany and the Netherlands have established intensive FDI relations with EU countries, both as investors and as hosts. The overall trend toward diversification is also visible in the geographical distributions of the FDI positions, which have become more even over time. Finally, shares in the inward FDI portfolio and shares in the outward FDI portfolio are positively correlated. Inward and outward FDI move together, not only at the aggregate level, but also bilaterally. This observation confirms that the FDI process between two countries typically involves capital flows of comparable size in both directions, through which countries swap claims on their capital stocks.

The presence of foreign investors means that part of domestic output is produced by firms controlled by foreigners. Comprehensive data on the share of output accounted for by foreign affiliates are scarce. In Table 2 we have collected some data, taken from several sources, that may give an impression of the weight of foreign-owned companies in the manufacturing sector and the total economy in 13 host countries in 1989 and 1998–1999. Table 2 first shows the output produced by majority-owned foreign affiliates (MOFA) of US companies as a percentage of host country GDP in 12 countries.[6] In 1999, US MOFAs alone were responsible for 17% of Irish GDP, 10% of Canadian GDP and 7% of UK GDP. In Australia, Belgium and the Netherlands their output share was around 5%. We combine this information with the share of the US in the host country's inward FDI position, if available, to arrive at a back-of-the-envelope estimate of the output share of all foreign affiliates taken together.[7] Our, admittedly rough, estimates indicate that between 10 and 20% of GDP could be accounted for by foreign-owned firms, pointing to a potentially substantial role for foreign affiliates in the domestic economy. Because the US economy is so large, foreign affiliates still account for a relatively small part of US GDP: 5.6% in 1999 and 6.0% in 2000 (Zeile 2002). Still, this represents a substantial increase from the level ten years ago (4.1%). Finally, Table 2 also reports, depending on availability, the share in employment in the manufacturing sector accounted for by foreign affiliates in 1998. These data too are suggestive of an important role of foreign firms in their host economies.

[6] US FDI in MOFAs is approximately 85% of total outward FDI.
[7] We computed the estimated output share of all foreign affiliates by dividing the US MOFA output share by the US share in inward FDI (as reported by the host country).

4. FDI relations and international business cycle linkages

In this section we investigate whether there is a positive relationship between the size of bilateral foreign direct investment positions and the degree of business cycle comovement among countries. If two countries have invested a lot in each other, do their output cycles tend to move in a more synchronized way? In addition we examine whether this relationship has changed over time.

Taking a bilateral perspective, we focus on the experience in the past 20 years of Canada, France, Germany, the Netherlands, the UK and the US. For these countries bilateral FDI positions (both inward and outward) that are consistently measured across time are available for a long period, including estimates for the year 2001.[8] We will refer to these six countries as the reporting countries, since the FDI positions are measured from their perspective. We look at the bilateral linkages of the six reporting countries among themselves and with six other countries (Australia, Belgium, Italy, Japan, Sweden and Switzerland). These latter six countries are selected because of their size and their importance as an importer and exporter of FDI. Taken together, our 12 countries represent 70% of the outstanding stock of FDI at the end of 2000. For each reporting country we thus distinguish bilateral links with 11 countries, which we will refer to as its partner countries.

The data on the FDI positions are available on an annual basis and reflect the state at the end of the year. We define the bilateral FDI position of country R versus country P as the sum of R's stock of direct investments in P and P's stock of direct investments in R, as reported by country R (in R's currency). We take the sum of both the inward and the outward position as our measure of the bilateral FDI link, as disturbances in country P may affect economic conditions in country R via both types of exposure. For instance, an unfavorable shock in country P may reduce the value of domestic firms' investment projects located in P, depressing their stock prices. This in turn may negatively affect domestic consumption and investment via wealth effects, confidence effects and balance sheet effects. Alternatively, companies in P may react to the worsening situation in their home country by reducing their presence abroad, cutting back employment and/or reducing investment at their affiliates in country R and other countries.

In the absence of a well-established definition of international output comovement, we distinguish five measures of the degree of output comovement. The first measure is the correlation of the quarterly

[8] Data on bilateral FDI positions for the US, Germany and Canada are available for the years 1982–2001, for France for 1988-2001, for the Netherlands for 1984–2001, and for 1984 and 1987–2001 for the UK. Missing observations have been estimated on the basis of bilateral FDI flows. Sources are OECD (2002a), Banque de France (2002), Deutsche Bundesbank (2003), Statistics Canada (2002), Sparling (2002), Borga and Yorgason (2002) and Borga and Mataloni (2001). Recent data are also available on the websites of Statistics Canada, the Deutsche Bundesbank, the Banque de France, De Nederlandsche Bank, the UK Office of National Statistics and the US Department of Commerce.

growth rates of real GDP. The second measure is the correlation of the quarterly output gaps, the log difference between actual real GDP and its trend level (estimated by the Hodrick-Prescott filter).[9] The third measure is the business cycle coherence on a quarterly basis, which is based on a business cycle dating by the IMF (IMF 2002).[10] It equals the fraction of time that two countries are in the same business cycle phase (expansion or recession). The fourth and fifth comovement measures are the correlation of the annual growth rates of real GDP and the correlation of the annual output gaps respectively. The correlations derived from annual data may also pick up spillover effects that occur with a delay of one or more quarters.

