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DETERMINANTS OF CAPITAL INTENSIVE AND R&D INTENSIVE FOREIGN DIRECT INVESTMENT

by

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Determinants of Capital Intensive and R&D Intensive Foreign Direct Investment*

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Abstract

We study the determinants of capital intensity and technology content of foreign direct investment, an important economic driving force for developing countries. For this purpose, we use sectoral industry data on U.S. foreign investment abroad, and data on host countries' institutional characteristics, like investment climate, protection of property rights, labor standards and constitutional arrangements. Our regressions show that better protection of property rights has a significant positive effect on R&D but not on capital intensive capital flows. There is evidence that an increase in workers' bargaining power results in a reduction of capital and technologically intensive foreign investment. And although the evidence with respect to constitutional arrangements is not very strong, presidential regimes appear to be less able than parliamentary ones to deliver policies attracting R&D intensive capital flows. This is consistent with recent research on the effects of constitutional arrangements on economic growth.

1 Introduction

There has been a spectacular increase in capital flows in the last two decades. In particular, foreign direct investment (FDI) has been growing three times as fast as total investment between 1980 and 2000. Over this period, there has been also a change in the nature of FDI flowing to developing countries. Previously, foreign investment was concentrated to the extraction of natural resources for

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shipment abroad. Nowadays, as developing countries become wealthier, investment diversifies into production of consumer goods for their local markets. The increasing size and variety of these flows has made both economists and policy makers interested in understanding their determinants and effects. Research, on the one hand, tries to understand how FDI affects productivity and growth, or income inequality and the environment. On the other hand, many studies try to pinpoint the host and source country and industry characteristics behind FDI flows. A question of interest among developing countries is what policies are better at attracting much needed capital and new technologies. A number of studies have found that institutional quality is a positive determinant of FDI (and thus, in particular, corruption is a negative determinant), higher taxation reduces capital flows, and more protection of intellectual property rights attracts high-tech investment. The data shows mixed results on other dimensions of policy. For example, Rodrik (1996) found that countries with higher labor standards attract more FDI, an effect that seems to disappear when controlling for political risk (see Cho (2003)). And measures of labor costs and workers' bargaining power are found to have a negative effect on FDI (Smarzynska and Spatareanu (2005) and Cooke (1997)).

In this essay, we analyze the determinants of FDI by looking at the determinants of FDI composition. This is done by studying the interaction between some industry characteristics and host country characteristics. We use capital intensity and R&D expenditures for industry characteristics[1] and measures on protection of property rights, labor standards and constitutional arrangements for host country characteristics. Our regressions show that a better protection of property rights attracts high-tech investment; a result which is not surprising, given the correlation that exists between the overall protection of property rights and the degree of protection of intellectual property rights. But FDI flowing to countries with a low protection of property rights is not biased to less capital intensive sectors. We also find that countries which give workers more bargaining power attract less capital intensive and high-tech investment. Finally, we find that a country's constitutional arrangement has an effect on FDI flows. We look at whether presidential regimes and majoritarian electoral systems, as opposed to parliamentary and proportional, respectively, have a differential effect on FDI. We find evidence of there being a negative effect of presidential regimes on R&D intensive FDI. This finding is consistent with recent results of Persson (2005) which show that these political institutions have an effect on growth rates.

For our empirical analysis, we use data on US investment abroad provided by the Bureau of Economic Analysis. They provide yearly FDI data between 1999 and 2003 for 14 industry categories. Both manufacturing and services data is reported, and capital and R&D intensity are calculated from this same data source. For host country institutions, we use an average of data for the nineties, since some measures do not have data available for more recent years. Ideally

[1] Helpman et al (2004) use capital intensity and R&D intensity as proxies for unobserved industry characteristics.

we would like to perform a panel regression. But, due to the lack of data and time variation, we instead do a cross-section analysis. As a first approximation, we look at the interactions of industry characteristics with the institutional variables that constitute the focus of our study. Given that other country characteristics might have differential effects on FDI composition, we then introduce interaction terms of industry characteristics with known determinants of FDI flows.[2]

This paper is organized as follows. In section 2, we summarize the state of the current literature on determinants of FDI, with a particular emphasis on the institutional characteristics that are subject to study in this essay. In section 3, we develop the hypotheses we want to test. Section 4 presents the econometric specification and describes the data used. Section 5 presents the results and in section 6, we conclude and describe prospective further research.

2 Related literature

Researchers have had an interest in understanding FDI from two different perspectives. Trade economists are interested in FDI as a substitute for trade exports. A firm has two ways of servicing a foreign market. It can either export final goods produced at home, or it can directly set up multiple production plants in those markets. The importance of this decision can be grasped by noting that the largest 500 multinationals control approximately 50% of world trade (Rugman 1988). There are many reasons why a firm might choose the second alternative over the first. The size of a host country market, its expected growth, input costs and natural resources, as well as its policy environment, are of importance for this decision. There is also a trade-off between proximity to costumers and the advantages of scale economies from concentrated production. Riker and Brainard (1997) use US firm level data to test this last hypothesis. They find evidence that tariffs and trade costs have a negative effect on the share of exports over total sales (exports plus affiliate sales), while plant economies of scale have a positive effect on the export share. More recently, Helpman et al (2004) introduce intraindustry heterogeneity into a standard proximity-concentration model. To control for omitted industry characteristics, they include measures of capital intensity and R&D intensity. They find that capital intensity has a significant negative effect on the ratio of exports to FDI sales, while there is no significant effect of R&D intensity.

