EAST-WEST CENTER WORKING PAPERS

WORKING PAPERS

EAST-WEST CENTER

The U.S. Congress established the East-West Center in 1960 to foster mutual understanding and cooperation among the governments and peoples of the Asia Pacific region including the United States. Funding for the Center comes from the U.S. government with additional support provided by private agencies, individuals, corporations, and Asian and Pacific governments.

East-West Center Working Papers are circulated for comment and to inform interested colleagues about work in progress at the Center.

For more information about the Center or to order publications, contact:

Publication Sales Office
East-West Center
1601 East-West Road
Honolulu, Hawaii 96848-1601

Telephone: 808-944-7145
Facsimile: 808-944-7376
Email: ewcbooks@EastWestCenter.org
Website: www.EastWestCenter.org

EAST-WEST CENTER WORKING PAPERS

Economics Series

No. 76, April 2005

FDI and Trade – Two Way Linkages?

Ilan Noy and Joshua Aizenman

Ilan Noy is an Assistant Professor of Economics at the University of Hawaii at Manoa and was a Visiting Fellow at the East-West Center. He has a Ph.D. from the University of California, Santa Cruz.

Joshua Aizenman is a Professor of Economics at the University of California in Santa Cruz and held faculty positions at the University of Pennsylvania, University of Chicago (GSB), and Dartmouth College. Professor Aizenman is also a Research Associate for the National Bureau of Economic Research and consulted the International Monetary Fund, the World Bank, the Inter-American Development Bank, and the Federal Reserve Bank of San Francisco. He has a Ph.D. from the University of Chicago.

February 2005
Preliminary version, comments are welcome

FDI and Trade – Two Way Linkages?

Abstract

The purpose of this paper is to investigate the intertemporal linkages between FDI and disaggregated measures of international trade. We outline a model exemplifying some of these linkages, describe several methods for investigating two-way feedbacks between various categories of trade, and apply them to the recent experience of developing countries. After controlling for other macroeconomic and institutional effects, we find that the strongest feedback between the sub-accounts is between FDI and manufacturing trade. More precisely, applying Geweke (1982)'s decomposition method, we find that most of the linear feedback between trade and FDI (81%) can be accounted for by Granger-causality from FDI gross flows to trade openness (50%) and from trade to FDI (31%). The rest of the total linear feedback is attributable to simultaneous correlation between the two annual series.

Joshua Aizenman
Economics Department and the NBER
E2 building, 1156 High St.
University of California, Santa Cruz
Santa Cruz, CA 95064
jaizen@ucsc.edu

Ilan Noy
Economics Department
Saunders 542, 2424 Maile Way
University of Hawaii, Manoa
Honolulu, HI 96822
noy@hawaii.edu

JEL Classification: F15, F21, F36, H21
Keywords: financial openness, commercial openness, trade, foreign direct investment.

1. Introduction

A growing literature has recognized the existence of two-way feedbacks between financial flows and trade for developing countries. Yet, it is clear that aggregate measures of both financial flows and trade openness mask important differences between the various components of both measures. It is reasonable to expect that the linkages between FDI and trade in goods will be strong (and possibly bi-directional), but it is less evident whether the impact of trade on FDI should be different for countries in different stages of development or whether inflows and outflows of FDI react differently with different types of goods trade flows. This paper aims to provide preliminary answers to such questions with the help of both theoretical modeling and an empirical estimation of these relationships.

We investigate linkages between finance and trade with more disaggregated measures of both. Such dis-aggregation allows us to identify the salient features of the feedback effects. We describe several methods for investigating two ways feedbacks between various categories of trade, and apply them to the recent experience of developing countries. We find that the strongest feedback between the sub-accounts is between FDI and manufacturing trade. Specifically, applying Geweke (1982)'s decomposition method, we find that most of the linear feedback between trade and FDI (81%) can be accounted for by Granger-causality from FDI gross flows to trade openness (50%) and from trade to FDI (31%). The rest of the total linear feedback is attributable to simultaneous correlation between the two annual series. Similar results are obtained when we instead investigate causality between trade openness and net FDI flows or net inflows.

We also consider other linkages between the sub-accounts of the current and the financial accounts and generally find them significantly less important.

In Section 2 we discuss the theoretical literature and present a model on the possible links between FDI and trade. In section 3 we discuss the state of the empirical literature on the subject while section 4 presents our findings for disaggregated measures of FDI and trade flows. Section 5 focuses on the question of causality and section 6 concludes the paper with further interpretive remarks and by outlining several avenues for future research.

2. The Theory

One of the more robust links between finance and trade in developing countries is through vertical FDI. We should expect two ways feedbacks between trade and FDI, possibly because both would increase due to similar reasons, like higher factor productivity, better institutions, growing markets, etc.[1]

Below we describe a model of production by multinationals that fragment their production optimally, and benefit from the cost advantage associated with locating labor-intensive production stages in labor abundant countries. A by-product of this fragmentation is the growth of a two-way trade: higher imports of primary and intermediate products, followed by higher exports of the improved/final products. Multinationals will opt to locate the production in the developing countries that offer the highest productivity/wage ratio. A developing country experiencing rapid improvement in its productivity, due to accumulation of human capital, learning by doing, or better

institution will attract growing inflows of vertical FDI, increasing thereby its international trade. In circumstances where the multinational employs skilled workers in the developing country, the greater volume of trade that comes with the vertical FDI opt to increase the demand for skilled workers, increasing thereby the return to human capital in the developing country. This in turn will increase overtime the supply of skilled workers, potentially increasing future FDI.

We consider a global economy composed of 2 blocks of countries, H and F, each consuming two types final goods -- a homogeneous one, Z, and n heterogeneous goods, denoted by $Y_{t,i}$, i = 1, …, n. The F block is composed of developing countries, differing in labor productivity. Asterisks signify F variables. The utility of the H consumers at time t is a semi-additive function of the two goods

$$(1) \qquad u_t = Z_t + \frac{A}{\delta}\sum_{i=1}^{n} \left[Y_{t,i}\right]^{\delta}, \qquad 0 < \delta < 1.$$

The intertemporal utility is the conventional net present value of the temporal utilities, discounted by applying the subjective rate of time preferences. Similar preferences characterize consumers in country F. The supply of labor in each block is inelastic and Good Z is produced using a simple Ricardian technology. In H, this technology is

$$(2) \qquad Z = L_z.$$

We normalize the price of good Z to one, so the real wage is one in the competitive equilibrium.