Figure 1 offers an impression of the average degree of business cycle comovement among the G7 countries (the United States, Japan, the United Kingdom, Germany, France, Italy and Canada) in the years 1980–2001, based on our first two measures. The graph first of all shows that the degree of output comovement has been high by historical standards in recent years. Moreover, its behavior over time differs from period to period. In the 1980s the average correlation of real GDP growth rates was fairly constant, in the first half of the 1990s it substantially declined, while in recent years it sharply increased. This non-monotonic time profile underscores the importance of time-variation in the mixture of common and idiosyncratic shocks. Given that the time profile of FDI linkages (and other measures of interdependence) is strictly increasing, Figure 1 makes clear that any link between FDI and business cycle comovement must be hidden in the cross-section of countries.[11]

Our estimation method has to take into account that time variation in the mix and size of disturbances may obscure the relationship between FDI positions and output correlations. For this reason, cross-section regressions for each reporting country are the natural estimation design. Due to the limited number of observations (11) per country, we have pooled the cross-section regressions for the six reporting countries into a single one.[12] To find out whether more intensive FDI linkages are associated with a greater degree of output comovement, we estimate the following regression equation

$$\rho(i, j) = \alpha_0 + \alpha_1 D_1 + \alpha_2 D_2 + \alpha_3 D_3 + \alpha_4 D_4 + \alpha_5 D_5 + \beta FDIP(i, j) \qquad (1)$$

[9] As a check on robustness, we also did the estimations for output gap correlations based on a trend level estimated by the Christiano-Fitzgerald filter. These results, which are very similar to those reported for the HP-filtered data, are available from the authors upon request. Source of the data was the *Quarterly National Accounts*, published by the OECD.

[10] The IMF (2002) dated business cycle peaks and troughs for the level of real GDP on the basis of the Bry-Boschan algorithm for 21 industrial countries using quarterly data for the years 1973–2000. We use this dating of (level) recessions and expansions to calculate the coherence for each pair of countries, which is defined as the fraction of time the two countries are in a recession or an expansion simultaneously.

[11] Recent empirical evidence on increasing business cycle comovement is provided by Artis and Zhang (1999), Luginbuhl and Koopman (2003), Lumsdaine and Prasad (2003) and Carvalho and Harvey (2003), among others.

[12] We have also estimated separate cross-section regressions for each reporting country. These results are available from the authors upon request.

where D_i indicate country-specific dummies, which are one if the observation refers to reporting country *i*, and zero otherwise. $\rho(i,j)$ denotes the measure of business cycle comovement between reporting country *i* and partner country *j* (11 countries) over a certain time-span, while *FDIP*(*i*,*j*) is the average strength of the corresponding FDI link. Eq. (1) assumes that the intercept differs across countries, but that β is the same for each country. Differences in intercepts take into account fixed differences across countries and may also correct for methodological differences between national FDI statistics. The parameter β measures the sensitivity of output comovement to variations in the intensity of FDI relations. We conduct diagnostic tests whether the data support the implied restriction that all countries have the same β.

If the sample period for which we compute output comovement measures and FDI exposures happens to be characterized by a preponderance of common shocks, all $\rho(i,j)$ will tend to be large, which will translate into high estimates of the intercepts $\alpha_0+\alpha_i$ in eq. (1). By contrast, if the sample period is dominated by idiosyncratic shocks, all $\rho(i,j)$ will tend to be small, resulting in low estimates of $\alpha_0+\alpha_i$. However, conditional on the mixture of shocks, differences in $\rho(i,j)$ for a given country *i* vis-à-vis its partners could still be explained by differences in the intensity of the bilateral economic relations. The coefficient β can thus be interpreted as the effect of a unit increase in FDI exposure given the mixture and size of shocks in the years over which output comovement and FDI positions have been measured.

The average vulnerability through bilateral FDI linkages – denoted by *FDIP*(*i*,*j*) – over a certain time-span is calculated as follows. Since both inward and outward FDI make a country more sensitive to outside developments, we first compute, for each year, the total FDI position (both inward and outward) of country *i* vis-à-vis country *j*, as recorded by country *i* (in the currency of country *i*). To calculate the vulnerability of reporting country *i* and partner country *j* that is associated with this amount, we express it as a percentage of GDP of country *i* and *j*, respectively. Since a correlation is a symmetric concept, we take the simple average of both vulnerability measures as our annual observation of the exposure associated with the bilateral FDI link.[13] *FDIP*(*i*,*j*) is the average of the annual observations over the time-span under consideration.

[13] Note that the same dollar amount may imply vastly different vulnerabilities because GDPs differ greatly across countries. For example, the Dutch FDI position versus the US at the end of 2000 amounted to 35% of Dutch GDP or 1.6% of US GDP. We use purchasing power parity exchange rates to convert partner country GDPs into reporting country currencies. Assigning the two individual vulnerability measures the same weight in the calculation of *FDIP* is supported by the data. When we included both measures in eq. (1) as separate explanatory variables, the hypothesis of equal slope coefficients could not be rejected at the usual significance levels. Note that the use of the bilateral position implicitly assumes that indirect exposures via third countries are relatively unimportant.