Development economists are interested in the effects of FDI on host countries' productivity and growth performance, and its environmental and social implications. Aitken and Harrison (1999) studied if FDI flows had an effect on Venezuelan firms and found a small effect. Haskel et al (2002) studied the effect of FDI on a sample of UK manufacturing firms and found evidence of positive FDI spillovers, although the size of these effects was not very large. Given that

[2] We control for population size, GDP per capita, trade openness, human capital, and the size of the government as a proxy for tax rates.

even if there are few spillovers, FDI still brings new technologies and management skills to the host country, governments all over the world compete for investment from multinational corporations. In order to attract these capital flows, it is important to understand the factors influencing FDI decisions as well as the determinants of the composition of such flows.

Smith (2001) studied how foreign patent rights affected US exports, affiliate sales and licenses. She found that strong patent rights increase the flow of knowledge to affiliates, as the risk of imitation is reduced. Smarzynska Javorcik (2004) finds similar results using firm data for Eastern Europe and former Soviet Union countries. It is also found that weak protection deters FDI in technology-intensive sectors, and biases investment on projects focusing on distribution rather than local production. A number of papers have shown that host countries' institutional quality in general is a significant determinant of FDI flows.[3] Alfaro et al (2003) find evidence that institutional quality is the most important predictor of capital flows for the period 1971-1998**.** As measures of institutional quality, they use government stability, internal conflict, corruption, observance of the law, repudiation of contracts, and expropriation risk. Of these measures, the one that received most attention in the literature is corruption. Wei (2000) finds that corruption has a large negative effect on FDI using data on flows between 12 source countries and 45 host countries. The effect found is the economic equivalent of an increase of up to 50 percentage points in the tax rate. Finally, using the same firm level data of Smarzynska Javorcik (2004), Smarzynska and Wei (2000) find that corruption does not only discourage inward FDI, but also shifts the ownership structure towards joint ventures. They conclude that this is evidence of the value of a local partner in minimizing the costs of bureaucratic procedures. They find no effect of corruption on R&D intensive FDI, but technologically more advanced firms retain ownership in more corrupt countries.[4]

Another series of papers has studied the impact of labor market regulations and labor standards on FDI. Cooke (1997) found that US FDI was negatively affected by the presence of high levels of union penetration, centralized collective bargaining structures, and stiff restrictions on layoffs. Conversely, Rodrik (1996) found that countries with higher labor standards (as measured by the total number of International Labor Organization conventions ratified by the country) attract more FDI. Recently, Cho (2003) showed that replicating Rodrik's regression with political stability as an added regressor eliminated the significance of labor standards on FDI flows. In her regressions, it is a higher level of political risk that discourages FDI flows. Smarzynska Javorcik and Spatareanu (2005) use firm level data for 25 European countries and find that greater flexibility in the host country's labor market (measured by flexibility of

[3] In fact, there is a strong correlation between these measures of institutional quality and the measures of protection of patent rights used in the above mentioned papers.

[4] See also Henisz (2000), who examines the effect of corruption on FDI, market entry, and ownership mode for US based multinational firms, finding at most a positive effect of corruption on FDI flows. Hines (1995) also failed in finding a negative correlation between aggregate FDI inflows and corruption levels in host countries.

dismissals, length of notice period, and required severance payments) is associated with larger FDI flows. FDI in service sectors appears to be more affected than investment in manufactures, something they attribute to services being more labor intensive than manufactures.

There is another literature that studies the effects of constitutions on economic policymaking. Persson and Tabellini (2003 and 2004) have found systematic and quantitatively large effects of both electoral rules and forms of governments on fiscal policy and corruption. They find that the size of the government, as a percentage of GDP, is 5 percentage points lower in countries with presidential regimes and majoritarian electoral systems. There is also an effect of these constitutional variables on the composition of expenditure, with welfare spending being 2 percentage points lower in countries with presidential regimes and majoritarian electoral systems. Although this research started with the aim of empirically validating theoretical models of how the rules of policymaking affected actual policy[5], it is spreading in new directions. Persson (2005) combines these insights with research on long-run economic development that shows certain structural policies to be essential for economic performance. He shows constitutional arrangements to have an effect on some structural policies (protection of property rights, and trade openness) that promote long-run economic growth. In particular, he finds that parliamentary democracies with proportional representation produce the most growth promoting policies.

3 Hypotheses to be tested

We are primarily interested in the determinants of the composition of FDI flows. Therefore, we need to differentiate these flows according to some dimensions that might be of interest both to the economic researcher and the policymaker. We will concentrate on two characteristics of flows that seem to be particularly relevant; capital intensity and R&D intensity. Several studies use one or both of these variables[6], thus giving us confidence in the academic front. And FDI is seen as globalization at its best for developing countries, not only providing capital but a potent bundle of capital, managerial and technological knowledge. Thus, policymakers in developing countries would agree with us on the importance of understanding what policies attract more R&D and capital intensive FDI.