For concreteness, we focus on one of a developing country, where the technology in the homogenous sector is:

---

[1] Gordon et. al. (2001) shows that vertical FDI from the OECD to developing countries has increased substantially in the last twenty years. This increase has been paralleled with a corresponding

(3) $$Z^* = a^* L_z^*,$$

where the parameter a^* is the productivity of foreign labor and the real wage is $w^* = a^*$. The homogenous good, Z, is a composite good, characterized by stable and mature technology, with limited prospects for future productivity improvements. In contrast, Y goods are relatively high tech goods, the outcome of multinationals' R&D. Unlike good Z, producing intermediate Y inputs in country F is likely to increase F's productivity overtime. Due to the reasons elaborated in the literature dealing with vertical FDI, multinationals producing Y goods frequently fragment vertically their production line [see Feenstra (2003) for a useful overview]. Specifically, we assume that goods Y are produced in a vertical mode, where production is fragmented geographically. The final production stage is done at H, using intermediate inputs produced in F at an earlier stage, in the developing county that offers the most cost effective production line. The intermediate input, M_i, can be produced in the foreign country at time t using a Cobb-Douglas production technology

(4) $$M_{t,i} = \sqrt{b_{t,i}^* L_{t,i}^*}$$

where $L_{t,i}^*$ is the labor employed, $b_{t,i}^*$ is labor productivity in the foreign intermediate-goods sector. The final production stage combines the intermediate input $M_{t,i}$ and the H value added using a Leontief technology to supply the final output, $Y_{t,i}^s$:[2]

(5) $$Y_{t,i}^s = Min\left[M_{t,i};\ \sqrt{b_i L_{t,i}}\right]$$

---

increase in trade flows.

[2] The analysis can be extended to a general CES function. Of course, the Leontief technology simplifies the math. It may be also a reasonable assumption in manufacturing industries where, by design, there are fixed proportions [like auto body produced in Mexico, engine in the US, etc.].

The fragmented production process requires the multinational to invest in two plants, resulting in a periodic set-up cost of C_i at each country. This cost may be viewed as the periodic investment needed to sustain the production capacity. We assume that goods Y_i are ordered so that a higher index i is associated with a higher periodic set-up cost. We consider the case where, due to learning by doing and accumulation of human capital, the developing country's labor employed in activities Y_i becomes more productive -- $b^*_{t,i} < b^*_{t+1,i}$. To simplify, we take first the productivity improvement as an exogenous process. Each period, the multinational allocates the production of the intermediate output $M_{t,i}$ to the developing country that is the most cost effective. To simplify notation, we henceforth suppress the time subscript.

Applying (1), the demand for good Y in each country is

$$Y_i^d = (A / P_{y,i})^{\eta}; \quad \eta = \frac{1}{1-\delta} > 1. \tag{6}$$

The total demand facing the multinational is qY_i^d, where q stands for a scale measure of the number of countries composing the global economy.

Assuming that good i is produced, it follows from (4) and (5) that employment levels in the final and the intermediate production stages of good i are:

$$L_{Y,i} = \frac{(Y_i^s)^2}{b_i}; \quad L_i^* = \frac{(Y_i^s)^2}{b_i^*} \ . \tag{7}$$

The monopoly profits are

$$\Pi_i = qY_i^d P_{y,i} - L_{y,i} - w^* L_i^* - 2C_i. \tag{8}$$

Substituting (6)-(7) into (8), we find that

$$(9) \qquad \Pi_i = \overline{A}(Y_i^s)^{\delta} - \frac{(Y_i^s)^2}{b_i} - w^* \frac{(Y_i^s)^2}{b_i^*} - 2C_i \quad \text{where} \quad \overline{A} = A(q)^{1/\eta}$$

The first-order condition characterizing optimal output $\left(\widetilde{Y}\right)$ and the resulting profits are

$$(10) \qquad \widetilde{Y}_i = \left[\frac{0.5\overline{A}\,\delta}{(b_i)^{-1} + w^*(b_i^*)^{-1}} \right]^{\frac{1}{2-\delta}} . \; ; \quad \Pi_i = k_i - 2C_i \qquad \text{where}$$

$$(11) \qquad k_i = (1 - 0.5\delta)\overline{A}\left[\frac{0.5\overline{A}\,\delta}{(b_i)^{-1} + w^*(b_i^*)^{-1}} \right]^{\frac{\delta}{2-\delta}} .$$

Hence, k_i is determined by the real wages and by the efficiency of the labor in H and F, where

$$(12) \qquad \frac{\partial \Pi_i}{\partial b^*} > 0; \quad \frac{\partial Y_i}{\partial b^*} > 0$$

The multinational allocates the production of the intermediate product i to the developing country characterized by the highest normalized productivity/wage ratio (i.e., the highest b^* / a^*). Hence, a developing country that gains productivity in activity *i* at a rate that exceeds its competitors will attract overtime more FDI. The exports of such a country would increase both due to the higher production level of the infra marginal goods, and the introduction of new, relatively high C_i goods.

Our analysis assumed so far that the productivity improvements are exogenous, as will be the case if productivity is only impacted by an exogenous accumulation of human capital. One can extend our model to account for an endogenous accumulation of human capital, allowing for a heterogonous labor force. Specifically, suppose that there are two labor types, skilled and unskilled. Unskilled labor is employable only in sector Z, whereas skilled workers have the option of employment at sector Y. The economy starts

with relative scarcity of skilled labor. Unskilled workers may become skilled workers following the accumulation of human capital, a process that is associated with time and resource costs. In such an economy, higher trade implies also higher demand for skilled workers, inducing more unskilled workers to acquire human capital. Consequently, a greater abundance of skilled workers would increase the economy's attractiveness to multinationals. Higher trade would tend to increase the demand for skilled workers, increasing overtime the supply of skilled workers, thereby increasing the future attractiveness of the country for multinational FDI.

Arguably, India's recent trade history is a case study exemplifying these trends. The education system in India has been known for producing highly qualified engineers. In the 1970s-1980s, the options available to these engineers in India were rather limited, implying that relatively low domestic demand imposed a constraint on the effective supply of engineers. The recent advances of telecommunication and the Internet reduced drastically the cost of trade in information services. The direct outcome has been a sizable increase in the export of information services, putting in motion a two way feedback process. The greater export of services from India increased the return for education in India, increasing overtime the supply of human capital, and the attractiveness of India for future FDI, etc...