Simple pooling of six cross-section regressions into a single one renders 66 observations, which implies some sort of double counting of the observations relating to the links among the six reporting countries. Although there are 66 independent observations on FDI exposures, there are only 51 unique observations on the correlations. Observations relating to links among the six reporting countries thus get double weight in the sum of squares, once with $FDIP(i,j)$ according to country i's statistics and once with $FDIP(i,j)$ according to country j's statistics. Note that estimation of six separate cross-section equations would implicitly involve the same double counting. For this reason we always report two sets of estimation results: the first one is based on OLS (66 observations), the second one on weighted least squares (WLS). Observations relating to links among the six reporting countries are assigned a weight of ½, all other observations a weight of 1, so that all observations on $\rho(i,j)$ receive equal weight in the sum of squares. The effective number of observations in case of estimation by WLS is 51.[14]

Table 3 reports the empirical results for the complete sample period 1982–2001 and three subperiods, 1982–1989, 1990–1994 and 1995–2001. This particular split-up of the sample is based on the work by Helbling and Bayoumi (2003), who studied business cycles in the period 1973–2002 for the G7 countries. They found that the years 1990–1994 were characterized by an atypical pattern of business cycle linkages, probably because of the aftermath of German reunification and the collapse of the Japanese asset market bubble. Moreover, FDI grew very rapidly in the period 1995–2001.

The empirical results provide supportive evidence for a link between bilateral FDI patterns and output comovement patterns. Contemporaneous correlations of quarterly growth rates are significantly higher for economies that have intensive investment relations than for countries that have less intensive investment relations. Moreover, the positive association of FDI and output comovement is more apparent in the most recent years, as evidenced by the larger point estimate and t-statistic of the slope coefficient β for the subperiod 1995–2001 (5.36 for OLS; 6.30 for WLS), compared to that for the complete sample (2.83 for OLS; 4.01 for WLS). The estimate of β indicates that a difference in FDI exposure of 1 percentage point is associated with an 0.02 percentage point higher output correlation in recent years.

Panel 4b shows that there is also a statistically significant positive association between the intensity of FDI relations and the correlation of output gaps for all subperiods considered. This holds for both the

[14] *FDIP* may possibly be endogenous. For example, FDI location decisions may partly be driven by the desire to insure against national business cycle risks. This argument implies a negative association between output correlations and FDI intensity. Our working hypothesis is that the association is positive, however. To the extent risk diversification motives play a part, some downward bias may be introduced, which will tend to make it more difficult to obtain a positive estimate that is statistically significant. Consequently, significant positive estimates cannot be attributed to this kind of endogeneity bias.

OLS and the WLS estimates. However, the relationship does not appear to have gained in strength in recent years. Measuring output comovement by business cycle coherence, we find a positive and significant β-estimate for the complete sample (1982–2001), but for the eighties there seems to be no connection between FDI relations and output comovement (panel 4c). Finally, the results for correlations derived from annual data also point to a positive association of FDI exposures and business cycle linkages (panels 4d and 4e). Lastly, parameter tests show that the pooled regression design is appropriate, as (with one exception) the hypothesis of equal slope coefficients across reporting countries cannot be rejected at conventional significance levels, while the hypothesis of equal intercepts is rejected in a number of cases.[15]

5. The role of international trade

The evidence presented thus far only focuses on FDI links between countries. Economies are also linked by international trade ties, however, which is an alternative explanation of international business cycle comovement. Moreover, it is likely that countries that invest a lot in each other will also tend to trade a lot with each other. The countries of the European Union, or the US and Canada, are a case in point. Investment ties and trade ties may also vastly differ, however. For example, the share of the US in the foreign trade of the Netherlands is only 4%, whereas its share in Dutch FDI capital is more than 20%. The fact that geographical distributions of FDI exposures and foreign trade relations are correlated, implies that the estimates in Table 4 may partly reflect the effects of trade relations (or economic relations in general). To shed light on this issue, this section examines the role of bilateral trade ties in explaining output comovement patterns.

We first look into the relationship between international trade and output comovement along the same lines as the analysis for FDI. To this end we estimate eq. (2), which is similar to eq. (1),

$$\rho(i, j) = \alpha_0 + \alpha_1 D_1 + \alpha_2 D_2 + \alpha_3 D_3 + \alpha_4 D_4 + \alpha_5 D_5 + \gamma TRADE(i, j) \qquad (2)$$

TRADE(*i*,*j*) measures the average vulnerability associated with the bilateral trade link between reporting country *i* and partner country *j* over a certain time-span. As in the case of the *FDIP* variable, the source of the data is country *i*'s statistics. The basic data are the (annual) exports and imports of country *i* relating to country *j*, as recorded by country *i* (in the currency of country *i*). We assume that only exports are a source of vulnerability. Recording country *i*'s vulnerability is therefore calculated as

[15] There is also some evidence that the FDI-output comovement relationship may be nonlinear. Regression equations that feature the square root of *FDIP* generally perform somewhat better than specifications in which *FDIP* enters linearly, especially for the more recent periods which are characterized by higher FDI exposures. Results are available upon request.

its exports to partner country *j*, expressed as a percentage of country *i*'s GDP. Reporting country *j*'s vulnerability is calculated as country *i*'s imports from *j*, expressed as a percentage of country *j*'s GDP. We take the simple average of these two as our annual observation of the exposure associated with bilateral trade link.[16] Finally, $TRADE(i,j)$ is the average of the annual observations over the time-span under consideration.

Table 4 presents the results. We find that, in general, the estimates of γ are statistically significant from zero for all measures of output comovement and both estimation methods. Hence, more intensive foreign trade relations go hand in hand with more synchronized business cycles.[17] Judged by both the estimates and the *t*-statistics, international trade linkages had their weakest effects in the 1980s. During the years 1990–1994 – when Germany ran current account deficits in the aftermath of reunification and Japan adjusted to collapse of the stock market and real estate bubbles – trade linkages are strongly linked to the correlation pattern of GDP growth rates. For the most recent subperiod 1995–2001 the influence of trade ties, although significant in most cases, is more muted compared to that measured over the whole sample period, especially for correlations based on annual data. Like for FDI, the results are weakest for the coherence measure.

