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FOREIGN DIRECT INVESTMENT, HOST COUNTRY PRODUCTIVITY AND EXPORT: THE CASE OF U.S. AND JAPANESE MULTINATIONAL AFFILIATES

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The literature on the transfer of technology from FDI to host country firms is growing rapidly. Most of the studies find that there are positive spillover effects from FDI flow to host country firms in advanced economies. The result for the case of FDI recipient developing economies is mixed. The purpose of this study is to analyze the role that foreign direct investment from the U.S. and Japan plays in affecting developing countries' productivity, and export. Trade and production dataset by industrial groups and disaggregated U.S. and Japanese FDI data are used to empirically test presence of spillover effects on labor productivity and export. The results of the study show that positive productivity effects from U.S. and Japanese FDI firms are not empirically supported for the case of sample developing countries. The presence of FDI firms from all source countries and the number of U.S. total FDI and U.S. manufacturing FDI firms increase exports of host countries to the rest of the world. On the other hand, productivity is enhanced by foreign portfolio investment, availability of skilled manpower, capital intensity of industries and the number of bilateral investment treaties signed by host countries. Official development assistance and official aid have significantly negative effect on host country productivity, value added and export.

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JEL classification: F2, O4

1. INTRODUCTION

Host countries are concerned about the effect of foreign direct investment (FDI) on national welfare. There are both benefits and costs associated with FDI flow to developing countries. The net effect depends on factors attributable to the host country and the foreign firm, including the host country's capacity to tap the benefit and trade and investment policies, as well as the nature and motivation of affiliate firms' business

practices. The welfare impacts of FDI come through three channels: improved productivity, marketing and networking externality advantages that help local firms to penetrate world markets, and crowd-in effects through infrastructure expansion and backward and forward linkages.

These impacts of FDI on a host country's welfare are often divided in to two categories direct and indirect impacts. The direct benefits are relatively easy to quantify, and include tax revenue contribution, generation of foreign currency (if export-oriented), and creation of employment opportunities.[1] One of the indirect effects is the spillover effect that complicates the computation of welfare impacts, as it is difficult to quantify some aspects, like the benefits through economies of scale. The positive spillover effects are benefits generated through the transfer of technology, managerial and marketing skills, and the network effect of marketing (through reduced costs of marketing to penetrate foreign markets following the footings of the affiliate firms' exports). It can also be argued that the presence of foreign firms helps to expand infrastructure facilities, which makes it easier and profitable for local firms to crowd-in.

The negative spillover effects occur with competition over limited resources and limited skilled manpower, and either due to strategic motives by the affiliates of MNCs or the high technological gap between local and foreign firms. There are also other costs associated with inflow of FDI, such as restrictive business practices by foreign firms (i.e., intra-firm trade, transfer pricing, and profit repatriation) and in the case of developing country governments forgone tax revenue (or high subsidies). The net welfare effects differ by the nature of FDI (amount and forms of entry), motives behind internal transactions, and host country government policies. Theoretical and empirical findings are not conclusive on the net welfare effects of FDI, particularly for the case of developing countries.

It is noted that, though, these positive benefits are not readily available (Blomstrom and Kokko (1998), Caves (1997), Dunning and Narula (1996)). Due to lack of appropriate institutional setup and presence of technology gap, it becomes critical problem for developing countries to tap the expected benefits from the inflow of FDI.

For the case of advanced and some emerging economies in East Asia, it is well documented that there is positive spill over effects from foreign firms (Liu *et al*. (2001), Djankov and Hoekman (1998), Aitken *et al*. (1997)). But the case for developing countries as to their potential benefit from FDI firms present is not yet conclusive. Most previous studies dealing with this issue for the case of developing countries take one or two sample countries to address the issue (Aitke *et al*. (1999), Djanov and Hoekman (1998), Liu *et al*. (2001)). Estimating the effect of total factor productivity also becomes

[1] The employment benefit is often ignored on the ground that there is no actual employment creation but foreign firms compete with local firms over the existing employed labor; this is particularly true for skilled labor in the case of developed countries. However, foreign firms often target the unskilled cheap labor, which is in elastic supply in developing countries.

standard way of measuring the impact of FDI in a host country. In the context of FDI flow in developing countries, one needs to consider the real contribution of the inflow of capital, which is the degree of improvement in labor productivity. Total factor productivity lumps all factors together and it is necessary to disentangle the contribution of foreign capital to improve the productivity of the factor that accounts for the larger share of developing countries - labor. The purpose of this study is to fill this empirical gap by reexamining the role that FDI plays in affecting value added, productivity and volume of export of a host country.

In addressing the impact of FDI in developing counties, this study uses industry level disaggregated dataset both for FDI inflows and productivity for each sample country. Such disaggregated dataset, to the best of our knowledge, have not been used to address the issue of welfare impact of FDI. Instead of picking only one variable as indicator of welfare for developing countries, this study uses three different indicators: productivity, value added and export. For purpose of comparison, in addition to inflow of FDI not only from all source countries, but also disaggregated inflow of FDI from U.S. and Japan is used to empirically test the spillover effects.

The results of this study show most FDI inflows from most sources resulted in negative spillover effects on host country's productivity. Positive spillover effects from U.S. and Japanese firms in a host country are not supported for the case of sample developing countries. Only U.S. manufacturing FDI increases value added of host countries. The presence of FDI from all sources and the number of U.S. FDI firms and U.S. manufacturing FDI also increase exports of host countries to the rest of the world. On the other hand, productivity is enhanced by foreign portfolio investment, availability of skilled manpower, capital intensity of industries and the number of bilateral investment treaties signed by host countries. Official development assistance and official aid have negative and significant effects on host country productivity, value added and export.

The next section presents a review of the theoretical and empirical literature on the welfare impact of FDI. The third section discusses the theoretical foundation and econometric specification. The fourth section presents estimation techniques and the last section provides conclusions of the study.

2. LITERATURE REVIEW

Recently, the competition to attract foreign direct investment (FDI) has become one of the priorities of policy makers in developing countries. In economies where domestic private investment is very low and where foreign capital is crucial to increase production/productivity and transfer technology, policy makers provide different forms of incentives to attract FDI (Aggarawal (1987)). It is also well documented that to tap the expected benefits from FDI there is a need for a minimum threshold level of absorptive capacity, which includes human and physical capital, and suitable policies to allow host countries to capture the benefits from FDI (Reis (2001), Richardson (1998),

Dunning and Narual (1996)).