As we just saw in the previous section, better institutions in general attract more aggregate flows, and better protection of intellectual property rights in particular biases these flows towards more technology-intensive sectors. It seems natural to ask whether other dimensions of a host country's institutional strength also have a differential effect on the composition of FDI flows. Given that corruption has received substantial attention in previous works, we would

[5] See, for example, Persson and Tabellini (1999) and Lizzeri and Persico (2001).

[6] As reported above, Helpman et al (2004) use both capital and R&D intensity as proxies for industry unobservables. Smarzynska Javorcik (2004) and Smarzynska and Wei (2000) try to distinguish FDI flows according to their technological intensity.

like to see if countries with less corruption indeed receive more R&D intensive investments than more corrupt countries. Another measure of institutional quality that we study is expropriation risk. We would expect that the higher is this risk, the less capital and R&D intensive will foreign investments be. Observance of the law, repudiation of contracts, and the quality of the bureaucracy are also expected to have a similar effect on the composition of FDI flows.

Why would the composition of FDI flows be affected by labor institutions? We have seen that the literature has found a number of effects of labor market characteristics on the size of aggregate flows. It does not surprise us to see that countries with less flexible labor markets receive less investments. It has long been known that one of the driving forces behind the decision to move production abroad is to reduce input costs. If regulations make hiring labor more expensive, investment will in general be lower. Instead of looking at measures of labor market flexibility (severance payments or flexibility of dismissals), we study the effect of an increase in the power of labor negotiation on the composition of flows. As workers' bargaining power increases, the higher are their wages, especially in capital and R&D intensive industries, where there are more economic rents to bargain for. Thus, we expect to see less capital and R&D intensive foreign investment in countries with higher union penetration. We also check whether collective bargaining has an effect on the composition of FDI flows. We expect to see two opposite forces at work. On the one hand, centralized bargaining results in more union power and thus, should affect FDI composition in a similar way as union penetration. On the other hand, decentralized bargaining means that labor contracts within an industry more closely follow firms' productivity levels, thus potentially deterring capital and R&D intensive investment. Anticipating our results, we find that the former effect dominates, but the impact on FDI composition is weaker than that found for unionization.

We are finally interested in studying whether host countries' political arrangements have an effect on the level and composition of FDI. Although it seems unrealistic to think that a country would reform its constitution to change its form of government just to attract more FDI, we expect this research to be useful in two respects. First, by contributing to further understanding why some countries are better at attracting foreign investment than others. If constitutional features are part of the reason why a country fails to deliver policies that create the investment friendly environment desired by multinational corporations, there is no point in pushing the country for structural reforms. At the same time, as research finds more evidence on the social and economic costs of some forms of government, there will be a stronger case in favor of constitutional reform. Following recent work by Persson (2005), we expect to see higher FDI flows in parliamentary democracies with proportional representation and a bias in these flows towards more capital and R&D intensive sectors.

4 Econometric specification and data

4.1 Econometric specification

Given that we want to estimate the effect of institutional variables on the composition of FDI, we should ideally use panel data with variation in source and host countries, and with data for a long period and a large number of industries. This would provide some time variation in the institutional variables of interest while, at the same time, making it possible to use country fixed effects to control for other country unobservables. Moreover, if there is time variation in the industry characteristics, such as R&D intensity, we could also control for other industry unobservables by using industry fixed effects. Having several source countries would also allow us to test whether it is host country institutions per se that are of importance, or both source and host country institutions (conveniently compared) that affect bilateral flows. The data to which we have access limits our ability to perform this analysis. We have institutional data up to the end of the nineties, and FDI outflows from a single source country, the U.S., into 56 host countries from 1999 to 2003.

Thus, we restrict ourselves to performing a cross-section study trying to get the most out of our data. For that reason, we exploit the variation in industry characteristics to see the differential effects of institutional variables on sectoral FDI, while at the same time controlling for country characteristics. Thus, to give an example, we do not directly estimate the effect of corruption on FDI, but whether more corrupt countries attract more or less capital intensive FDI.

To perform these regressions, we should take into account the existence of many zero, and even negative, values for some sector-country pairs, meaning FDI inflows. Moreover, when seeing a negative value for FDI, we are not certain of whether that value reflects the desired actual level of negative investment, or just the observed level of disinvestment given the constraints in reducing exposure in a given host country. Therefore, we treat negative values as zeroes as well and thus use a Tobit specification.[7] The regression to estimate is

$$ln(FDI_{ic}) = X_i\beta + I_cX_i\delta + \mu_c + \epsilon \tag{1}$$

where FDI_{ic} is investment in sector i in country c, I_c is a vector of institutional variables in country c, X_i is a vector of industry i characteristics, and δ is the regression coefficient we want to estimate: the interaction between institutions and industry characteristics on FDI flows. Finally, the μ_c are country fixed effects and the error term ϵ is assumed to be *i.i.d.* normally distributed with mean zero and variance σ^2. In this specification, there will be positive foreign investment when $X_i\beta + I_cX_i\delta + \mu_c + \epsilon > 0$, and when $X_i\beta + I_cX_i\delta + \mu_c + \epsilon \leq 0$ the realized level will be zero (and the desired level might be negative, as seen in the data).