The results in Tables 3 and 4 suggest that FDI relations as well as trade relations are important determinants of the degree of business cycle comovement. So the next natural step in the analysis is to incude both linkages into the regression equation,

$$\rho(i,j) = \alpha_0 + \alpha_1 D_1 + \alpha_2 D_2 + \alpha_3 D_3 + \alpha_4 D_4 + \alpha_5 D_5 + \beta FDIP(i,j) + \gamma TRADE(i,j) \tag{3}$$

If multicollinearity is a problem the estimates of both β and γ will be insignificant. In this case we can conclude that economic relationships do matter for business cycle comovement, but we cannot statistically distinguish between the contribution of international trade and that of FDI.

Table 5 presents the results of eq. (3). For the years 1982–2001 the OLS-results indicate that bilateral trade ties are mostly significant while bilateral FDI ties are not, although the *t*-statistic is always greater than one. However, this finding is not robust with respect to the estimation method. In particular, correlations of real GDP growth rates are found to be closer related to FDI relations than

[16] Due to data limitations, data refer to exports and imports of goods only. We use purchasing power parity exchange rates to convert partner country GDPs into reporting country currencies. Assigning both trade measures the same weight is supported by the data. When we included both measures in eq. (2) as separate explanatory variables, the hypothesis of equal slope coefficients could not be rejected at the usual significance levels.

[17] A similar result was reported by Frankel and Rose (1998) and De Haan, Inklaar and Sleijpen (2002).

trade relations. In addition, for three of the four other comovement measures the coefficient estimates for both linkages are not significantly differently from zero, while their *t*-statistics are similar in magnitude. This is an indication that multicollinearity between trade and FDI relationships is significantly affecting the estimation problem. Consequently, there is strong and robust evidence for a link between bilateral economic relationships and bilateral business cycle correlations. However, it is difficult to disentangle the effects of FDI relations and those of foreign trade relations.

The results for the various subperiods suggest, however, that a remarkable change has occurred over the past 20 years. According to both estimation methods, bilateral FDI relations are far more closely linked to bilateral output comovement patterns than trade relations in the most recent period 1995–2001. This holds in particular for correlations of real GDP growth rates, but the same pattern emerges for the output gap and the other comovement measures. The finding that trade relations have become less important could partly be explained by the fact that horizontal FDI is a substitute for international trade. By contrast, the years 1990–1994 appear to have been characterized by a more dominant influence of foreign trade relations. For the early years of the sample (1982–89) the picture is mixed. In most cases the estimates of both β and γ are insignificant, implying that it is difficult to disentangle the roles of trade and FDI as transmission channels of disturbances. For the output gap correlations we find a significant effect of FDI relations, but not of trade relations when estimating by OLS. We get a similar pattern using WLS for correlations of real GDP growth rates.

6. Lagged spillovers

The discussion so far has concentrated on cross-country variations in contemporaneous correlations. This offers an incomplete picture as international spillovers may occur with some lags as well. For this reason, we next analyze the link between FDI exposures and the extent to which economies are affected with a lag by developments in other countries. Our measure of the lagged spillover is based on the concept of Granger causality. For each country pair (*i*,*j*) – 66 in total – we first estimate the following regression equation for various time-spans

$$y(i,t) = \alpha + \sum_{l=1}^{m} \gamma_l y(i,t-l) + \sum_{l=1}^{m} \lambda_l y(j,t-l) \qquad (4)$$

where *y* denotes the quarterly growth rate of real GDP or the output gap, and *m* stands for the maximum lag with which *y*(*j*) affects *y*(*i*).[18] Granger causality from *y*(*j*) to *y*(*i*) obtains if some of the λ_l's are nonzero. In that case, conditions in partner country *j* influence those in reporting country *i* with

[18] Note that there is no double-counting issue in the case of lagged spillovers.

a lag. We take the sum of the coefficients λ_l as our measure of the lagged spillover from country *j* to country *i*. Preliminary tests indicate that the maximum lag length *m* in eq. (4) for most country pairs equals 1 for output growth rates and equals 2 for output gaps. We therefore restrict our analysis to lagged spillover measures derived from eq. (4) with *m* set to either 1 or 2. The left-hand side variable is now the lagged spillover measure. As the focus is now on the vulnerability to lagged spillovers from partner countries, the bilateral FDI position is expressed as a percentage of reporting country GDP.

Tables 6 reports the estimation results of suitably modified versions of eqs. (1)–(2). We find that a country's vulnerability to past disturbances in partner economies is positively related to the size of its bilateral FDI exposure. This holds for both the full sample period and the period 1995–2001. The relevance of FDI linkages for the cross-country pattern of lagged output spillovers is more apparent for the output gap, as indicated by the generally larger *t*-statistics. Once again, the period of German reunification emerges as an atypical episode. For foreign trade relations we mostly find weaker effects than for FDI linkages, notably in the case of lagged spillovers of real GDP growth rates. This contrasts with our findings about contemporaneous comovement patterns, where FDI linkages mattered most in the most recent period only.