It is believed that efficiency-seeking FDI tends to be located in countries with elastic supply of skilled labor and sound technological and physical infrastructure (Gary (1997)). Low-income host countries with limited human and physical capital and poor infrastructure cannot compete to attract such efficiency-seeking firms. Resource-seeking, export oriented FDI, and to some extent local market targeting firms are common types of FDI to developing countries, the efficiency and welfare benefits of which are questionable from the host country's view point. Domestic investors are also concerned about the shift in entrepreneurship and the crowding out effect of foreign investment on domestic firms (Caves (1997)). The other impacts of FDI as indicated by similar studies are the widening wage and income inequalities that result from the inflow of FDI in developing countries, which raise distributional issue (Figini and Gorg (1999), Tsai (1995)).

Previous studies test the roles of aggregate foreign capital flow on employment, productivity and technology transfer (Larudee and Koechin (1999), de Mello (1999), Aitken and Harrison (1999)). The impact of FDI on a domestic firm's productivity is crucial for the host countries as domestic infant industries are expected to learn from foreign firms (Markusen and Venables (1999)). Host country governments compare expected benefits with costs in the forms of forgone tax revenue due to financial incentives, repatriated profits and the crowding out effect of foreign firms given the absorptive capacity of the country (Hanson (2001)).

FDI, like any other form of capital inflow, is expected to increase the capital stock of developing countries to help mitigate scarcity of capital and improve productivity of domestic factors of production. Unlike portfolio and official development aid, FDI not only helps transfer capital but also management skills, and infrastructure economies of scale advantages to local firms (Blomstorm and Kokko (1998)). FDI is also thought of as a composite bundle of capital stocks, skills and technology (de Mello (1997)). Some of these benefits[2] are imperfectly tradable in the world market and can be acquired only through FDI inflow. In his survey article de Mello (1997) points out that the impact of FDI is expected to be greater, the greater the value-added content of FDI-related production and productivity spillovers associated with FDI, then FDI leads to increasing returns in domestic production.

The policy adopted by the host country government also matters in tapping the benefits of foreign investment. For instance, restrictive domestic content requirement raises efficiency concerns. The foreign investors' response is also different depending on whether they target the local market or export sector as host country government provide different incentives to different forms of entry and different sectors. Host countries often face trade-offs in choosing policy with respect to FDI. Tax/subsidy incentives lower tax

[2]The benefits from technology spillover are improved productivity, employment and gain in consumer surplus through increased production, infrastructure development, managerial skill, and economies of scale that facilitate trade.

revenue, domestic content and local ownership requirements bind inflow of foreign capital; and trade-offs between the short-term losses by domestic firms include crowding out and long-term employment gains from inflow of FDI (Khawar (1997)). The net effect of these policy measures and the response of FDI on host country welfare is not conclusive in the case of developing countries.

Affiliates of MNCs, however, need more than the policy of host country government. Often, they demand bilateral and multilateral agreements to ensure their benefits, avoid double taxation and aid in security. To this effect, developing countries sign bilateral investment treaties (BIT) with both developed and other developing countries to improve protection, guarantee benefits for both sides and avoid double taxation (UNCTAD (2000)). Membership in a multilateral investment guarantee agency (MIGA) is also seen as advantage to guarantee benefits and provide some security for investment (Baker (1999)). From the point of view of developing countries, the signing of the BIT and membership in MIGA attracts FDI along with development objectives to enhance the welfare of their society. However, there are some conflicts of interest in signing the agreements, and the net effect of them on the overall host country's welfare is not clear. The role of BIT and MIGA in securing benefits and enhancing welfare is also worth considering.

It is also well documented that the welfare effects of FDI depend on the level of the development and trade policy of the host country (Harris and Schmitt (2001)), the level of entry[3] by FDI[4] (Richardson (1998)), specific incentive policies by the host country's governments (Hanson (2001), Barros and Carbral (2000), Fumagalli (1999)), and absorptive capacity of host countries (Borenztein (1998)). However, most theoretical works focus on the welfare impact of FDI through tax competition among host country governments (Lai (2001)) and host country size (Haufler and Wooton (1999)).

Recent studies (Bhattacharjea (2002), and Razin and Sadka (2003), Smarzynska (2002)) clearly indicate the role of absorptive capacity, domestic market share and institutions. Bhattacharjea (2002) and Smarzynska (2002) show that for local firms to benefit from inflow the FDI firm should have a large home market share (domestic-market-oriented). In most developing economies, due small local markets or lack of purchasing power, FDI firms target other neighboring markets or sell back their home country. This supports the absence of spillover effects in such host countries. It is also possible that since the inflow of FDI firms crowd out some local firms, at least those in the same industry, the net spill over effect on domestic firms may even be negative.

The study by Razin and Sadaka (2003) reinforces the possibility of absence (or

[3] Forms of entry by MNCs (FDI, licensing, joint venture) are also found to affect national welfare differently as host countries follow different policies with respect to each form of entry (Moran (2000), Teng (2001)). However, in this paper no distinction is made.

[4] This is measured by ownership share of foreign firms in a host country, either full ownership (FDI), joint venture, subsidiary or branch.

negative in the extreme case) of spill over effects in those developing countries characterized by lack of transparency. Their study show that the gain form FDI firms hinges on the strength of financial institutions, corporate governance and accounting standards. Under this situation, FDI firms use their superior technologies and management experiences to reveal the true value of the productivity factor. But again FDI firms prefer a host country with incomplete information and with weak institutions not to reveal the true value of the productivity factor. To this effect, developing countries with weak institutional setup end up attracting capital flow mainly in the form of FDI. This hinders improvement in productivity and the transfer of what is available to other local firms.

The problem often faced in the analysis of the welfare impact of FDI is how to define the welfare of a host country. Khawer (1997) and Harris and Schimitt (2001) define welfare of a host country as national income, which is the sum of all forms of factor incomes, while Teng (2001) uses the sum of consumer and producer surplus to account for the welfare effect of FDI. To fully account for the welfare effect, one should include both direct and indirect effects. Empirically, these effects can be measured through the three channels [improved productivity, penetration of foreign market (export) and the domestic fixed capital formation (crowd-in/out effects)] used as a proxy for both direct and indirect effects of FDI inflow on host country welfare.