[7] Given that we use logarithm of FDI as our independent variable, we replace zeroes and negative values by small positive numbers, such that the log gives a large negative number, and we truncate the distribution just below the lowest positive observation. Performing small changes in this threshold has no significant effect on the regressions.

The use of country fixed effects allows us to correctly estimate this differential effect under the hypothesis that the institutional variable of interest in the regression, corruption for example, is the only country characteristic with a differential effect on FDI composition. Given that this is a strong assumption, we perform another set of regressions. In these, we introduce interaction terms between country characteristics that have been found to affect FDI, or that we expect could possibly affect the composition of FDI, and industry characteristics. The variables we use are population, as market size is a significant determinant of capital flows, GDP per capita, as a proxy of labor costs, trade openness (measured as exports plus imports over GDP), which gives a measure of the ability to integrate production chains in a given country, government expenditure (as a fraction of GDP), to proxy for tax rates, and human capital. We denote the vector of these variables by W_c. The following is the equation we estimate

$$ln(FDI_{ic}) = X_i\beta + I_cX_i\delta + W_cX_i\gamma + \mu_c + \epsilon. \quad (2)$$

Finally, as a robustness check, we drop the country fixed effects and instead use the above mentioned country variables, and their interaction with industry characteristics, along with other regressors[8]. The estimated equation is

$$ln(FDI_{ic}) = X_i\beta + I_cX_i\delta + W_cX_i\gamma + W_c + \epsilon. \quad (3)$$

As another check, we also did a regression with the same regressors as the above, replacing industry characteristics by industry fixed effects. The results are very similar in significance and size and thus, we do not report them.

4.2 Data description

The data used in this study mainly comes from three sources. The data to compute our dependent variable, the U.S. direct investment abroad (*USFDI*), comes from the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce. We use Total Capital Flows, detailed by industry and by country. The variable is measured in millions of dollars and the data available is for 56 countries plus some regional aggregates. We average the annual Total Capital Flows across years for the period 1999-2003 for each country and each industry category.

In addition, we computed two variables for each industry category: capital intensity, the ratio between capital and labor expenditures (*CAPINT*); and the ratio between R&D and capital expenditures (*RDCAP*). A list of categories and their respective characteristics is included on Table 1.[9]

[8] We use continental dummies to proxy for geographical location variables that might affect FDI flows, the fraction of host countries' natives that speak English, and whether the legal system is similar to the US one, as transaction costs might be reduced when speaking the same language or sharing the same legal system.

[9] All tables are in the appendix.

The data on labor market indicators comes from a cross-country database described in Rama and Artecona (2002). This dataset includes 121 countries. Figures are reported for five-year period averages, from 1945-49 to 1995-1999. Our five variables of interest are classified into two broad categories: (1) trade unions and collective bargaining, and (2) labor standards. In the first category, we use the following variables[10]: total trade union membership, in percentage of the total labor force (*TUMMBR*) and workers covered by collective bargaining agreements, in percentage of total salaried or dependent workers (*TUCVGE*). In the labor standard category, we use: cumulative number of ILO (International Labor Organization) conventions ratified by the country (*ILOCNV*); ratification of the ILO convention on the right of workers and employers to establish associations or organizations of their own, without government interference, and to affiliate with similar associations at the international level (*ORGNZE*); and ratification of ILO convention on the right to bargain collectively (*BRGAIN*). To build our cross-section dataset, we took averages for the last two periods: 1990-1994 and 1995-1999 for the 56 countries for which we have data on US direct investment.

The third source of data is an extended version of the cross-section described in the book by Persson and Tabellini (2003). Their data set is used to study the relation between constitutional rules and policy outcomes across democracies. Therefore, it has variables describing economic performance (e.g. GDP per capita, human capital), economic policy (openness, government consumption, protection of property rights), forms of democracy and political institutions (dummy variables for democracy, majoritarian democracy, presidential democracy), protection of property rights, and other country characteristics (continental location, colonial origin, legal origin). We extended their dataset to also include non-democracies. Variables are collected for as many countries as possible on an annual basis. A detailed description of the variables follows:

Protection of Property Rights. The primary source for the next five variables is Knack and Keefer (1995).

CORRUPTION – Variable "Corruption in Government" from the International Country Risk Guide. Lower scores indicate "high government officials are likely to demand special payments" and that "illegal payments are generally expected throughout lower levels of government" in the form of "bribes connected with import and export licenses, exchange controls, tax assessment, police protection, or loans." The variable runs from 0 to 10.

RULE OF LAW (named "Law and Order Tradition" in ICRG) – This variable "reflects the degree to which the citizens of a country are willing to accept the established institutions to make and implement laws and adjudicate disputes." Higher scores indicate: "sound political institutions, a strong court system, and provisions for an orderly succession of power." Lower scores indicate: "a tradition of depending on physical force or illegal means for settling claims." Upon changes in government new leaders "may be less likely to accept

[10] We refer to Rama and Artecona (2002) for a detailed explanation of the variables.

the obligations of the previous regime." The variable runs from 0 to 10.

REPUDIATION (Risk of Repudiation of Contracts by Government) – "This indicator addresses the possibility that foreign businesses, contractors, and consultants face the risk of a modification in a contract taking the form of a repudiation, postponement, or scaling down" due to "an income drop, budget cutbacks, indigenization pressure, a change in government, or a change in government economic and social priorities." Lower scores signify "a greater likelihood that a country will modify or repudiate a contract with a foreign business." The variable runs from 0 to 10.