Table 7 presents the empirical results for the case in which both FDI and trade relations enter the regression equation. These findings show that FDI patterns dominate the explanation of cross-country lagged spillover patterns, both for the complete sample and all subperiods. In all cases, the estimated coefficient of the bilateral trade position is insignificant and often wrongly signed. This particular result suggests that the FDI channel of transmission may be working for a longer time than the international trade channel. In case of a shock in a certain country, the trade channel quickly transmits the shock to the other economies, but then shuts down. The presence of an FDI channel implies that this shock may affect the other economies not only contemporaneously, but also in the next two quarters.

7. Summary and conclusions

This paper examines to what extent the rapid expansion of foreign direct investment (FDI) and the internationalization of production can be related to the phenomenon of more synchronized business cycles. Both larger inward and outward investment positions may make the domestic economy more susceptible to economic disturbances abroad.

We focus on the relationship between bilateral FDI positions and cross-country business cycle patterns. Do countries that have comparatively intensive FDI ties also exhibit a relatively large degree of business cycle comovement? We analyze the experience in the years 1982–2001 of Canada, France,

Germany, the Netherlands, the UK and the US, looking at the bilateral linkages of these six countries among themselves and with six other countries (Australia, Belgium, Italy, Japan, Sweden and Switzerland), employing five measures of international output comovement. In addition, we investigate the ability of international trade patterns to explain business cycle linkages.

Taking into account both FDI relations and foreign trade relations, we conclude that before 1995 there is no strong evidence in favor of an independent role of FDI in explaining cross-country business cycle patterns. Although the degree of output comovement tends to be higher for economies that have relatively intensive investment relations, we find the same to be true for international trade relations. We thus find strong and robust evidence for a link between bilateral economic relationships and bilateral business cycle correlations, but multicollinearity problems prevent a precise assessment of the respective contributions of trade and FDI. Trade patterns tend to explain the pattern of output comovement better than FDI linkages in the years immediately following German reunification and the collapse of the Japanese asset market bubble (1990–1994). The strong growth of FDI since 1995 appears to have changed this picture. FDI linkages are much better able to explain the pattern of international business cycle linkages than foreign trade relations in the years 1995–2001. Regarding the vulnerability to foreign output spillovers that occur with a lag, we find that FDI exposures are relevant, but international trade relations are not. In contrast to the case of contemporaneous linkages, this result is also obtained for the complete sample, not just the most recent period.

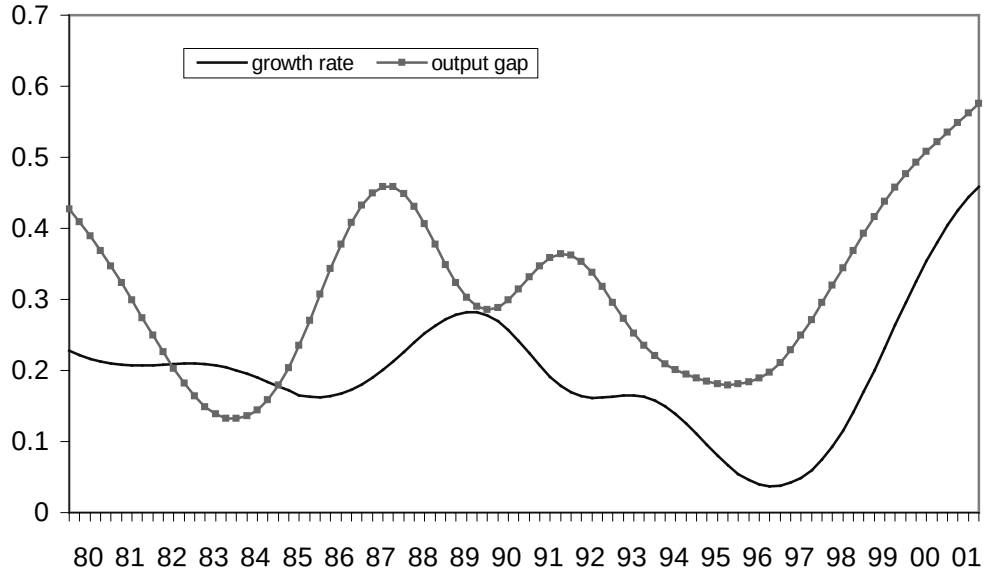
The empirical results of this paper are supportive evidence for the view that apart from the foreign trade channel, FDI now constitutes a separate channel through which economies may affect each other in an economically significant fashion. Moreover, foreign disturbances may influence the domestic economy for a longer time-span when relayed through the FDI channel than through the trade channel, which mainly operates contemporaneously.

Our research has two policy implications. The first one is that the trend towards greater economic interdependence through FDI implies an underlying tendency for business cycles to display a more synchronized behavior than in the past. This is not to say that we will actually observe greater output comovement in the future all the time, however. As the experience of the 1990s teaches, the effects of large asymmetric shocks may overshadow the upward influence on account of increasing interdependence.

The second lesson for policy makers is that FDI appears to have become an important channel for the international transmission of disturbances. This aspect of global linkages should be incorporated into the macroeconomic models that are used for making forecasts, evaluating scenarios and conducting policy analyses by national policy makers and international organizations, such as the IMF and the

OECD. Up until now, international trade and financial asset prices serve as the main linkages among individual economies in these models. Finding out how the FDI channel exactly operates constitutes an interesting research agenda. In related research, we present evidence for several countries that domestic labor market conditions (wages and/or employment) are partly determined by the profitability of firms abroad (Jansen and Stokman 2003). International rent sharing may thus be an important aspect of global economic linkages at the macro-level. Adding a variable measuring foreign profitability to the specification of wage or employment equations could be a useful first step towards the incorporation of the FDI channel into (large-scale) econometric models.