The observed positive association between trade and finance may also be the outcome of other processes, such as political-economy factors. Rajan and Zingales (2003), for example, propose an interest group theory of financial development whereby incumbents oppose financial development because it breeds competition. In these circumstances, the incumbents' opposition will be weaker when an economy allows both

cross-border trade and capital flows. They predict that a country's domestic financial development should be positively correlated with trade openness, and identify the time varying nature of this association. Another alternative channel, operating in the same direction from finance to trade, might be due to reliance of international trade on trade credits. Greater openness to trade credit flows, leads to a decrease in the cost of this credit and thereby increases international trade.[3]

3. The Empirical Literature

A number of recent papers have examined the interactions between financial flows and trade (See Albuquerque et al., in press, Do and Levchenko, 2004, Lane and Milesi-Ferretti, 2004, Rose and Spiegel, 2004, Swenson, 2004). Most prominent in this literature is the argument that a larger inflows of foreign direct investment (FDI) will lead to higher volume of trade as well as other benefits such as increased rates of total factor productivity growth or higher output growth rates.

Aizenman and Noy (2004) examine de-facto measures of financial and trade openness, and show that aggregate financial and commercial openness measures are closely linked. They empirically decompose causality and find strong affects in both directions. Anther approach linking trade and financial openness is Portes and Rey (2003), showing that both international trades in goods and in assets are explained by similar gravity regressions. Their work highlights the role of information flows and frictions in accounting for trade in goods and assets. Aviat and Coeurdacier (2004) extend the methodology of Portes and Rey (2003), and investigate the geography of trade in

[3] See Helpman and Razin (1978) for an integrated theory of trade in goods and securities. For a similar argument on the impact of services liberalization on goods trade see Blyde and Sinyavskaya (2004).

goods and asset holdings. They find that the causality between bilateral asset holdings and trade in goods runs significantly in both ways and that these effects are strong. Other recent work that discuss financial flows or FDI more specifically is Agénor (2003), Blonigen and Wang (2004), Chan and Gemayel (2004), Edison and Warnock (2003), Harrison et al. (2004), Lane (2003), and Razin et al. (2003).

4. Data, Methodology and Results

This section reviews the data, the methodology we employ and our main results on the determinants of various measures of financial and trade openness and causality between them. We begin by describing the data. We next discuss the model we estimate for the determination of FDI flows and trade and finally examine the question of causality. The appendix provides a detailed summary of the variables, sources and samples described in this section.

4.1 The data

We measure *de facto* financial openness using the sum of total capital inflows and outflows (in absolute values) measured as a percent of gross domestic product. Capital flows are the sum of FDI, portfolio flows, trade credits and loans. We construct an openness index for each one of these flour components and briefly discuss them below. We then focus on FDI openness in our estimations. The data on financial flows is taken from the IMF's *Balance of Payments Statistics* dataset. These measures of financial openness are exactly analogous to the standard measure of commercial openness (sum of exports and imports as percent of GDP), which we investigate as well.

We sub-divide the standard measure of commercial openness into openness for trade in goods, trade in services and trade in incomes. We further divide trade in goods

into openness measures for trade in foodstuffs, in fuel, in manufacturing and in metals/ores. This data is from the World Bank's *World Development Indicators*. We provide descriptive statistics and then incorporate them in our estimations.

In table 1 we describe our data for financial and commercial openness. Specifically, table 1A presents averages for financial openness disaggregated by type (FDI, loans, trade credits and equity flows) for the 1980s and 1990s.[4] We divide our country sample into industrialized and developing countries. A number of observations merit discussion at this point. First, one can observe a dramatic increase (doubling) of FDI in the 1990s as compared to the previous decade. This trend is more pronounced for the developing countries whose inflows of FDI went up from an average of about 1% of GDP to almost 3% (most of this increase appears to have come from a large increase in FDI outflows from the industrial countries). Portfolio flows have also seen a dramatic increase (more pronounced for the industrialized countries) while trade credits and the amount of loan flows have not changed that much in the last two decades (as % of GDP).

Table 1B records descriptive statistics for trade flows (disaggregated by type, countries' income levels and decades). Apparent is the relative stability of most measures of trade openness in both developing and developed countries. Exception are a large increase in the volume of trade in manufactures for developing countries and a large decrease in trade in fuels for both samples.[5] Interestingly, on average, developing countries appear to be more open to trade in both goods (across all types) and services than our sample of industrialized countries.

---

[4] The 1990s include data up to and including 1998. Because we limit our data to 1998, our data does not completely reflect the slowdown in capital flows following the Asian crisis.

[5] At the very least, part of the reason for this decline is average lower oil prices during the 1990s.

Table 2 presents correlation coefficients between our financial openness measures and the commercial/trade openness measures disaggregated by types of flows. The only notable correlations are a significant correlation of FDI flow measures with goods and services trade (especially trade in manufactures and fuels) for developing countries and a much weaker association between FDI flows and trade in industrialized countries. Other significant and noteworthy correlations are between trade in goods and trade in services (for both samples) and a high correlation between equity flows and FDI flows for the industrialized countries sample.

In our estimations, we include several control variables that are described below. This list is based on our previous research (Aizenman and Noy, 2004) and recent empirical work on FDI (especially Albuquerque et al., 2005 and Blonigen and Wang, 2004). In order to ensure our results are not driven by a 'missing variables' bias, we include a host of macroeconomic control variables. In all regressions we use per capita gross domestic product (measured in PPP dollars), a domestic interest rate spread (from a world rate of interest), and a weighted average of G3 growth rates. In an initial specification, we also included the government's budget surplus (as % of GDP), the inflation rate (CPI), a world interest rate (U.S 1-year T-bill rate), the government's budget surplus, gross domestic product (in $1995), and government consumption (as % of GDP). Neither of these was significant and all were dropped from the specifications we report. [6] All the macroeconomic data are taken from the World Bank's *World Development Indicators* and the IMF's *International Finance Statistics*.

[6] In Aizenman and Noy (2003) we found a disparity between the impacts of budget surplus in developing and OECD countries which may be explained by the differential cyclical patterns of fiscal policy. In contrast to the OECD countries, fiscal policy tends to be pro-cyclical in developing countries. Financial crises tend to lead to recessions in developing countries, inducing abrupt fiscal adjustment,

For the political-economy determinants of financial openness, we concentrate our empirical investigation on two political-institutional measures. Aizenman and Noy (2004) discuss the motivation behind the inclusion of political variables in the estimation of financial openness. We first include a variable that measures the degree of democratic rule. Our democracy index is taken from the *Polity IV* project and ranges from -10 (fully autocratic) to +10 (fully democratic).[7]

In addition, for our second political-economic control, following the work of Wei (2000) and Dreher and Siemers (2003), we examine whether corruption matters for the degree of financial openness. To that end, we use a measure of corruption that is taken from the *International Country Risk Guide.* The data are available in monthly observations. We obtain annual observations from 1982 onward by averaging the monthly data points for each year. This index ranges from -6 (low probability/risk of encountering corruption) to 0 (high risk of corruption). Two other political variables that were initially included but later dropped due to their insignificance were a measure of political risk (from the *ICRG* data) and a measure of government unity (taken from the World Bank's *Dataset on Political Institutions 2000*).