Previous empirical studies considered each of these impacts on welfare separately. For instance, the impact of FDI on local firm productivity was addressed by Djankov and Hoekman (1998) for Czech, Egger and Pfaffermayr (1999) for Austria, Liu and *et al*. (2001) for China, Konings (1999) for emerging economies and Aitken and Harrison (1999) for Venzuela. The only empirical study on the role of FDI to help penetrate foreign market for exports is by Aitken, Hanson and Harrison (1997) for the case of Mexican manufacturing firms. Stuides by Lipsey (1999) and Eaton and Tamura (1996) also presented the trends in export behavior of East Asian firms following the entry of U.S. and Japanese MNCs. Agosin and Mayer (2000) present evidence for the crowding-out effect of MNCs for the case of developing countries. This paper will reconsider the two channels of productivity and export through which FDI affects host country welfare for the cases of U.S. and Japanese FDI in developing countries.

The results of previous studies are mixed. Djankov and Hoekman (1998) and Aitken and Harrison (1999) find a positive impact of foreign firms on local firms productivity. Aitken, Hanson and Harrison (1997) also find is a positive externality from foreign firms which enhances the export prospects of local firms. On the other hand Khawar (1997) and Agosin and Mayer (2000) indicate the presence of trade-off between government objectives by crowding-out domestic firms at least in the short run. Egger and Pfaffermayr (1999) also show that although foreign firms induce labor-augmenting productivity, job creation by foreign firms is overestimated. Konings (1999) show negative spillover effects to domestic firms for the case of Poland. For the case of oil-exporting Arab countries, Sadik and Bolbol (2001) fail to support the productivity spill over effects form foreign firms to local firms. Some of the reasons, specific to

developing countries, include lack of absorptive physical, human and institutional capacity to tap the benefits from FDI firms. The purpose of this study is to take this issue one more step further and search for any spill over effects using disaggregated FDI and productivity data by industrial groups.

3. THEORETICAL FOUNDATION AND ECONOMETRIC SPECIFICATION

3.1. Theoretical Foundation

The level of analysis of most previous studies is either firm or country level. For those with firm level analysis, the networking, infrastructural and marketing externality benefits obtained by the overall industry may underestimate the spillover effects. The benefit to other firms in the same industry or even in other industries should be included to see the full effect of the presence of the FDI. For those studies at a country level alone, positive externalities in one industry may offset negative externalities in other industries, it only reflects the net effects. This study approaches the issue at the industry level. The assumption here is that if a foreign firm enters a particular industry in a host country, the benefit may trickle down to most firms in the industrial group since some of the benefits are in the form of networking and marketing skills.

Hanson (2001) defines the welfare effects of a host country that has received FDI as the sum of factor incomes net of subsidy provided by the host country to attract FDI.

Let the revenue function of a local firm is given by:

$$r^i = r^i(y_i, Y_i, \lambda_i(Y^d)) \tag{1}$$

where r^i is the revenue function, y_i is output of the local firm, Y_i is output of the rival foreign firm, Y^d is the domestic output of foreign firm, and λ_i captures the spillover effects from a foreign firm's domestic production to domestic industry. Also let w and z represent wages to labor (L) and the rate of return to capital (K), respectively, and a_i and b_i represent the per-unit labor and capital costs to produce a unit of output. Assuming that similar firms operate in an industry, one can extend this to industry level revenue function. To make it simple, the sum of individual firms return function can give us industry level function. This can be used to compute welfare function for a host country.

Let s represents the rate of subsidy provided by a host country government; welfare is given by the sum of a factor income net of subsidy:

$$\omega = wL + zK + \sum_i^n \left[r^i - (a_i + b_i)y_i\right] - sY_i \tag{2}$$

Welfare is affected by spillover effects through the local firm revenue function at the rate of λ_i. In this case, the spillover effects can be in the form of positive externality to help improve productivity and help penetrate the international market. The presence of foreign firms also implies positive externalities in the forms of infrastructure and training workers, which benefit the host country by crowding-in local firms. The crowding-out effects come through competition over limited resources and a market share that raises the unit costs (a_i and b_i) to drive local firms out of the market. Hence, the three channels of spillover effects can be captured by the welfare function.

In this paper to account for the two channels through which the presence of FDI in developing countries affect the welfare of a host country's productivity (the value added) and export of the host country are used as a proxy for the impact of a foreign firm's spillover effects. FDI from all source countries, the U.S., and Japan are considered in the estimation of productivity, value added and export equations. The control variables are the traditional growth and productivity determinants as well as the regional, country and industrial group dummy variables.

3.2. Econometric Specification

Consider the following basic augmented production function. It is similar to the one used by de Mello (1999), except that in this case foreign firms though FDI affects the technical component of the production function.

$$Y = A(F)\,\Phi(L, K, \Omega) \tag{3}$$

where Y is output, K is capital, L is labor, A captures the efficiency of production, Ω is a vector of control variables, and F denotes FDI flows. In this production function, it is assumed that FDI has role in terms of advance in technology (A) that helps to improve productivity and export market networking. Such an approach emphasizes the externalities or indirect impact on local firms in an industry subject to inward FDI. The presence of multinational corporations exerts contagion, demonstration and competition effects on local firms in an industry and therefore helps raise their productivity.

To estimate productivity model, a model can be developed - termed as "productivity spillover model" - that contrasts with an overall impact model (Liu *et al*. (2001)). An augmented version of the model used by Liu *et al*. (2001) is given below. Let $Y_{it}(P_{it}, E_{it})$ represents the two channels through which FDI affects the welfare of host countries, which leads to the following equation:

The general form of the estimated model is as given below:

$$Y_{ijt} = X_{ijt}\beta + \alpha_i + \delta_j + U_{ijt} \quad \text{where} \quad i = 1, \ldots\ldots, N \quad \text{and} \quad t = 1, \ldots\ldots T \tag{4}$$

The assumptions of this model are that X_{ijt} is 1x k vector of time varying regressors, α_i denotes the unobservable country specific effect, and δ_j denotes the unobservable industry specific factors. U_{ijt} denotes the remainder disturbance and is i.i.d. $N(0,\sigma_\varepsilon^2)$. $\alpha_{i'}$'s and δ_j's can be fixed or random.