Figure 1. Average output comovement among G7 countries



Unweighted average of the bilateral correlations of quarterly real GDP growth rates and output gaps respectively, for all possible pairs among the United States, Japan, Germany, France, the United Kingdom, Italy and Canada. Before averaging across the 21 country pairs, correlations were smoothed using a symmetric rolling 40-quarter window, using a Gaussian kernel.

Table 1. Bilateral FDI positions, 1985 and 2000

	1985						2000					
	Canada	France	Germany	N'lands	UK	US	Canada	France	Germany	N'lands	UK	US
						Inward foreign direct investment position (% of total)						
Australia	0.1	0.0	0.1	0.0	4.7	1.8	0.5	0.0	0.0	0.2	3.4	1.7
Belgium	0.4	9.5	2.2	5.4	1.7	1.4	1.2	15.5	33.1	18.7	1.4	5.6
Canada		0.5	0.9	0.2	2.9	9.3		0.5	0.3	0.2	3.2	9.4
France	1.7		6.1	4.4	4.4	3.6	9.9		7.2	5.2	16.7	10.8
Germany	2.9	13.5		7.7	2.4	8.0	2.4	11.4		13.8	8.9	10.3
Italy	0.0	4.3	1.4	0.1	0.5	0.7	0.3	4.0	1.2	0.4	0.8	0.5
Japan	2.5	0.5	5.8	2.6	2.2	10.5	2.6	1.9	1.8	3.5	3.6	13.5
Netherlands	2.2	17.1	12.7		18.0	20.1	4.7	19.2	19.7		14.1	12.1
Sweden	0.4	1.0	2.1	2.1	1.5	1.3	0.8	2.3	1.7	2.5	1.3	1.8
Switzerland	1.7	10.3	14.0	11.2	6.3	5.7	2.0	7.9	4.9	4.8	3.1	5.7
UK	9.6	13.7	8.9	14.1		23.6	7.3	13.7	7.1	15.7		17.6
US	75.1	23.1	37.6	34.3	51.2		63.2	15.0	17.5	21.6	34.4	
Total (% of GDP)	18.6	5.6	4.6	15.1	12.1	4.4	28.4	19.5	23.8	64.6	30.9	12.4
						Outward foreign direct investment position (% of total)						
Australia	2.1	0.5	1.3	0.7	9.6	3.8	1.3	0.6	0.6	0.8	1.3	2.7
Belgium	0.2	11.9	9.2	7.0	1.7	2.5	1.0	13.8	7.7	12.1	9.9	3.5
Canada		2.0	3.8	3.3	6.8	20.4		7.0	1.1	1.8	1.7	10.0
France	0.3		8.3	5.6	2.9	3.3	1.3		5.0	6.1	3.6	3.0
Germany	1.1	8.9		9.3	4.2	7.3	1.1	5.6		10.5	3.9	3.9
Italy	0.3	4.2	3.8	1.4	0.9	2.6	0.9	3.2	3.4	1.8	0.6	1.7
Japan	0.5	0.9	1.5	1.0	1.0	4.0	1.6	1.7	1.7	0.4	0.8	4.6
Netherlands	0.9	7.0	6.1		5.2	3.1	2.3	9.0	13.2		30.4	9.1
Sweden	0.0	0.1	0.5	0.3	0.6	0.4	0.3	0.6	1.4	0.8	3.2	1.8
Switzerland	1.0	16.3	7.4	5.6	1.3	6.8	1.5	4.0	3.1	4.9	1.1	4.3
UK	7.7	6.5	4.9	5.8		14.3	10.4	12.7	10.4	10.7		18.7
US	69.2	24.2	29.7	41.3	35.2		48.3	25.4	28.0	25.7	23.5	
Total (% of GDP)	11.8	4.6	6.6	29.6	21.7	5.5	32.0	32.8	24.9	79.8	63.3	13.2
Correlation in-out	1.00	0.82	0.91	0.94	0.94	0.47	0.98	0.71	0.57	0.91	0.68	0.75
same, excl US	0.90	0.69	0.44	0.67	0.32		0.51	0.78	0.68	0.95	0.52	

Sources: OECD (2002), Deutsche Bundesbank (2002), Statistics Canada (2002), Sparling (2002), Banque de France (2002), UK National Statistics (2002), Borga and Yorgason (2002) and Borga and Mataloni (2001).

Table 2. The role of foreign affiliates in host economies

	share in host country GDP of US affliates (%)		estimated share in host country GDP of all foreign affiliates (%)		share in host country man. employment of all for. affiliates (%)	p.m. US share in host country inward FDI stock (%)	
	1989	1999	1989	1999	1998	1989	1999
Australia	4.9	4.7	18.7	10.8		26.3	43.6
Belgium	5.6	5.1					
Canada	9.5	10.0	14.5	14.4		65.6	69.5
France	2.3	2.6	12.0	15.0	27.8	19.1	17.3
Germany	3.0	2.9	9.3	12.0	7.2	32.4	24.2
Ireland	12.4	16.8			36.8		
Italy	1.9	2.0	12.7	15.0	14.0	15.0	13.3
Japan	0.5	0.7	1.0	1.7	1.8	50.5	40.5
Netherlands	5.8	4.5	21.4	17.7	21.9	27.1	25.4
Sweden	1.2	2.6	12.2	19.6	26.8	9.9	13.2
Switzerland	2.9	3.3	12.3	10.3		23.6	32.0
UK	6.2	7.0	14.7	14.9	27.3	42.1	47.0
US			4.1	5.6	13.4		

Sources: columns 1 and 2: Borga and Yorgason (2002); US data: Zeile (2002); columns 3 and 4: own calculations; column 5: UNCTAD (2002) and OECD (2002); columns 6 and 7: UNCTAD (2002).