In order to examine whether the occurrence of financial crises contaminates our result, as they might systematically change the relationship between financial openness

---

reducing fiscal deficits. These observations may lead to the positive association between smaller budget deficits and lower *de facto* financial openness [see Gavin, Hausmann, Perotti and Talvi (1996), Aizenman, Gavin and Hausmann (2000) and Talvi and Vegh (2000)].

[7] The "Polity IV database includes annual measures for both institutionalized democracy (DEMOC) and autocracy (AUTOC), as many polities exhibit qualities of both these distinct authority patterns....A third indicator, POLITY, is derived simply by subtracting the AUTOC value from the DEMOC value; this procedure provides a single regime score that ranges from +10 (full democracy) to -10 (full autocracy)." (Marshall and Jaggers, 2000, p. 12). We use the POLITY variable in our regressions. In Aizenman and Noy (2003), we also use other measures of political competition to verify the robustness of this result.

and our control variables, we also include crises measures in a number of regressions. Crisis measures were never significant.

As the theoretical discussion in Aizenman and Noy (2004) suggests, one of the determinants of *de facto* financial openness should be the legal impediments to financial flows (*de jure* financial openness). Accordingly, we also attempted to include in our multivariate analysis a binary measure for restrictions on the capital account taken from the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions.* This binary measure is the only internationally comparable measure of *de jure* financial openness available for a large sample of countries and over the time period.

A priori, we see no reason to restrict our sample and therefore attempted to include all 205 countries and territories for which data are available in the 2001 edition of the World Bank's *World Development Indicators* (*WDI*). Our control variables, though, are available for only a subset of this group. Most importantly, most of the data on FDI flows are typically available only from the 1980s and only for a much smaller set of countries. Our data set is therefore an annual panel of 83 countries for the years 1982-1998.

Blonigen and Wang (2004) argue that pooling developed and developing countries in empirical studies of this type is inappropriate and likely to lead to misleading results. We also hypothesize that results for industrialized/developed countries might be different from those for developing countries as the nature of FDI in these groups might be different; for example vertical vs. horizontal FDI. We thus repeat our regressions for developed economies – which we define as those economies that were members of the OECD in 1990 – and developing countries. Developing countries are defined by

excluding OECD countries and island economies (as these are often used as off-shore banking centers and their level of *de facto* openness to financial flows is often dramatically different from other countries in the same income level). For a summary of the information described in this section including detailed data sources and sample sizes, see the appendix.

4.2 Methodology and Estimation Results

We start by positing a linear structure for the determination of the level of financial openness whereby:

$$(13) \qquad FDI_{it}[T] = \alpha + \beta_1 X_{it} + \beta_2 \overline{CO}_{it-1}[T] + \varepsilon_{it}$$

The dependent variable [($FDI_{it}(T)$], FDI openness for country i at time t and type T (gross, net, inflow, or outflow), is assumed to be dependent on separate country intercepts, a vector X_{it} of macroeconomic and political-institutional control variables, a vector of average lagged trade openness measures [$\overline{CO}_{it-1}$ (T)] , and an error term. The variables examined are described below.

While in Aizenman and Noy (2004), we found strong evidence of autocorrelation in the aggregate financial openness measure; this is not the case for estimations of the different components of financial openness. We therefore estimate the model with a standard fixed-effects least-squares methodology.

Table 3 includes results for our benchmark regressions. For the first stage regression, the adjusted R^2 is between 0.58 and 0.71 depending on the LHS trade variables used and the sample. In examining the independent variables, we first turn to our control macro-variables. The coefficient for per-capita GDP is always positive and

statistically significant – i.e., an increase in GDP per capita increases financial openness. We find that an increase domestic per capita GDP of PPP$1000 will facilitate up to a 0.4 percentage points increase in the volume of FDI flows (as percent of GDP). The coefficient for the interest rate spread is negative for developing countries and positive for industrial ones but is rarely statistically significant. Foreign growth rates are positive and significant for developing countries but negative and insignificant for developed ones.

The political-economy determinants of international financial flows, corruption levels and the democracy measure are never statistically distinguishable from zero in our regression specifications. The democratic regime variable is consistently negative, in line with our previous findings on aggregate measures of financial openness. Since we use a fixed-effects specification these results are not surprising, as these measures tend to be fairly constant over time.[8] A dummy variable for the 1990s is consistently negative and significant for industrial countries and positive and significant for the developing countries sample.

The association between FDI gross flows and trade is significant at the 1% level and is apparent and identical for both developing and developed countries (columns 1-2). We then go on and decompose our measure of trade openness into trade in goods, in services, and in incomes. Interestingly, the association between goods trade and FDI openness and trade in incomes and FDI openness is twice as strong and statistically significant while that is no longer the case for developed-industrialized economies.

[8] In Aizenman and Noy (2003), we present significant results for these measures when fixed effects are not included.

Services trade is not statistically significant for either sample but for the developing countries sample the coefficient is negative (albeit not significant even at the 10% level).

In table 4, we go on and further break down our measures for trade into trade in services, incomes and four categories of goods trade (foodstuffs, fuel, metals/ores and manufacturing). For developing countries, the association between trade in services and FDI flows is still negative (and significant in column 3), while the association with trade in incomes is positive and significant as already noted in the previous specification. We now also find that the association between FDI gross flows and goods trade is due mostly to an association of FDI flows with trade in foodstuffs. Intriguingly, the association of FDI with trade in fuels is negative and significant; this result also holds for industrial economies. Trade in manufacturing is the only trade openness measure that is consistently significant and positive for developed economies (it is insignificant for the developing countries sample).

In columns 3-4 of table 4, we add a binary variable for capital account restrictions. As might be predicted, restricting the capital account reduces significantly the openness to FDI flows for both developing and industrial countries.

In table 5, we restimate our benchmark specifications with a different left-hand-side FDI variables. In columns 1 and 3 we examine FDI inflows while in columns 2 and 4, outflows. For the trade openness measures, the only variable that is consistently significant, as before, is goods trade for the inflows specifications (columns 1 and 3). Trade does not appear to explain FDI net outflows.