EXPROPRIATION (Risk of Expropriation of Private Investment) – This variables evaluates the risk of "outright confiscation and forced nationalization" of property. Lower ratings "are given to countries where expropriation of private foreign investment is a likely event." The variable runs from 0 to 10.

GADP – index of government's anti-diversion policies. It is an equal-weighted average of these five categories: i) law and order, ii) bureaucratic quality, iii) corruption, iv) risk of expropriation and v) government repudiation of contracts (each of these items has higher values for governments with more effective policies towards supporting production) and ranges from zero to one.

Economic Performance.

GDPPC – Real GDP per capita in 2000 U.S. dollars (Constant price: Chain series). Primary source: Penn World Table 6.1

POPULATION – Source: Penn World Table 6.1, in thousands.

TRADE – sum of exports and imports of goods and services measured as a share of GDP. Source: The World Bank's World Development Indicators 2002.

CG – central government expenditures as a percentage of GDP, constructed using the item Government Finance – Expenditures in the IFS, divided by GDP at current prices and multiplied by 100. Source: IMF/IFS

HUMANCAPITAL – Follows Hall and Jones (1999) with data from Barro and Lee (2000).

Constitutional Variables.

MAJ – dummy variable for electoral systems. Equals 1 if the entire lower house is elected under plurality rule, 0 otherwise. Only legislative elections (lower house) are considered. Source: see Persson and Tabellini (2003)

PRES – dummy variable for forms of government, equal to 1 in presidential regimes, 0 otherwise. Only regimes where the confidence of the assembly is not necessary for the executive (even if an elected president is not the chief executive, or if there is no elected president) are included among presidential regimes. Most semi-presidential and premier-presidential systems are classified as parliamentary. Source: see Persson and Tabellini (2003).

Other Country Characteristics.

LAAM – regional dummy variable, equal to 1 if a country is in Latin America, Central America or the Caribbeans, 0 otherwise.

OECD – dummy variable, equal to 1 for all countries that were members of OECD before 1993, 0 otherwise, except for Turkey coded as 0**,** even though it was a member of OECD before the 1990s.

AFRICA – regional dummy variable, equal to 1 if a country is in Africa, 0 otherwise.

ASIAE – regional dummy variable, equal to 1 if a country is in East Asia, 0 otherwise.

ENGFRAC – the fraction of the population speaking English as a native language. Source: Hall and Jones (1999).

LEGOR_UK – dummy variables for the origin of the legal system, classifying a country's legal system into Anglo-Saxon Common Law. Source: La Porta et al. (1998).

Table 2 brings the summary statistics for the main variables used in the regressions:

5 Empirical results

5.1 Protection of Property Rights

The empirical analysis finds substantial evidence of differential effects of the degree of protection of property rights on FDI composition. In Table 3**,** we report the results of regressions with country fixed effects and only interactions between industry characteristics, capital and R&D intensity, with measures of institutional quality. We find strong negative effects of a deterioration of the protection of property rights on R&D intensive investment, but a positive effect on capital intensive investment. As said previously, these regressions provide accurate results under the strong assumption that there are no other country characteristic with a differential effect on FDI composition. We lift this assumption and find (see Table 4) that all interaction terms between capital intensity and measures of protection of property rights become insignificant. R&D intensive investment is still negatively affected by a lower protection of property rights. For example, an increase of one standard deviation in *CORRUPTION* reduces R&D intensive FDI (one standard deviation above its mean) by 54.3%[11]. For the variable *GADP*, an average of all measures of protection of property rights, a deterioration of one standard deviation reduces R&D intensive investment by 47.9%.

This is an extremely important result. Not only does corruption, and other measures of a country's protection of property rights, deter aggregate FDI flows, but there is a significant reduction in the technological content of incoming flows. These results are in contrast to those of Smarzynska and Wei (2000), who find

[11] The coefficient is positive because *CORRUPTION* is measured in such a way that higher values imply lower levels of corruption. The same holds for all other measures of protection of property rights.

no significant interaction between corruption and technological sophistication (measured both at the firm and the industry level). While theirs is a model of the decision to invest or not, using micro data, ours is a macro result: we see how capital flows from the U.S. to a series of countries are affected by the degree of protection of property rights in these countries. Both sets of results should then be seen as addressing different questions and thus, complementing each other. Finally, Table 5 shows that the results remain similar in size and significance after dropping the country fixed effects and controlling for country characteristics. In the table, we only report the interaction coefficients of interest.