In the above specification, the overall error term is assumed to have the usual Gauess-Markove's assumptions. But in the context of panel data where the sample is drawn from heterogeneous countries, the assumptions may not hold. In practice, panel (group-wise) heteroscedasticity is assumed in the model and panel-corrected estimation procedure is used to estimate the model (Back and Katz (1995)). Such model can take the following form:

$$Y_{ijt} = X_{jit}\beta + \delta_j + U_{ijt}$$

$$\text{where } i = 1,\ldots\ldots,N; j = 1,\ldots\ldots K \text{ and } t = 1,\ldots\ldots T \text{ and } U_{ijt} \sim N(0,\sigma_i^2) \qquad (5)$$

In this case, the country specific effect and the remainder disturbance are lumped together as overall error terms and panel-heteroscedasticity is introduced in the error term. Industry specific effects are controlled by dummy variables, since it is suspected that industry specific factors correlate with the other regressors. In this paper, as the test for homoscedasticity fails even after accounting for the country effects, panel-heteroscedasticity corrected model is estimated and it explains the data better than the usual fixed or random effect models.
The explanatory variables can be represented in a vector form as:

$$X_{ijt} = [FDI_{it}\ \ CAPITAL_{ijt}\ \ LABOR_{it}\ \ POLICY_{it}\ \ OCAPITAL_{it}\ \ EMPL_{ijt}]$$

where *i* stands for country, *j* for industry and *t* for time. Some of the explanatory variables have only country and time dimensions. The definitions of individual dependent variables are provided in the Appendix. FDI measures components of U.S. FDI flows and Japanese FDI flows to host countries as well as total FDI flows to host countries from all sources countries. Together with the total FDI, it is believed that other forms of capital flow in the form of official aid and official development assistance help to improve the welfare of a host country. OCAPITAL measures other forms of capital other than FDI, such as portfolio (bond and equity) investment, and official development assistance and aid. CAPITAL refers to industry level fixed capital formation. EMPL measures industry specific employment level. LABOR measures two variables, the economically active labor force in the host country and the indicator of skilled manpower. For the case of export and value added, industry level employment is also used to control for industry level employment.

POLICY refers to two variables, which include a dummy variable for the periods of

membership in Multilateral Investment Guarantee Agency (MIGA) and the number of Bilateral Investment Treaties (BIT) signed during each period. These agreements provide a kind of protection for foreign investors over future policy or government change. Other control variables include the number of firms in an industry, telephone main lines per 1000 people as a proxy for infrastructure, GDP per capita and the indicator of political uncertainty.

There is no a prior expected signs for FDI and OCAPITAL. But one would expect positive sign as most developing countries are capital-scarce and have relatively more unskilled labor. Capital intensity of an industry (CAPITAL) is expected to have a significant positive impact on productivity and export of host country industries. Policy and labor, especially the availability of skilled labor force, are also expected to increase productivity and export of local firms. LABOR and POLICY are expected to have a positive impact as argued by the proponents of FDI in order to promote the development of host countries through technology transfer in all models considered.

4. ESTIMATION AND DATA

The data for this study is drawn from the World Bank Trade and Production CD-ROM and the World Bank World Development Indicators CD-ROM for sample developing countries. The selection of countries is based on availability of data for both productivity as well as U.S. and Japanese FDI data. The World Bank Trade and Production CD-ROM provides detailed trade and production data by country and by industrial group from 1979-1999. FDI data for the U.S. is obtained from the Bureau of Economic Analysis. For Japanese FDI, data is obtained from the Japanese Ministry of Finance website. Both the U.S. and Japanese FDI data is available from 1987-1998 that limits the sample period used in this study. Some countries have incomplete observations on productivity and capital by industrial group, which makes the panel unbalanced. Major macro-economic variables are the same during a given year for an industrial group in a host country. Sample host countries are taken from Africa, Asia, and Latin America. For the detailed list of variables used in estimation see description of the data in the Appendix. Table 1 presents mean values of the dependent variables (productivity, value added and value added) and FDI inflows for the sample countries for the period under investigation. It is easy to see that Asian tigers have high productivity and export compared to other developing countries.

Together with FDI flow from all source countries to developing countries, disaggregated U.S. and Japanese FDI by major industrial groups are also used to explain the two welfare indicators of a host country. U.S. and Japanese FDI data is further disaggregated into manufacturing and non-manufacturing. From manufacturing and non-manufacturing industrial groups, dominant sectors are picked to see their effects on productivity and export. From manufacturing, food producing, and from non-manufacturing, trade and service sub-sectors are selected. In addition to total FDI value,

number of FDI firms in a host country is also used to see if the values and numbers of FDI result in different conclusions. Finally, source countries exports (as opposed to FDI) are also tested for the roles in affecting a host country's productivity and exports to the rest of the world.

To see the robustness of the result, estimation is also made controlling for industry-specific factors. Simultaneous control of both country and industry specific factors is attempted. First, industry dummies are created for the 27 of the 28 industrial groups. Then these dummies are used in estimating random effects models that controls for country-specific factors. Regional dummy variables for the two regions, Africa and Asia, are also incorporated in the estimation, taking Latin America as a base.

Equation (5) is estimated for each FDI variable taking into account the dummy variables and other control variables. First, total FDI from all sources are used as the explanatory variable, including the control variables under three estimation alternatives: controlling for country effects, controlling for industry effects and controlling for both country and industry effects. A similar procedure is followed for the case of total FDI from U.S. and Japan, manufacturing, non-manufacturing, food, trade and service sub-sectors.

Most variables are transformed by taking ratios to account for the size of the host country and the non-stationary nature of some variables. For instance, total FDI as well as U.S. and Japanese FDI variables are divided by the GDP of host countries. U.S. and Japanese FDI to different industrial groups are divided by total FDI from the respective source countries. Similarly, other forms of capital such as bond and equity portfolios as well as official development assistance are also divided by host country GDP. The economically active labor force is also taken as a ratio to total population.

This study is different from other similar studies in three ways. First, the two components of determinants of welfare are used for analysis using data disaggregated by industrial groups. Second, the estimation is conducted to see the effects of the major capital-exporting countries, U.S. and Japan, for the purposes of comparison, and third, sample countries are taken from three regions, which represent developing economies to draw lessons for the respective regions.