Table 3. Pooled cross-section regression of output comovement on FDI positions

	OLS-estimates				WLS-estimates			
	estimate beta	t(beta)	p-value test a(i)=a	p-value test b(i)=b	estimate beta	t(beta)	p-value test a(i)=a	p-value test b(i)=b
	(a) quarterly growth rate of real GDP				(a) quarterly growth rate of real GDP			
1982-2001	0.014	2.83	0.321	0.165	0.020	4.01	0.135	0.331
1982-1989	0.018	2.10	0.367	0.393	0.023	2.62	0.257	0.356
1990-1994	0.025	2.32	0.664	0.504	0.030	2.78	0.393	0.486
1995-2001	0.019	5.36	0.088	0.612	0.023	6.30	0.011	0.721
	(b) quarterly output gap (HP filter)				(b) quarterly output gap (HP filter)			
1982-2001	0.021	2.93	0.331	0.328	0.022	2.97	0.224	0.428
1982-1989	0.026	2.44	0.028	0.503	0.018	1.66	0.007	0.394
1990-1994	0.027	2.08	0.242	0.651	0.027	2.17	0.046	0.887
1995-2001	0.016	2.71	0.125	0.476	0.025	3.83	0.150	0.657
	(c) business cycle indicator (coherence)				(c) business cycle indicator (coherence)			
1982-2001	0.448	2.97	0.225	0.843	0.361	2.01	0.373	0.847
1982-1989	0.083	0.43	0.942	0.286	0.063	0.28	0.932	0.047
1990-1994	1.319	2.48	0.274	0.842	0.874	1.49	0.359	0.658
1995-2001	0.325	1.85	0.054	0.998	0.365	1.70	0.086	0.990
	(d) annual growth rate of real GDP				(d) annual growth rate of real GDP			
1982-2001	0.023	3.10	0.184	0.367	0.024	3.12	0.159	0.475
1982-1989	0.021	2.06	0.000	0.594	0.017	1.69	0.000	0.407
1990-1994	0.048	2.64	0.245	0.727	0.043	2.30	0.078	0.783
1995-2001	0.017	3.06	0.102	0.982	0.020	3.23	0.158	0.907
	(e) annual output gap (HP filter)				(e) annual output gap (HP filter)			
1982-2001	0.024	2.79	0.226	0.643	0.022	2.36	0.205	0.494
1982-1989	0.025	3.04	0.120	0.921	0.019	2.05	0.183	0.910
1990-1994	0.021	2.34	0.181	0.759	0.020	2.20	0.111	0.871
1995-2001	0.021	2.81	0.416	0.979	0.027	2.92	0.539	0.967

Table 4. Pooled cross-section regression of output comovement on foreign trade flows

	OLS-estimates				WLS-estimates			
	estimate beta	t(beta)	p-value test a(i)=a	p-value test b(i)=b	estimate beta	t(beta)	p-value test a(i)=a	p-value test b(i)=b
	(a) quarterly growth rate of real GDP				(a) quarterly growth rate of real GDP			
1982-2001	0.030	3.65	0.182	0.068	0.033	3.26	0.209	0.327
1982-1989	0.027	2.18	0.359	0.176	0.024	1.78	0.302	0.743
1990-1994	0.061	3.90	0.623	0.124	0.055	3.12	0.756	0.223
1995-2001	0.027	3.04	0.433	0.670	0.046	3.92	0.183	0.382
	(b) quarterly output gap (HP filter)				(b) quarterly output gap (HP filter)			
1982-2001	0.043	3.46	0.397	0.068	0.043	3.01	0.338	0.258
1982-1989	0.021	1.33	0.011	0.477	0.015	0.88	0.007	0.811
1990-1994	0.068	3.59	0.269	0.325	0.053	2.62	0.128	0.811
1995-2001	0.032	2.46	0.381	0.289	0.062	3.38	0.523	0.121
	(c) business cycle indicator (coherence)				(c) business cycle indicator (coherence)			
1982-2001	0.839	3.21	0.143	0.423	0.961	2.84	0.187	0.584
1982-1989	0.174	0.63	0.954	0.952	0.091	0.27	0.937	0.997
1990-1994	2.580	3.18	0.366	0.164	2.466	2.62	0.446	0.325
1995-2001	0.384	0.95	0.054	0.962	0.806	1.34	0.072	0.810
	(d) annual growth rate of real GDP				(d) annual growth rate of real GDP			
1982-2001	0.044	3.35	0.157	0.110	0.044	3.02	0.150	0.353
1982-1989	0.034	2.36	0.000	0.475	0.026	1.74	0.000	0.557
1990-1994	0.095	3.48	0.365	0.276	0.083	2.71	0.196	0.665
1995-2001	0.022	1.68	0.316	0.828	0.039	2.18	0.398	0.672
	(e) annual output gap (HP filter)				(e) annual output gap (HP filter)			
1982-2001	0.043	2.88	0.197	0.199	0.044	2.46	0.196	0.441
1982-1989	0.020	1.64	0.172	0.485	0.012	0.82	0.321	0.531
1990-1994	0.044	3.17	0.106	0.267	0.039	2.60	0.083	0.689
1995-2001	0.021	1.19	0.763	0.575	0.052	1.99	0.808	0.398