In addition to the specifications discussed above, we tested a number of alternative specifications of our empirical model in order to verify the robustness of our

results. Because of space considerations we do not include the full specifications in our tables but all these results are available upon request. As we already noted in the previous section, we tested the significance of a number of other control variables and found none to have any explanatory power. We also hypothesized that financial crises (either banking or currency crises) might significantly affect the level of financial openness in general and more specifically the use of financial repression for generating government revenues. Interestingly, in all iterations of the model we attempted, none of the coefficients for the crises variables comes out significant for the developing countries sample (nor for the other samples).[9]

5. Reverse Causality from finance to trade

5.1 Reverse Specifications

In the previous section we have established that past trade openness Granger-causes FDI gross flows openness (see Granger, 1969 and Sims, 1972 for a definition of G-causality). As we already suggested that causality might also run from past financial openness to present trade openness we also estimate the opposite specification:

$$(14) \qquad CO_{it}[goods] = \gamma + \delta_1 X_{it} + \delta_2 \overline{FO}_{it-1}[T] + \eta_{it}$$

Where the LHS variable is now the openness to goods trade while on the RHS we include a set of control variables (chosen incrementally with the Akaike Information Criterion) and various measures of financial openness (FDI, loans, equity and trade

[9] We utilized a number of variants of these binary indicators (currency crisis and banking crisis, their onset year only, and these separately or together in the same specification) and we never reject the null (no effect). For currency crises, our indicator is identified by periods in which an index, composed of a weighted average of the real exchange rate and foreign reserves, changed dramatically – by more than 2 standard deviations. This measure is described in detail and evaluated in Hutchison and Noy (2002). The

credits). The measures for trade credits and portfolio flows are not reported for many countries so we subsequently drop them in the specifications reported in columns 3-4 and thus increase the sample size significantly. We use the same assumptions, methodology, definition of variables and samples as before. Results are reported in table 6. The FDI openness measure appears to have a statistically significant, positive, and large effect on trade in goods while for the developing-countries sample the measure of gross loans appears to have the opposite effect (reducing goods trade).

5.2 Decomposition of Causality

In Granger (1969), the possibility of simultaneous causality between the two time series is assumed away by arguing that, at least in principle, it should be feasible to obtain higher frequency observations and thus identify accurately the exact chronology of effects and do away with the correlations in the contemporaneous data series. As we only have annual data, and since financial flows respond quickly to exogenous shocks, it is reasonable to expect that our data will also contain what appears to be instantaneous causality between trade and financial openness. Furthermore, Granger's (1969) approach does not allow us to estimate and compare the relative magnitudes of causality between the two time series.

Geweke (1982) suggests a methodology to distinguish between (temporal) causality from *x* to *y*, from *y* to *x* and simultaneous causality between the two. We briefly describe the methodology and provide results.[10]

---

banking crisis binary indicator is taken from Caprio and Klingebiel (1999) and is analyzed in Arteta and Eichengreen (2002) and Hutchison and Noy (forthcoming).

[10] Readers may also consult Geweke (1984) and Granger (1988). The only applications we are aware of which apply this methodology to macro-economic data series are Chong and Calderón (2000), Calderón and Liu (2003) and Aizenman and Noy (2004). Other approaches to identifying causality in macroeconomics will typically rely on an instrumental variable methodology. An excellent book length treatment of the issue of causality in macroeconomics is Hoover (2001).

First we estimate the following equations using a panel fixed-effects least squares estimation.

$$(15) \quad FDI_{it} = \alpha_i^1 + \sum_{s=1}^{p} \beta_{1s}^1 FDI_{it-s} + \sum_{s=0}^{p} \beta_{2s}^1 CO_{it-s} + \varepsilon_{it}^1$$

$$(16) \quad FDI_{it} = \alpha_i^2 + \sum_{s=1}^{p} \beta_{1s}^2 FDI_{it-s} + \sum_{s=1}^{p} \beta_{2s}^2 CO_{it-s} + \varepsilon_{it}^2$$

$$(17) \quad FDI_{it} = \alpha_i^3 + \sum_{s=1}^{p} \beta_{1s}^3 FDI_{it-s} + \varepsilon_{it}^3$$

$$(18) \quad CO_{it} = \alpha_i^4 + \sum_{s=1}^{p} \beta_{1s}^4 CO_{it-s} + \sum_{s=1}^{p} \beta_{2s}^4 FDI_{it-s} + \varepsilon_{it}^4$$

$$(19) \quad CO_{it} = \alpha_i^5 + \sum_{s=1}^{p} \beta_{1s}^5 CO_{it-s} + \varepsilon_{it}^5$$

Next, following Geweke's (1982) notation we define $F_{CO \to FDI}$ as the linear feedback (i.e. G-causality) from trade openness to FDI, $F_{FDI \to CO}$ as the G-causality from FDI openness to trade openness, and $F_{FDI \bullet CO}$ as the instantaneous linear feedback between the two series. $F_{FDI,CO}$, defined as the total measure of linear dependence between the two series is therefore given by:

$$(20) \quad F_{FDI,CO} = F_{FDI \to CO} + F_{CO \to FDI} + F_{FDI \bullet CO}.$$

Given these definitions, Geweke (1982) concludes the following:

$$(21) \quad F_{FDI \to CO} = \log[\mathrm{var}(\varepsilon_{it}^5) / \mathrm{var}(\varepsilon_{it}^4)]$$

$$(22) \quad F_{CO \to FDI} = \log[\mathrm{var}(\varepsilon_{it}^3) / \mathrm{var}(\varepsilon_{it}^2)]$$

$$(23) \quad F_{FDI \bullet CO} = \log[\mathrm{var}(\varepsilon_{it}^2) / \mathrm{var}(\varepsilon_{it}^1)]$$

Geweke (1982) shows that the null hypothesis (H_0: F=0) can be statistically examined using the χ^2 distribution. In estimating (15)-(19), we started with three lags (p=3) of the independent variables in each regression and reduced step-wise the number of lags using the Akaike Information criterion. In all cases, it turned out that a single lag

(p=1) contained all the information required to estimate the model. Consequently, we set p=1 throughout. Table 7 provides our results for this decomposition of causality between the two series for the complete sample. Most of the linear feedback between trade and FDI (81%) can be accounted for by Granger-causality from FDI gross flows to trade openness (50%) and from trade to FDI (31%). Simultaneous correlation between the two only accounts for 19% of the total linear feedback between the two series. Similar results are obtained when we instead investigate causality between trade openness and net FDI flows or net inflows.

6. Concluding remarks

Our analysis indicates that there are complex two-way positive feedbacks between FDI and international trade. It suggests the presence of large benefits associated with reducing restrictions to trade and FDI. We close the paper by noting that our model and empirical work can be extended to account for more complex aspects of the association between FDI and trade. For example, we ignore the potential importance of private and public infrastructure investment as an input into the production process, and the role of financial intermediation in facilitating domestic investment. All these considerations are left for future research.