5. RESULTS AND DISCUSSION

The results of this study show that the total FDI inflow to developing countries lowers productivity and value added in the host countries. The same is true for the case of U.S. FDI. None of the FDI that goes to different sub-sectors in a host country facilitates improvements in productivity or value added. This result proves that the expected spillover effect from FDI is not materialized in the cases of sample developing countries. Estimation results of the determinants of a host country's productivity, value added and total exports including total FDI from all source countries in shown in Tables 2-4 in the Appendix. The difference between the three tables in the appendix is the

variables used to account for the specific effects in the model. In the three cases the impact of the control variables are more or less the same. This is true even when one uses U.S. and Japanese FDI variables and their components. Since the impact of the control variables are similar in almost all cases, only the coefficients of U.S. and Japanese FDI and their components are reported (Tables 5-7) under the three alternative estimation approaches.

Most control variables have significant effects on productivity, value added and exports (Table 4). The results show that productivity improvement is observed in those countries, which sign BITs and have more skilled manpower, GDP per capita and inflows of portfolio investment (both in bonds and equity). The capital intensity of industrial groups also improves productivity of a host country as expected. Surprisingly, total FDI and official development assistance and aid lower productivity of the host countries.

Similar results are observed for value added, the exception being the total labor force (as opposed to skilled labor force) and employment at the industry level increase the value added. Most other variables have similar impacts as shown in productivity model.

The result for the total host country's exports is different, in that total FDI increases exports from host countries, unlike its impact on productivity and value added. The change in the sign of total FDI in the export equation proves that FDI inflow in developing countries targets the export sector or tends to export products so local firms follow suit and take advantage of the infrastructure and marketing skills of foreign firms. The employment level at each industry, total labor force and skilled manpower also increase the exports of host countries. This result is expected, as most developing countries have comparative advantage in labor-intensive products to compete in the international market. Estimation results controlling for both country and industry effects are presented in the table below.[5]

The impact of U.S. and Japanese total FDI as well as their major components on productivity, value added and total export is reported in Tables 5-7. None of the U.S. and Japanese FDI variables have any positive impacts to improve host country productivity. Rather, most of U.S. FDI components impede productivity enhancement. For the U.S., total FDI, non-manufacturing FDI, food processing FDI, and trade and service FDI have negative and significant impact on productivity. For the case of Japan, it is only manufacturing FDI that has a similar effect. The remaining FDI components have negative signs but insignificant. The result of negative spillover effect is in line with the findings of Konings (1999) for the case of Poland. The exports of Japan to the host countries improve productivity, even though the reverse is true for the case of U.S. export (Table 7). Servicing local market through export, not through FDI, is beneficial for a host country to improve productivity for the case of Japan.

[5] Estimation results that separately control for country and industry effects are presented in Tables 2 and 3 in the appendix.

Table 4. Determinants of Productivity, Value Added and Total Export of Host Countries: FDI from all Countries Controlling for Country and Industry Specific Effects

Variable	Labor Productivity	Value Added	Total Export
Capital Intensity	0.003***	0.002	-0.003**
	(5.58)	(1.41)	(-2.09)
Number of Workers	-	0.001***	0.001**
		(20.79)	(2.73)
Number of Firms	-0.001***	-0.001*	-0.001***
	(-4.77)	(-1.68)	(-2.95)
African Dummy	-0.006	0.668***	1.02***
	(-0.15)	(8.09)	(8.99)
Asian Dummy	-0.55***	0.64***	0.86***
	(-22.04)	(13.04)	(13.66)
Bilateral Investment Treaty	0.03***	0.08***	0.013
	(7.7)	(9.88)	(1.3)
Multilateral Investment Guarantee Agency	-0.058***	-0.27***	-0.17***
	(-2.9)	(-6.78)	(-3.26)
GDP per capita	0.001***	0.001***	-0.001*
	(20.98)	(26.03)	(-1.85)
Total FDI	-0.02***	-0.13***	0.13***
	(4.43)	(-12.89)	(12.1)
Labor Force	-1.32***	1.63**	3.88***
	(-3.42)	(2.32)	(4.12)
Skilled Labor Force	0.006***	-0.002	0.03***
	(8.16)	(-1.36)	(13.29)
Bond Portfolio Investment	2.12*	4.77*	-8.01**
	(1.85)	(1.75)	(-2.7)
Equity Portfolio Investment	9.02***	23.19***	3.78
	(8.23)	(9.28)	(1.55)
Official Development Assistance and Aid	-1.67***	-17.05***	-8.67***
	(-5.49)	(-24.16)	(-8.22)
Infrastructure	-0.002***	-0.015***	0.001
	(-6.28)	(-16.67)	(1.09)
Political Instability	0.09***	0.27***	0.55***
	(3.83)	(5.28)	(7.94)
Political Instability Square	-0.007**	-0.024***	-0.055***
	(-2.29)	(-3.73)	(-6.37)
Constant	1.85***	11.02***	-6.95***
	(10.26)	(36.9)	(-16.27)
Wald test chi2	18523***	14171***	3739***
Number of Observations	4462	4462	4333
Number of Countries	22	22	22
Number of Industrial Groups	28	28	28

Notes: * p < 10%, ** p < 5%, *** p < 1%. Numbers in parentheses are *t*-ratios.

The impacts on value added are slightly different. Most variables turn out to be significant with the negative signs similar to those in the productivity model. One exception is that the U.S. manufacturing FDI has a positive and significant impact on the value added. The number of U.S. FDI also improves productivity in the host country (Table 7). U.S. exports to host countries, unlike Japanese exports, increases value added in host countries. Hence, only U.S. manufacturing FDI firms and U.S. exports improve net total production in the sample developing countries.