5.2 Labor standards

Given that our previous analysis showed that some country characteristics might have a differential effect on FDI composition, we directly report the results of the country fixed effects regression that includes these interaction terms. The results are reported in table 6. There is a strong negative effect of unionization on both capital intensity and R&D intensity of flows. Both interaction terms are negative when we measure unionization by the dummy *ORGNZE*, and by membership *TUMMBR*. Ratification of ILO convention 87 on the right to organize reduces capital intensive FDI by 53.4% and R&D intensive FDI by 60.8%. An increase of a standard deviation in total trade union membership decreases capital intensive foreign investment by 34.6%. The effects of collective bargaining on FDI composition are less robust. Ratification of ILO convention 98 on the right to bargain collectively only has a significant effect on R&D intensive foreign investment. This is reduced by 48.3% when a country has ratified this convention, i.e. when *BRGAIN = 1*. But there is no effect on capital intensity FDI, and no effect of the coverage of collective bargaining agreements (*TUCVGE*) on either measure of FDI composition. Given that we expected to see two opposite forces at work, one increasing capital and R&D intensive FDI, and the other decreasing them, it is no surprise that the estimates are mostly insignificant. Finally, we follow Rodrik (1996) and check whether the total number of ILO conventions ratified by a country has a differential effect on FDI composition. We find negative results, thus we conclude that labor standards do not have a cumulative effect on the capital and R&D intensity of foreign investment, but what is of importance is the type of conventions that are ratified.

These results extend the findings of Smarzynska Javorcik and Spatareanu (2005). They show that labor market flexibility increases aggregate FDI flows. While they also report that FDI in services is more affected than in manufactures, their interpretation of this being due to services being more labor intensive might be wrong. In fact, the converse is true in our sample. As can be calculated from table 1, capital intensity in services (0.33) is higher than in manufactures (0.25). Our results should be interpreted as indicating not that higher labor costs deter labor intensive investment, but that a higher bargaining power for labor deters capital and R&D intensive investment. By allowing labor to better appropriate part of the economic rents of a project, higher bargaining power

deters the most productive investments. And these are the more capital and R&D intensive ones.

5.3 Constitutional arrangements

The last series of regressions we perform relate to two constitutional features of host countries: whether the form of government is presidential or parliamentary, and whether the electoral system is proportional or majoritarian. In the regressions reported in table 8**,** we can see no significant effect of the electoral system on either capital or R&D intensive foreign investment. For presidential regimes, there is a significant negative effect in the technological content of capital flows. Countries with a presidential regime receive almost 50% less R&D intensive research than parliamentary countries.

Although the evidence is not very strong, this result supports Persson's (2004) findings that parliamentary and proportional democracies are better at promoting structural policies that lead to sustained long-run economic growth. In developing countries, FDI might be the most important way of incorporating new technologies, and thus increase their growth perspective. Thus, our result indicates that one of the forms in which presidential regimes reduce growth is by being unable to deliver policies attracting technologically intensive capital flows.

6 Conclusions

In the last twenty years, there has been an increase in the flows of FDI into developing countries. As these countries become wealthier, these flows have diversified away from the extraction of natural resources and into the production of consumer products for their local markets. Thus, there is reverse causality in that FDI goes to richer countries and, at the same time, provides these countries with the capital and technology that allow them to become richer. In this paper, we have focused on these second channels, and tried to throw some light on how host country institutions affected the capital and R&D content of capital inflows.

We saw that there are important effects of the protection of property rights on the technological content of foreign investment. Better protection of property rights results in FDI being more concentrated in technologically intensive sectors. This result strengthens the case of having an investment friendly environment, by showing that otherwise not only aggregate capital flows will be reduced, but there will be a deterioration in the technological content of incoming flows. We also saw that there is evidence that giving more power to workers results in a decrease in capital and R&D intensive foreign investment. We do not advice developing countries to reduce workers' rights, but make the point that a strengthening of workers' power should be done hand in hand with other measures compensating the negative effects on the technological content of foreign investment.

Finally, we found partial evidence of presidential regimes failing, as compared with parliamentary ones, in delivering policies attracting technologically intensive FDI. The reason for this might be that the confidence requirement inherent in parliamentary arrangements helps producing a more stable and broad legislation, for example, better protection of property rights.

We intend to explore the link between protection of property rights, and the size and composition of FDI in more detail. We are constructing a larger data set with more time, country, and industry variation to see the two channels more clearly: from protection of property rights to FDI and from constitutional arrangements to protection of property rights.

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Appendix

A1 Tables

Table 1: Capital Intensity and ratio of R&D and capital expenditures by industry category

Category	*CAPINT*	*RDCAP*
Mining	1.329	0.022
Utilities	1.083	0.003
Manufacturing: Food	0.236	0.151
Manufacturing: Chemicals	0.273	1.257
Manufacturing: Primary and fabricated metals	0.208	0.190
Manufacturing: Machinery	0.276	0.984
Manufacturing: Computer and electronic products	0.299	1.603
Manufacturing: Electrical eq. appliances and components	0.221	0.758
Manufacturing: Transportation equipment	0.290	0.638
Wholesale trade	0.358	0.259
Information	0.684	0.094
Financial (except depositary institutions and insurance)	0.165	0.018
Professional, scientifical, and technical services	0.146	0.691
Other industries	0.259	0.025

Source: BEA (2005)