References

Agénor, Pierre-Richard (2003). "Benefits and Costs of International Financial Integration: Theory and Facts," *World Economy*, 26 (8), 1089-1118

Aizenman, J., M. Gavin and R. Hausmann, (2000) "Optimal Tax and debt Policy with Endogenously Imperfect Creditworthiness", *Journal of International Trade & Economic Development*, 9 (4), 367 – 395.

Aizenman, J., and I. Noy (2004) "Endogenous Financial and Trade Openness: Efficiency and Political Economy Considerations", manuscript.

Albuquerque, R., N. Loayza, and L Servén (in press). World market integration through the lens of foreign direct investment. *Journal of International Economics.*

Arteta, C., and B. Eichengreen (2002). "Banking Crises in Emerging Markets: Presumptions and Evidence." In: M. Blejer and M. Skreb. (eds.) *Exchange Rate and Financial Vulnerability in Emerging Markets*. Cambridge, MA, MIT Press.

Aviat A. and N. Coeurdacie (2004), "The Geography of Trade in Goods and Asset Holdings," manuscript, Cnrs–Ehess–Ens.

Blonigen, Bruce A. and Miao Wang (2004). "Inappropriate Pooling Of Wealthy And Poor Countries In Empirical FDI Studies." NBER Working Paper #10378.

Blyde, J. and Natalia S. Sinyavskaya (2004). "The Impact of Liberalizing Trade in Services on Trade in Goods: An Empirical Investigation." Paper presented at the LACEA 2004 conference in San José, Costa Rica.

Calderón, César and Lin Liu (2003). "The direction of causality between financial development and economic growth." *Journal of Development Economics,* 72, 321– 334.

Caprio Gerard and Daniela Klingebiel (1999). Episodes of Systemic and Borderline Financial Crises. Manuscript (October).

Chan, Kitty K. and Edward R. Gemayel (2004). Risk Instability and the Pattern of Foreign Direct Investment in the Middle East and North Africa Region. IMF Working paper 04/139.

Chong, Alberto and César Calderón (2000). "Causalilty and Feedback Between Institutional Measures and Economic Growth." *Economics and Politics*, 12(1), 69-81.

Do, Quy-Toan and Andrei A. Levchenko (2004). Trade and Financial Development. Paper presented at LACEA 2004, San Jose, Costa Rica.

Dreher, Axel and Lars-H.R. Siemers (2003). "The Intriguing Nexus Between Corruption and Capital Account Restrictions", mimeo, June.

Feenstra, R. (2003). *Advanced International Trade: Theory and Evidence*, Princeton Press.

Gavin, M., R. Hausmann, R. Perotti and E. Talvi (1996) 'Managing Fiscal Policy in Latin America and the Caribbean: Procyclicality, Volatility, and Limited Creditworthiness', mimeo, Inter-American Development Bank.

Geweke, John (1982). "Measurement of Linear Dependence and Feedback Between Multiple Time Series." *Journal of the American Statistical Association*, 77(378), 304-313.

Glick, Reuven and Michael Hutchison (forthcoming). "Capital Controls and Exchange Rate Instability in Developing Economies." *Journal of International Money and Finance*.

Geweke, John (1984). "Measures of Conditional Linear Dependence and Feedback Between Time Series." *Journal of the American Statistical Association*, 79(388), 907-915.

Granger, Clive W. J. (1969). "Investigating Causal Relations by Econometric Models and Cross-spectral methods." *Econometrica*, 37(3), 424-438.

Granger, Clive W. J. (1988). "Some recent developments in a concept of causality," *Journal of Econometrics*, 39, 199-212.

Gordon H. Hanson, G. H., R. J. Mataloni and M. J. Slaughter (2001). "Expansion Strategies of U.S. Multinational Firms," NBER Working paper 8433.

Harrison, Ann E., Inessa Love, and Margaret S. McMillan (2004). Global capital flows and financing constraints. *Journal of Development Economics* 75, 269– 301.

Helpman E. and A. Razin (1978). *A Theory of International Trade Under Uncertainty*, Academic Press.

Hoover K. (2001). *Causality in Macroeconomics.* Cambridge University Press, Cambridge, UK.

Hutchison, Michael and Ilan Noy (2002). "Output Costs of Currency and Balance of Payments Crises in Emerging Markets," *Comparative Economic Studies*, XLIV(2), Summer.

Hutchison, Michael and Ilan Noy (forthcoming). "How Bad Are Twins? Output Costs of Currency and Banking Crises" *Journal of Money, Credit and Banking*.

Lane, Philip R., and Gian Maria Milesi-Ferretti (2004). International Investment Patterns. IMF Working Paper WP/04/134.

Marshall, Monty and Keith Jaggers (2000). "POLITY IV PROJECT - Political Regime Characteristics and Transitions, 1800-1999: Dataset Users' Manual". Mimeo, University of Maryland.

Portes, R. and H. Rey (2003), "The Determinants of Cross Border Equity Flows," manuscript, Princeton University.

Rajan, G. R. and L. Zingales (2003). **"**The Great Reversals: The Politics of Financial Development in the 20th Century," forthcoming, *Journal of Financial Economics*.

Razin, Assaf, Yona Rubinstein and Efraim (2003). "Which Countries Export FDI, And How Much?" NBER Working Paper 10145.

Rose, Andrew K., and Mark M. Spiegel (2004). A Gravity Model of Sovereign Lending: Trade, Default, and Credit. IMF Staff Papers, 51, 50-63.

Sims, Christopher A. (1972). "Money, Income, and Causality." *The American Economic* Review, 62(4), 540-552.

Swenson, Deborah L. (2004). Foreign Investment and the Mediation of Trade Flows. *Review of International Economics*, 12(4), 609–629.

Talvi, Ernesto, and Carlos A. Vegh (2000). "Tax Base Variability and Procyclical Fiscal Policy." NBER Working Paper No. W7499, January.

Wei, Shang-Jin (2000). "How Taxing is Corruption on International Investors?" *The Review of Economics and Statistics*, 82(1):1-11, February.