Table 7. Role of U.S. and Japanese FDI on Host Countries Productivity and Total Export: Controlling for Both Country and Industry Specific Effects

Variable	Labor Productivity	Value Added	Total Export
US FDI	-0.13***	-0.38***	-0.29***
	(-7.22)	(-9.7)	(-5.6)
Japanese FDI	0.001	-0.001***	0.001
	(1.47)	(-13.07)	(0.63)
Number of U.S. FDI	-0.001***	0.003***	0.002***
	(-5.57)	(16.86)	(9.26)
Number of Japanese FDI	0.001	-0.003***	0.002**
	(0.96)	(-5.34)	(2.11)
US FDI: Manufacturing	-0.058	0.92***	0.31**
	(-1.26)	(9.94)	(2.57)
Japanese FDI: Manufacturing	-0.08*	-0.38***	0.08
	(-1.82)	(-4.36)	(0.69)
US FDI: Non-manufacturing	-0.14***	-1.25***	-0.208**
	(-3.52)	(-14.8)	(-1.97)
Japanese FDI: Non-manufacturing	0.004	-0.72***	-0.002
	(0.09)	(-8.59)	(-0.017)
US FDI: Food Processing	-0.062	-0.59	-0.016
	(-2.05)	(-0.95)	(-0.24)
Japanese FDI: Food Processing	-0.033	-0.13**	-0.019
	(-1.08)	(-2.11)	(-0.28)
US FDI: Trade & Service	-0.13***	-0.19**	0.066
	(-3.33)	(-2.28)	(0.645)
Japanese FDI: Trade & Service	-0.019	-0.04	-0.062
	(-0.51)	(-0.48)	(-0.677)
US Export to Host Countries	-0.001**	0.0001***	0.0001**
	(-2.79)	(2.94)	(2.13)
Japanese Export to Host Countries	0.0001**	-0.0001***	0.001
	(2.1)	(-4.86)	(0.533)

Notes: * p < 10%, ** p < 5%, *** p < 1%. Numbers in parentheses are *t*-ratios.

In the export equation most variables are insignificant but have negative signs. Exports are enhanced by the presence of U.S. manufacturing FDI. The presence of more number of U.S. FDI firms also improves total exports, despite the negative sign on the total FDI (value) of U.S. firms. U.S. non-manufacturing FDI also lowers a host country's exports. Exports of U.S. to host countries increase exports by host countries to the rest of the world. This result seems to support the idea that exports by U.S. firms target neighboring markets; and local firms may benefit from U.S. export to the rest of the world. Japanese exports to host countries have no effect on exports by host countries. Estimation results that control for both country and industry effects are presented in the table below.[6]

6. CONCLUSION

Both theoretical and empirical studies focus on the determinants of FDI flow in general and the roles of host and home country characteristics and policies towards FDI. Recently, most developing country governments have raised concerns as to the contribution of the presence of foreign firms on the welfare of their respective economies. Recent drive for globalization and the increased role of multinational firms in trade and investment even takes the question to a higher level for the case of developing countries.

There are few empirical works that address the roles of FDI on the welfare of host countries, and most previous studies analyze only part of the welfare components, particularly, the productivity effects of FDI. Only one study addresses the roles of FDI through the export market penetration (Aitken *et al*. (1997)). Most studies conduct their research in the context of one country, the results of which may not necessarily be generalized to other economies. However, to understand the full welfare effects of FDI, the roles through the different channels, which affect economic agents in each host country, should be addressed.

The impacts of FDI on host country's productivity, value added and exports are analyzed in this study. The flows of total FDI from all source countries as well as industry level disaggregated FDI from the U.S. and Japan during the period 1989-1998 to sample developing countries are considered. The results of this study show most FDI flows from most sources resulted in negative spillover effects on the host country's productivity. Positive spillover effects from U.S. and Japanese firms in a host country are not supported for the cases of sample developing countries. Only U.S. manufacturing FDI increases value added of host countries. Presence of FDI from all sources, the number of U.S. FDI firms, and U.S. manufacturing FDI also increase exports of host

[6] Estimation results that separately control for country and industry effects are presented in Tables 5 and 6 in the appendix.

countries to the rest of the world. On the other hand, productivity is enhanced by foreign portfolio investment, availability of skilled manpower, capital intensity and BITs. Official development assistance and aid have negative and significant effects on a host country's productivity, value added and exports.

Host country governments should look into the bilateral and multilateral investment agreements to secure the benefits from foreign firms. Also, for the success of technology transfer, compatibility and suitability of the technologies for local firms in a host country should be studied carefully to benefit from inflow of foreign capital and technology.

It becomes clear that the link between capital flow and host country indicators is not static. Specially, it takes time for host country firms to build the capacity to absorb the benefit from the presence of foreign firms. Hence analysis of such spillover effect in a dynamic setting, particularly for the case of developing counties, is warranted.

APPENDIX

Data

All the variables used in this paper are in annual frequency. The main source of data for the U.S. FDI is the Bureau of Economic Analysis (BEA) publication (U.S. Direct Investment Abroad: Operations of U.S. Parent Companies and Their Foreign affiliates (Table 17. U.S. Direct Investment Position Abroad on a Historical-Cost Basis and Table 1. Selected data for foreign affiliates in all countries in which investment was reported). Data for Japanese FDI is obtained from the Japanese Ministry of Finance website (http://www.mof.go.jp/english/e1c008.htm). Trade and production data by industrial groups is obtained from the World Bank Trade and Production CD-ROM. All the other variables except bilateral trade, BIT, and membership in MIGA are taken from the CD-ROMs of World Development Indicators and International Financial Statistics of International Monetary Fund. Data on bilateral trade (exports and imports) is taken from the Direction of Trade Statistical Yearbook; BIT and membership in MIGA information is compiled from United Nations and World Bank publications [UN, Bilateral Investment Treaties 1959-1999, 2000; World Bank, Convention Establishing the Multinational Investment Guarantee Agency (MIGA), 2001]. Political instability index is taken from the Freedom House Annual Survey 1970-2000. The following is a list of variables used in the regression analysis.

List of Variables

Productivity (*labor*): computed as the ratio of value added to number of employees or persons engaged by country and by industrial.

Value Added: the difference between value of total output and intermediate materials used by country and by industry group.

Firms: Number of sample establishment by country and by industry group.
Labor: Number of employees or persons engaged by country and by industry group.
Capital Intensity: Gross fixed capital formation for the sample establishments in each industrial group.
Export: Value of total export as a share of total output by industry group.
Foreign Direct Investment: Value of total foreign direct investment, net by country.
U.S. FDI: for each country the value of the following disaggregated FDI values are used: Foreign direct investment, Foreign Direct Investment in Manufacturing (total), Foreign Direct Investment in Food, Foreign Direct Investment in Trade and Service, Foreign Direct Investment in Non-manufacturing (total) and number of FDI firms.
Japanese FDI: for each country the value of the following disaggregated FDI values are used: Foreign Direct Investment, Foreign Direct Investment in Manufacturing (total), Foreign Direct Investment in Food, Foreign Direct Investment in Non-manufacturing (total), Foreign Direct Investment in Trade and Services and number of FDI firms.
Exports from U.S.: Value of U.S. Exports to host countries.
Exports from Japan: Value of Japanese Exports to host countries.
Bilateral Investment Treaty: Number of Bilateral Investment Treaties signed during each year by country.
Multilateral Investment Guarantee Agency: Dummy for years of membership in Multilateral Investment Guarantee Agency.
Political instability: indicator (ranges from 1(stable) to 7(instable)) taken from Freedom House Annual Survey 1972-2000.
The following control variables are also used in estimating the model.
Gross Domestic Product per capita, Labor force, total population, telephone mainlines per 1,000 people.
Official development assistance and official aid.
Portfolio investment (*bonds*) *and Portfolio investment* (*equity*).