Table 2: Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
USFDI	157.18	727.4	-800	13619.2
CORRUPTION	6.93	2.09	3.33	10
EXPROPRIATION	9.17	0.91	6.15	10
REPUDIATION	8.57	1.21	5.59	10
RULE OF LAW	7.71	2.04	2.46	10
GADP	0.75	0.18	0.41	1
ORGNZE	0.75	0.42	0	1
BRGAIN	0.77	0.41	0	1
TUMMBR	26.87	20.9	0	85.3
TUCVGE	56.62	28.6	3.7	95
ILOCNV	54.29	28.9	4	124.4
MAJ	0.29	0.44	0	1
PRES	0.38	0.49	0	1
POPULATION	81897	211437	262.9	1189411
GDPPC	12772.6	7731.3	982.9	32785.9
HUMANCAPITAL	2.46	0.46	1.67	3.25
TRADE	73.54	54.75	17.57	355.1
CG	13.89	6.83	5.52	29.5
OECD	0.46	0.48	0	1
LAAM	0.23	0.42	0	1
ASIAE	0.14	0.35	0	1
AFRICA	0.05	0.23	0	1
ENGFRAC	0.11	0.28	0	1
LEGOR_UK	0.29	0.45	0	1

In all the regressions, *LOGFDI* is the dependent variable and standard errors are in parenthesis: *significant at 10%; ** significant at 5%; *** significant at 1%

Table 3: Protection of Property Rights

	(1)	(2)	(3)	(4)	(5)
capint*corruption	-0.82**				
	(0.33)				
rdcap*corruption	0.63***				
	(0.23)				
capint*expropriation		-1.68**			
		(0.75)			
rdcap*expropriation		1.35**			
		(0.55)			
capint*repudiation			-1.14**		
			(0.57)		
rdcap*repudiation			1.20***		
			(0.40)		
capint*ruleoflaw				-0.82**	
				(0.33)	
rdcap*ruleoflaw				0.64***	
				(0.23)	
capint*GADP					-11.64***
					(4.34)
rdcap*GADP					9.82***
					(3.02)
capint	3.77	13.60**	7.99	4.47*	7.36**
	(2.34)	(6.91)	(4.91)	(2.61)	(3.47)
rdcap	-4.66***	-12.68**	-10.65***	-5.22***	-8.12***
	(1.66)	(5.11)	(3.46)	(1.88)	(2.48)
constant	-4.22***	-4.40**	2.22	-0.70	2.22
	(2.01)	(2.15)	(1.86)	(1.93)	(1.89)
N. obs.	655	655	655	655	655
Censored obs.	230	230	230	230	230
Pseudo. R2	0.06	0.06	0.06	0.06	0.06

Other controls always included: country dummies

Table 4: Protection of property rights and Economic Performance

	(1)	(2)	(3)	(4)	(5)
capint*corruption	-0.11				
	(0.36)				
rdcap*corruption	0.75***				
	(0.24)				
capint*expropriation		-0.60			
		(1.00)			
rdcap*expropriation		1.33*			
		(0.70)			
capint*repudiation			0.94		
			(0.66)		
rdcap*repudiation			1.26***		
			(0.44)		
capint*ruleoflaw				-0.03	
				(0.35)	
rdcap*ruleoflaw				0.44*	
				(0.24)	
capint*GADP					-1.21
					(5.80)
rdcap*GADP					13.94***
					(3.98)
capint	15.56	15.00	23.57**	16.67	15.63
	(11.10)	(10.67)	(10.98)	(11.46)	(12.48)
rdcap	-9.30	-15.02**	-9.86	-11.25	-1.33
	(7.77)	(7.55)	(7.79)	(7.99)	(8.60)
constant	1.61	4.71***	5.10***	1.90	4.92***
	(1.16)	(1.49)	(1.49)	(1.19)	(1.48)
N. Obs.	611	611	611	611	611
Censored Obs.	226	226	226	226	226
Pseudo R2	0.10	0.10	0.10	0.10	0.10

Other controls always included: country dummies, capint*log(population), rdcap*log(population), capint*log(gdppc), rdcap*log(gdppc), capint*trade, rdcap*trade, capint*cg, rdcap*cg, capint*humancapital, rdcap*humancapital

Table 5: Protection of Property Rights, no country dummies

	(1)	(2)	(3)	(4)	(5)
capint*corruption	-0.11				
	(0.42)				
rdcap*corruption	0.77***				
	(0.26)				
corruption	-0.11				
	(0.28)				
capint*expropriation		-0.85			
		(1.11)			
rdcap*expropriation		1.37*			
		(0.78)			
expropriation		-0.48			
		(0.79)			
capint*repudiation			1.05		
			(0.78)		
rdcap*repudiation			1.48***		
			(0.54)		
repudiation			-1.23**		
			(0.55)		
capint*ruleoflaw				-0.04	
				(0.38)	
rdcap*ruleoflaw				0.37	
				(0.26)	
ruleoflaw				-0.20	
				(0.27)	
capint*GADP					-2.07
					(6.85)
rdcap*GDP					15.07***
					(4.54)
GADP					-6.08
					(4.83)
capint	13.03	12.04	23.66*	14.33	11.98
	(12.63)	(11.77)	(12.43)	(12.74)	(14.62)
rdcap	-11.80	-16.65**	-9.45	-14.86*	-1.82
	(8.56)	(8.36)	(8.88)	(8.84)	(9.73)
constant	-31.42***	-30.04***	-38.40***	-31.42***	-36.63***
	(8.68)	(8.44)	(8.97)	(8.86)	(9.87)
N. obs.	584	584	584	584	584
Censored obs.	210	210	210	210	210
Pseudo. R2	0.07	0.06	0.06	0.06	0.07

Other controls always included: log(population), log(gdppc), humancapital, trade, cg, oecd, laam, asiae, africa, engfrac, legor_uk, capint*log(population), rdcap*log(population), capint*log(gdppc), rdcap*log(gdppc), capint*trade,

rdcap*trade, capint*cg, rdcap*cg, capint*humancapital, rdcap*humancapital.