Appendix – Data Sources and Samples

Code	Source	Description
KTOTAL	*IMF-BOP statistics* [a]	Sum of capital inflows and outflows (% of GDP)
FDITOT	*IMF-BOP statistics*	Sum of FDI inflows and outflows (% of GDP)
TRADTOT	*IMF-BOP statistics*	Sum of trade credit inflows and outflows (% of GDP)
LOANTOT	*IMF-BOP statistics*	Sum of loan inflows and outflows (% of GDP)
EQTOT	*IMF-BOP statistics*	Sum of portfolio inflows and outflows (% of GDP)
TRADG	*WB-WDI* [b]	Sum of exports and imports (% of GDP)
SERVG	*WB-WDI*	Sum of service exports and imports (% of GDP)
GOODG	*WB-WDI*	Sum of goods exports and imports (% of GDP)
INCOMG	*WB-WDI*	Sum of trade in incomes (% of GDP)
FUELG	*WB-WDI*	Sum of trade in fuels (% of GDP)
MANUG	*WB-WDI*	Sum of trade in manufacturing(% of GDP)
FOODG	*WB-WDI*	Sum of trade in foodstuffs (% of GDP)
METALG	*WB-WDI*	Sum of trade in metals and ores (% of GDP)
GDPPCPP	*WB-WDI*	GDP per capita, PPP (current int'l $)
DLCPI	*WB-WDI*	Inflation, consumer prices (annual %)
BDGTG	*WB-WDI*	Overall budget deficit (% of GDP)
USTBILL	*IMF-IFS* [c]	Interest rate on U.S. Treasury bill
CORRUPT	*PRS*: International Country Risk Guide	Level of Corruption [d]
POLITY2	*POLITY IV* project	Political regime type [e]
KKCCAR	IMF- *EAER* [f]	Binary measure for current and/or capital account restrictions

Samples (1982-1998) [g]	
ALL	All countries for which data was available (81 countries)
IND	Industrialized countries (21 countries)
DEV	Developing countries – defined as all countries excluding OECD member countries (60 countries)

[a] The IMF's *Balance-of-Payments Statistics*.
[b] The World Bank's *World Development Indicators*.
[c] The IMF's *International Finance Statistics*.
[d] This index runs from -6 (low probability/risk of encountering corruption) to 0 (highly corrupt).
[e] The index runs between -10 (fully autocratic) to +10 (fully democratic).
[f] The IMF's Annual Report on *Exchange Arrangements and Exchange Restrictions*; extended to 1998 by Glick and Hutchison (forthcoming).
[g] Data availability further constrained our samples. Thus, the numbers reflect countries for which data were available for the aggregate financial flows but not necessarily for specific components (and not necessarily for the whole 1982-1998 time period).

Table 1A. Financial Openness By Type – Descriptive Statistics

	Developing countries		Industrialized countries	
	1980s	1990s	1980s	1990s
FDI	1.71	3.44	1.97	3.76
FDI inflows	1.07	2.85	1.03	1.87
FDI outflows	0.29	0.40	1.13	1.92
FDI net-flows	0.92	2.60	0.13	0.06
Trade Credits	1.49	1.68	0.67	0.51
Portfolio Flows	1.18	2.20	2.90	6.41
Loans	5.97	5.44	3.26	3.18

The table presents averages of sum of financial inflows and outflows (divided by types) as percent of GDP. Data from the *Balance of Payments Statistics*.

Table 1B. Trade Openness By Type – Descriptive Statistics

	Developing countries		Industrialized countries	
	1980s	1990s	1980s	1990s
Trade in Incomes	9.14	9.07	9.19	12.51
Trade in Services	20.79	22.76	15.36	17.36
Trade in Goods	66.31	61.69	52.25	51.80
Trade in manufacturing	28.84	37.78	34.85	38.95
Trade in foodstuffs	13.42	11.19	7.73	6.95
Trade in fuels	24.09	9.82	6.94	3.37
Trade in metals/ores	2.98	2.46	2.09	1.79

The table presents averages of sum of commercial inflows and outflows (divided by types) as percent of GDP. Data from the *World Development Indicators*.

Table 2. Correlations For Trade And Financial Flows

Developing Countries

	Equity flows	Trade credits	Loan flows	FDI flows	Trade in goods	Trade in services	Trade in incomes	Trade in manufactures	Trade in foodstuffs	Trade in fuel	Trade in metals
Equity flows	1	0.06	0.40	0.23	0.21	0.23	0.26	0.13	-0.04	0.13	-0.02
Trade credits		1	0.02	0.18	0.07	0.07	0.02	0.07	0.12	0.07	-0.03
Loan flows			1	0.15	0.13	0.21	0.72	-0.05	0.03	0.01	-0.07
FDI flows				1	0.60	0.55	0.22	0.60	0.23	0.46	0.22

Industrialized Countries

	Equity flows	Trade credits	Loan flows	FDI flows	Trade in goods	Trade in services	Trade in incomes	Trade in manufactures	Trade in foodstuffs	Trade in fuel	Trade in metals
Equity flows	1	0.03	0.26	0.63	0.13	0.09	0.30	0.34	0.03	-0.20	0.01
Trade credits		1	0.13	0.04	0.15	0.15	-0.16	0.20	0.03	0.23	0.07
Loan flows			1	0.30	0.17	0.17	0.44	0.28	0.04	-0.07	-0.01
FDI flows				1	0.20	0.05	0.33	0.36	0.17	-0.01	0.15

Table 3. Estimation of FDI Openness Index

	(1) DEV	(2) IND	(3) DEV	(4) IND
Per capita GDP	0.35***	0.28***	0.40***	0.32***
	(3.30)	(4.95)	(3.62)	(5.19)
Interest rate spread	-0.08	0.10*	-0.09	0.03
	(0.76)	(1.57)	(0.81)	(0.36)
Foreign growth rate	0.20**	-0.12	0.26***	-0.05
	(1.96)	(1.48)	(2.53)	(0.53)
Democratic regime	-0.04	0.05	-0.02	-0.19
	(1.04)	(0.09)	(0.36)	(0.29)
Corruption	-0.37*	-0.01	-0.13	0.03
	(1.60)	(0.05)	(0.54)	(0.11)
The 1990s	0.61*	-0.91***	0.75**	-0.61*
	(1.80)	(2.63)	(2.18)	(1.57)
Trade openness index…	0.02***	0.02**		
(Average for t-1,…,t-4)	(3.84)	(2.53)		
…for services			-0.06	0.06
			(1.49)	(0.71)
…for incomes			0.05***	0.00
			(4.48)	(0.05)
…for goods			0.03**	0.04
			(1.98)	(1.33)
Akaike IC	4.72	3.22	4.74	3.58
Observations	533	193	541	235
Adjusted R^2	0.58	0.71	0.55	0.67

t-statistics for all variables are given in parentheses. We denote significance levels at the 10%, 5% and 1% with *, ** and *** respectively. The LHS variable is the sum of FDI net inflows and outflows (as % of GDP). Estimation using least squares with country fixed effects. For definitions of variables, see appendix. In an initial specification, we also included the government's budget surplus (as % of GDP), the inflation rate (CPI), a world interest rate (U.S 1-year T-bill rate), government consumption (as % of GDP).