Table 5. Pooled cross-section regression of output comovement on FDI positions and foreign trade flows

	OLS-estimates				WLS-estimates			
	beta FDI	t(beta)	beta Trade	t(beta)	beta FDI	t(beta)	beta Trade	t(beta)
	(a) quarterly growth rate of real GDP				(a) quarterly growth rate of real GDP			
1982-2001	0.006	1.13	0.024	2.44	0.015	2.47	0.015	1.23
1982-1989	0.012	1.23	0.019	1.36	0.020	2.02	0.011	0.77
1990-1994	0.006	0.49	0.056	3.02	0.016	1.29	0.039	1.85
1995-2001	0.017	4.17	0.007	0.80	0.021	4.46	0.010	0.80
	(b) quarterly output gap (HP filter)				(b) quarterly output gap (HP filter)			
1982-2001	0.011	1.33	0.032	2.18	0.014	1.47	0.028	1.54
1982-1989	0.025	2.01	0.005	0.27	0.017	1.40	0.004	0.19
1990-1994	0.005	0.36	0.064	2.82	0.013	0.88	0.041	1.66
1995-2001	0.011	1.68	0.019	1.27	0.018	2.17	0.032	1.41
	(c) business cycle indicator (coherence)				(c) business cycle indicator (coherence)			
1982-2001	0.265	1.50	0.585	1.89	0.099	0.45	0.845	1.98
1982-1989	0.034	0.15	0.151	0.48	0.045	0.18	0.062	0.16
1990-1994	0.621	1.02	2.062	2.15	0.048	0.07	2.420	2.10
1995-2001	0.324	1.56	0.008	0.02	0.299	1.09	0.297	0.39
	(d) annual growth rate of real GDP				(d) annual growth rate of real GDP			
1982-2001	0.014	1.57	0.030	1.98	0.015	1.63	0.027	1.46
1982-1989	0.013	1.11	0.026	1.57	0.012	1.04	0.019	1.11
1990-1994	0.022	1.06	0.077	2.38	0.022	0.98	0.063	1.68
1995-2001	0.016	2.49	0.003	0.22	0.018	2.31	0.008	0.37
	(e) annual output gap (HP filter)				(e) annual output gap (HP filter)			
1982-2001	0.015	1.47	0.029	1.63	0.013	1.12	0.029	1.29
1982-1989	0.024	2.51	0.005	0.34	0.019	1.85	-0.001	-0.05
1990-1994	0.009	0.87	0.036	2.21	0.010	0.92	0.029	1.62
1995-2001	0.022	2.51	-0.004	-0.22	0.024	2.08	0.011	0.33

Table 6. Pooled cross-section regression of lagged output spillovers on FDI positions or foreign trade flows

	Foreign direct investment				Foreign trade			
	over 1 quarter		over 2 quarters		over 1 quarter		over 2 quarters	
	beta	t(beta)	beta	t(beta)	beta	t(beta)	beta	t(beta)
	(a) quarterly growth rate of real GDP							
1982-2001	0.0135	2.60	0.0171	3.02	0.0113	1.51	0.0159	1.93
1982-1989	0.0208	2.35	0.0306	3.10	0.0109	0.86	0.0255	1.78
1990-1994	0.0126	1.18	0.0102	0.64	0.0116	0.80	0.0083	0.38
1995-2001	0.0110	2.47	0.0130	2.08	0.0097	1.48	0.0087	0.94
	(b) output gap (HP filter)							
1982-2001	0.0144	4.58	0.0090	3.53	0.0171	3.71	0.0076	2.02
1982-1989	0.0212	3.16	0.0149	2.57	0.0210	2.18	0.0142	1.71
1990-1994	0.0132	1.76	0.0057	0.73	0.0070	0.68	-0.0056	-0.53
1995-2001	0.0115	3.14	0.0080	2.08	0.0131	2.42	0.0063	1.11

Table 7. Pooled cross-section regression of lagged output spillovers on FDI positions and foreign trade flows

	1 lag				2 lags			
	beta FDI	t(beta)	beta Trade	t(beta)	beta FDI	t(beta)	beta Trade	t(beta)
	(a) quarterly growth rate of real GDP							
1982-2001	0.015	2.07	-0.003	-0.26	0.017	2.24	-0.001	-0.05
1982-1989	0.026	2.28	-0.011	-0.70	0.031	2.45	-0.001	-0.05
1990-1994	0.012	0.86	0.000	0.01	0.011	0.51	-0.002	-0.06
1995-2001	0.012	1.94	-0.002	-0.21	0.017	1.93	-0.007	-0.61
	(b) output gap (HP filter)							
1982-2001	0.011	2.65	0.006	1.07	0.010	2.79	-0.002	-0.32
1982-1989	0.019	2.23	0.005	0.41	0.014	1.87	0.002	0.23
1990-1994	0.018	1.73	-0.009	-0.65	0.015	1.47	-0.019	-1.38
1995-2001	0.012	1.90	0.001	0.14	0.009	1.78	-0.003	-0.38

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