Table 6: Labor Market Indicators

	(1)	(2)	(3)	(4)	(5)
capint*orgnze	-2.12*				
	(1.21)				
rdcap*orgnze	-1.80**				
	(0.81)				
capint*brgain		-0.69			
		(1.03)			
rdcap*brgain		-1.28*			
		(0.67)			
capint*tummbr			-0.06**		
			(0.03)		
rdcap*tummbr			0.01		
			(0.01)		
capint*tucvge				-0.01	
				(0.02)	
rdcap*tucvge				0.00	
				(0.01)	
capint*ilocnv					-0.02
					(0.02)
rdcap*ilocnv					-0.01
					(0.01)
capint	23.43**	18.87*	13.82	19.86	16.97*
	(10.89)	(10.49)	(10.42)	(15.29)	(10.21)
rdcap	-12.85*	-14.43*	-16.72**	-12.03	-17.42**
	(7.60)	(7.50)	(7.33)	(10.59)	(7.32)
constant	4.56***	4.74***	-1.04	3.11**	4.69***
	(1.49)	(1.49)	(1.32)	(1.42)	(1.49)
N. obs.	611	611	611	400	611
Censored obs.	226	226	226	142	226
Pseudo. R2	0.10	0.10	0.10	0.10	0.10

Other controls always included: country dummies, capint*log(population), rdcap*log(population), capint*log(gdppc), rdcap*log(gdppc), capint*trade, rdcap*trade, capint*cg, rdcap*cg, capint*humancapital, rdcap*humancapital.

Table 7: Labor Market Indicators, no country dummies

	(1)	(2)	(3)	(4)	(5)
capint*orgnze	-1.99				
	(1.34)				
rdcap*orgnze	-1.72*				
	(0.89)				
orgnze	2.66***				
	(0.97)				
capint*brgain		-0.62			
		(1.14)			
rdcap*brgain		-1.21*			
		(0.73)			
brgain		-0.10			
		(0.79)			
capint*tummbr			-0.07**		
			(0.03)		
rdcap*tummbr			0.02		
			(0.02)		
tummbr			0.01		
			(0.02)		
capint*tucvge				-0.00	
				(0.03)	
rdcap*tucvge				0.00	
				(0.02)	
tucvge				-0.01	
				(0.02)	
capint*ilocnv					-0.02
					(0.02)
rdcap*ilocnv					-0.01
					(0.01)
ilocnv					0.02
					(0.01)
capint	21.35*	16.52	12.62	16.98	14.90
	(11.96)	(11.50)	(11.26)	(16.19)	(11.15)
rdcap	-14.79*	-17.20**	-19.98**	-12.73	-20.42**
	(8.37)	(8.22)	(8.01)	(11.22)	(8.05)
constant	-37.40***	-29.51***	-28.31***	-27.84**	-28.68***
	(8.64)	(8.30)	(8.09)	(11.29)	(8.12)
N. obs.	584	584	584	387	584
Censored obs.	210	210	210	136	210
Pseudo. R2	0.07	0.06	0.06	0.07	0.06

Other controls always included: log(population), log(gdppc), humancapital, trade, cg, oecd, laam, asiae, africa, engfrac, legor_uk, capint*log(population), rdcap*log(population), capint*log(gdppc), rdcap*log(gdppc), capint*trade,

rdcap*trade, capint*cg, rdcap*cg, capint*humancapital, rdcap*humancapital.

Table 8: Constitutional Arrangements

	(1)	(2)	(3)	(4)
capint*maj	1.37		1.74*	
	(0.96)		(0.91)	
rdcap*maj	0.34		0.27	
	(0.59)		(0.65)	
maj			-0.47	
			(0.55)	
capint*pres		0.68		0.98
		(1.03)		(1.13)
rdcap*pres		-1.33**		-1.25*
		(0.68)		(0.75)
pres				1.13
				(0.92)
capint	7.85	11.16	2.16	5.96
	(11.03)	(11.12)	(12.07)	(12.46)
rdcap	-14.99**	-9.21	-17.17**	-11.31
	(7.00)	(7.61)	(7.67)	(8.46)
constant	4.56***	1.50	-24.70***	-28.52***
	(1.48)	(1.15)	(8.22)	(8.59)
country dummies	Yes	Yes	No	No
other characteristics	No	No	Yes	Yes
N. obs.	608	608	581	581
Censored obs.	225	225	209	209
Pseudo. R2	0.10	0.10	0.07	0.07

Other characteristics: log(population), log(gdppc), humancapital, trade, cg, oecd, laam, asiae, africa, engfrac, legor_uk

Other controls always included: capint*log(population), rdcap*log(population), capint*log(gdppc), rdcap*log(gdppc), capint*trade, rdcap*trade, capint*cg, rdcap*cg, capint*humancapital, rdcap*humancapital

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