Table 4. Robustness for FDI Openness Index

	(1) DEV	(2) IND	(3) DEV	(4) IND
Per capita GDP	0.24*	0.22***	0.25*	0.20***
	(1.70)	(3.68)	(1.77)	(3.28)
Interest rate spread	0.00	0.04	0.00	0.05
	(1.04)	(0.61)	(0.73)	(0.65)
Foreign growth rate	0.36***	0.01	0.35***	-0.03
	(3.82)	(0.21)	(3.68)	(0.36)
Democratic regime	-0.04	-0.45	-0.04	-0.55
	(0.93)	(1.04)	(0.92)	(1.29)
Corruption	0.10	-0.06	0.13	-0.02
	(0.41)	(0.33)	(0.56)	(0.10)
The 1990s	1.45***	-0.61*	1.27***	-0.90***
	(3.63)	(1.79)	(3.16)	(2.57)
Capital account restrictions			-1.00**	-0.84***
			(2.34)	(3.12)
Trade openness in… (Average for t-1,…,t-4)				
…services	-0.07	-0.02	-0.08*	-0.03
	(1.45)	(0.24)	(1.59)	(0.35)
…incomes	0.03**	0.02	0.03**	0.00
	(2.49)	(0.51)	(2.48)	(0.04)
…goods (foodstuffs)	0.21***	0.18	0.20***	0.26
	(2.89)	(0.92)	(2.69)	(1.38)
…goods (fuel)	-0.12***	-0.09	-0.12***	-0.13*
	(3.96)	(1.35)	(3.88)	(1.92)
…goods (metals/ores)	0.14	-0.32	0.17	-0.22
	(1.03)	(0.61)	(1.30)	(0.41)
…goods (manufacturing)	0.00	0.10***	0.00	0.10**
	(0.01)	(2.62)	(0.24)	(2.55)
Akaike IC	4.70	3.54	4.69	3.49
Observations	437	260	437	251
Adjusted R^2	0.61	0.67	0.62	0.69

t-statistics for all variables are given in parentheses. We denote significance levels at the 10%, 5% and 1% with *, ** and *** respectively. The LHS variable is the sum of FDI inflows and outflows (as % of GDP). Estimation using least squares with country fixed effects. For definitions of variables, see appendix. Two additional variables that are never significant in this specification for developing countries are a financial crisis dummy (CCBC) and a dummy for current account restrictions (CAR). CCBC is negative and significant for industrialized countries sample.

Table 5. Estimation for the FDI Inflows/Outflows

	(1) FDI net inflows DEV	(2) FDI net outflows DEV	(3) FDI net inflows IND	(4) FDI net outflows IND
Per capita GDP	0.24***	-0.27***	0.10***	-0.20***
	(2.57)	(10.84)	(4.32)	(6.05)
Interest rate spread	0.00	0.01	0.03	0.00
	(1.30)	(1.20)	(1.02)	(0.07)
Foreign growth rate	0.06	-0.01	-0.01	0.00
	(0.97)	(0.23)	(0.41)	(0.03)
Democratic regime	0.03	0.02*	-0.15	-0.47
	(0.85)	(1.68)	(0.70)	(0.77)
Corruption	0.27	0.18***	-0.04	-0.03
	(1.48)	(2.91)	(0.41)	(0.24)
The 1990s	0.62**	0.01	0.10	0.66***
	(2.09)	(0.05)	(0.55)	(2.60)
Trade openness in… (Average for t-1,…,t-4)				
…services	-0.03	0.01	0.01	-0.06
	(0.91)	(0.83)	(0.18)	(0.95)
…incomes	0.01	0.00	0.02	0.01
	(0.79)	(0.00)	(1.37)	(0.48)
…goods	0.06***	0.00	0.04***	0.01
	(4.66)	(0.74)	(2.73)	(0.66)
Akaike IC	4.81	1.90	2.43	2.98
Observations	635	318	283	254
Adjusted R^2	0.39	0.66	0.58	0.59

t-statistics for all variables are given in parentheses. We denote significance levels at the 10%, 5% and 1% with *, ** and *** respectively. The LHS variable is either FDI net inflows or net outflows (as % of GDP). Estimation using least squares with country fixed effects. For definitions of variables, see appendix.

Table 6. Reverse Specifications for Goods/Services Trade Openness Indices

	(1) Goods DEV	(2) Goods IND	(3) Goods DEV	(4) Goods IND
US Treasury bill rate	2.18***	0.92***	1.21***	0.94***
	(4.98)	(6.65)	(6.44)	(8.21)
Real exchange rate appreciation index	-0.15***	-0.24***	-0.11***	-0.22***
	(2.65)	(7.02)	(6.34)	(7.87)
Democratic regime	1.25***	1.73	0.38***	-0.11
	(3.85)	(1.00)	(3.21)	(0.10)
The 1990s	4.00	1.97**	7.24***	1.27*
	(1.55)	(2.21)	(6.72)	(1.84)
Financial openness in… (Average for t-1,…,t-4)				
…FDI	-0.04	0.39	0.80***	0.79***
	(0.05)	(1.17)	(2.62)	(3.11)
…loans	-0.44***	-0.09	-0.30***	-0.04
	(4.91)	(0.81)	(5.94)	(0.32)
…equity	0.79**	0.30		
	(2.12)	(1.55)		
…trade credits	0.91	0.51		
	(0.62)	(0.67)		
Akaike IC	7.22	5.27	7.05	5.31
Observations	203	261	801	372
Adjusted R^2	0.97	0.89	0.93	0.89

t-statistics for all variables are given in parentheses. We denote significance levels at the 10%, 5% and 1% with *, ** and *** respectively. The LHS variable is the sum of imports and exports of goods or services (as % of GDP). Estimation using least squares with country fixed effects with a correction for an autocorrelation (AR1). For definitions of variables, see appendix. Similar estimation for trade in services does not yield any significant coefficients for the financial flows variables.

Table 7. Decomposition of Causality – Full Sample

	Percent of overall linear feedback [a]		
	FDI gross flows	FDI net flows	FDI inflows
From FDI openness to commercial openness ($F_{FO \to CO}$)	50	58	57
From commercial openness to FDI openness ($F_{CO \to FO}$)	31	34	32
Simultaneous feedback ($F_{FO \bullet CO}$)	19	8	11

[a] Using the methodology outlined in Geweke (1982) and defined in equations (15)-(23). The overall linear feedback is defined in equation (20).