Table 1. Mean of Some of the Variables used in the Productivity, Export and Value Added Models: 1989-1998

COUNTRY	PRODL	VADD	EXPTO	USFDINO	JPFDINO	RUSFDI	RJPFDI	NFDI
Bangladesh	1.03	9.71	0.38	2.5	3.35	0.67	11.6	0.01
Bolivia	2.24	8.86	0.28	9.28	0	0.17	1	0.96
Cameroon	2.54	9.42	0.32	8.73	0	0.31	0.9	-0.05
Chile	3.54	12.26	0.18	130.14	6.57	0.05	13.69	3.31
Colombia	2.85	12.23	0.19	139.4	1	0.22	2.67	1.44
Ecuador	2.34	10.05	0.13	63.61	0.54	0.21	1.36	1.92
Egypt	1.67	11.56	0.11	63.88	0.56	0.24	0.45	1.87
Ethiopia	1.54	9.01	0.10	1.89	0	0	1	0.35
Hong Kong	3.23	12.08	12.72	421.33	145.56	0.25	140.75	-
India	1.16	12.95	0.33	78.33	9.44	0.33	0.58	0.17
Indonesia	1.75	12.62	0.76	145.54	113.64	0.22	8.71	1.19
Kenya	1.25	9.81	0.24	23.82	0.2	0.02	0.8	0.15
Korea, Rep.	3.81	14.84	0.26	167.65	34.62	0.19	11.33	0.38
Malaysia	2.7	12.33	0.64	150.18	84.13	0.23	130.78	5.29
Mexico	2.97	13.02	0.30	608	7.2	0.42	5.99	1.52
Morocco	2.35	11.31	0.26	17.52	0	0.12	1	0.85
Pakistan	1.96	11.01	0.35	22.99	0.67	0.66	2.34	0.48
Panama	2.72	9.29	0.17	126.21	146.31	1.44	2587.16	3.33
Peru	3.05	11.77	0.08	58.55	0.58	0.44	0.83	1.17
Philippine	2.19	11.95	0.38	127.15	51.3	0.24	51.56	1.59
Singapore	3.61	12.22	2.29	351.39	89.11	0.28	204.01	10.61
South Africa	2.83	13.28	0.87	104	0	0.01	1	0.21
Sri Lanka	1.32	9.84	1.34	5.09	5.35	0.11	14.91	0.88
Trinidad a	2.62	9.36	0.43	27.41	0.19	0.35	1.18	5.55
Uruguay	2.97	10.82	0.20	26.14	2	0.06	2.04	0.36
Venezuela	3.02	12.36	0.14	219	3.2	0.22	9.74	1.26

Notes: PRODL = Value added per number of employees, VADD = Value added by industrial group, EXPTO = Ratio of total export to total output by industrial group, USFDINO = Number of U.S. FDI in a host country, JPFDINO = Number of Japanese FDI in a host country, RUSFDI = Ratio of Total U.S. Foreign Direct Investment (FDI) to GDP, RJPFDI = Ratio of Total Japanese FDI to GDP, NFDI = Ratio of Total FDI to GDP.

Table 2. Determinants of Productivity, Value Added and Total Export of Host Countries: FDI from all Countries Controlling for Country Specific Effects

Variable	Labor Productivity	Value Added	Total Export
Capital Intensity	0.023***	0.014***	-0.002
	(24.19)	(10.65)	(-1.27)
Number of Workers	-	0.001***	0.001***
		(23.22)	(3.57)
Number of Firms	-0.01***	0.001	-0.001
	(-8.75)	(0.65)	(-1.51)
African Dummy	-0.187**	0.74***	1.058***
	(-2.84)	(6.88)	(7.53)
Asian Dummy	-0.657***	0.52***	0.8***
	(-16.24)	(7.89)	(10.34)
Bilateral Investment Treaty	0.027***	0.071***	0.012
	(4.35)	(6.85)	(1.00)
Multilateral Investment Guarantee Agency	-0.13***	-0.256***	-0.14**
	(-4.25)	(-4.71)	(-2.22)
GDP per capita	0.001***	0.001***	-0.001
	(13.6)	(18.55)	(-1.27)
Total FDI	-0.011*	-0.119***	0.141***
	(-1.74)	(-9.41)	(10.97)
Labor Force	0.387	0.817	4.54***
	(0.701)	(0.921)	(4.24)
Skilled Labor Force	0.004***	0.001	0.027***
	(3.84)	(0.486)	(11.0)
Bond Portfolio Investment	4.36**	4.22	-11.61***
	(2.25)	(1.234)	(-3.17)
Equity Portfolio Investment	10.29***	19.46***	4.24
	(5.57)	(6.19)	(1.29)
Official Development Assistance and Aid	-1.887***	-14.76***	-7.98***
	(-4.35)	(-18.28)	(-6.29)
Infrastructure	0.003***	-0.014***	0.001
	(-5.403)	(-12.07)	(0.33)
Political Instability	0.136***	0.299***	0.46***
	(3.45)	(4.37)	(6.14)
Political Instability Square	-0.011**	-0.028***	-0.05***
	(-2.26)	(-3.19)	(-5.11)
Constant	1.318***	9.47***	-7.50***
	(5.18)	(24.31)	(-16.42)
Wald test chi2	4999***	8099***	823***
Number of Observations	4462	4462	4333
Number of Countries	22	22	22
Number of Industrial Groups	28	28	28

Notes: * p < 10%, ** p < 5%, *** p < 1%. Numbers in parentheses are *t*-ratios.

Table 3. Determinants of Productivity, Value Added and Total Export of Host Countries: FDI from all Countries Controlling for Industry Specific Effects

Variable	Labor Productivity	Value Added	Total Export
Capital Intensity	0.027***	0.017***	-0.003
	(19.55)	(8.12)	(-1.39)
Number of Workers	-	0.001***	0.001***
		(21.76)	(3.76)
Number of Firms	-0.001***	-0.001	-0.001
	(-5.66)	(-0.58)	(-1.59)
African Dummy	-0.175***	0.77***	1.29***
	(-3.98)	(7.81)	(10.96)
Asian Dummy	-0.64***	0.57***	1.02***
	(-21.87)	(8.82)	(13.25)
Bilateral Investment Treaty	0.019***	0.095***	-0.003
	(4.07)	(9.07)	(-0.26)
Multilateral Investment Guarantee Agency	-0.094***	-0.23***	0.066
	(-4.17)	(-4.5)	(1.09)
GDP per capita	0.001***	0.001***	-0.001*
	(16.6)	(20.24)	(-1.66)
Total FDI	-0.02***	-0.12***	0.14***
	(-4.16)	(-10.22)	(10.04)
Labor Force	-0.923**	1.36	3.29***
	(-2.41)	(1.58)	(3.38)
Skilled Labor Force	0.005**	-0.001	0.03***
	(7.05)	(-1.29)	(16.15)
Bond Portfolio Investment	5.61***	16.37***	-15.63***
	(3.62)	(4.82)	(-3.83)
Equity Portfolio Investment	11.71***	17.15***	3.13
	(7.96)	(5.27)	(0.81)
Official Development Assistance and Aid	-2.08***	-14.69***	-8.63***
	(-7.05)	(-22.17)	(-10.19)
Infrastructure	-0.003***	-0.02***	0.001
	(-6.12)	(-14.17)	(0.81)
Political Instability	0.13***	0.47***	0.38***
	(4.65)	(7.29)	(4.89)
Political Instability Square	-0.01**	-0.05***	-0.04***
	(-2.77)	(-7.05)	(-4.44)
Constant	1.69***	9.16***	-7.35***
	(9.68)	(23.57)	(-16.67)
Wald test chi2	7380***	6530***	1129***
Number of Observations	4462	4462	4333
Number of Countries	22	22	22
Number of Industrial Groups	28	28	28

Notes: * p < 10%, ** p < 5%, *** p < 1%. Numbers in parentheses are *t*-ratios.

Table 5. Role of U.S. and Japanese FDI on Host Countries Productivity and Total Export: Controlling for Country Specific Effects

Variable	Labor Productivity	Value Added	Total Export
US FDI	-0.077**	-0.337***	-0.324**
	(-2.68)	(-6.58)	(-5.25)
Japanese FDI	-0.001	-0.001***	0.001
	(-0.61)	(-10.46)	(0.551)
Number of U.S. FDI	-0.001***	0.003***	0.002***
	(-3.62)	(13.42)	(6.36)
Number of Japanese FDI	-0.001	-0.003***	0.001
	(-0.68)	(-4.52)	(1.39)
US FDI: Manufacturing	0.019	1.06***	0.31**
	(0.255)	(8.21)	(2.39)
Japanese FDI: Manufacturing	-0.11	-0.42***	0.026
	(-1.38)	(-3.44)	(0.19)
US FDI: Non-manufacturing	-1.15**	-1.34***	-0.23*
	(-2.41)	(-12.07)	(-1.89)
Japanese FDI: Non-manufacturing	0.003	-0.62***	0.002
	(0.04)	(-5.51)	(0.019)
US FDI: Food Processing	-0.034	-0.05	-0.04
	(-0.713)	(-0.663)	(-0.48)
Japanese FDI: Food Processing	-0.07	-0.25***	-0.032
	(-1.35)	(-2.85)	(-0.35)
US FDI: Trade & Service	-0.06	-0.218*	0.04
	(-0.99)	(-1.92)	(0.3)
Japanese FDI: Trade & Service	-0.04	-0.11	-0.04
	(-0.62)	(-1.03)	(-0.37)
US Export to Host Countries	0.0001	0.0001***	0.0001**
	(1.1)	(7.45)	(2.58)
Japanese Export to Host Countries	-0.0001	-0.0001***	0.0001
	(-0.189)	(-7.15)	(0.13)

Notes: * p < 10%, ** p < 5%, *** p < 1%. Numbers in parentheses are *t*-ratios.

Table 6. Role of U.S. and Japanese FDI on Host Countries Productivity and Total Export: Controlling for Industry Specific Effects

Variable	Labor Productivity	Value Added	Total Export
US FDI	-0.087***	-0.51***	-0.32***
	(-3.915)	(-10.66)	(-5.24)
Japanese FDI	0.001	-0.001***	0.001
	(0.925)	(-10.38)	(1.43)
Number of U.S. FDI	-0.001***	0.004***	0.002***
	(-3.19)	(15.53)	(4.96)
Number of Japanese FDI	0.001	-0.003***	0.001
	(0.944)	(-7.75)	(0.96)
US FDI: Manufacturing	-0.08	1.04***	0.22*
	(-1.62)	(9.66)	(1.93)
Japanese FDI: Manufacturing	-0.067	-0.403***	0.014
	(-1.26)	(-3.53)	(0.12)
US FDI: Non-manufacturing	-0.14***	-1.51***	0.036
	(-3.11)	(-17.14)	(0.35)
Japanese FDI: Non-manufacturing	-0.007	-0.63***	-0.13
	(-0.16)	(-6.63)	(-1.25)
US FDI: Food Processing	-0.028	-0.177**	-0.002
	(-0.87)	(-2.506)	(-0.04)
Japanese FDI: Food Processing	-0.11***	-0.32***	0.006
	(-3.01)	(-3.95)	(0.076)
US FDI: Trade & Service	-0.04	-0.48***	0.12
	(-0.95)	(-5.19)	(1.25)
Japanese FDI: Trade & Service Sector	-0.04	-0.04	-0.13
	(-0.92)	(-0.49)	(-1.37)
US Export to Host Countries	-0.0001	0.001***	0.0001***
	(-0.74)	(7.09)	(3.46)
Japanese Export to Host Countries	0.0001	-0.0001***	-0.0001
	(1.21)	(-7.51)	(-1.13)

Notes: * p < 10%, ** p < 5%, *** p < 1%. Numbers in parentheses are *t*-ratios.

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