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## Institutions and bilateral asset holdings

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Véronique Salins & Agnès Bénassy-Quéré

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## INSTITUTIONS AND BILATERAL ASSET HOLDINGS

### SUMMARY

Contrasting with the neoclassical view saying that capital return is higher in less developed countries because of its relative scarcity, attracting foreign investment is still a major issue for developing countries. Investors' risk aversion can probably explain part of this phenomenon. One major component of country risk is the insecurity related to poor institutions (corruption, weak enforcement of laws, poor information on financial and non-financial firms, etc).

We provide a detailed study of institutional determinants of bilateral asset holdings by evaluating the impact of a wide range of institutional variables within a gravity model. It is then possible to highlight the institutional features of the recipient country that matter most for attracting foreign investments. We rely on a portfolio-choice model where the risk perceived on foreign assets depends on institutions and on the geographic distance from the investor to the target country. This model yields a gravity setting for bilateral asset holdings where institutions, capital controls, exchange rate volatility, interest rate differentials, real exchange rate variations and GDP per capita also play a role. This model is estimated with cross-country data for year 2002. We use a tobit methodology in order to account for a possible selection bias. We rely on bilateral portfolio investment data from the *Coordinated Portfolio Investment Survey Guide* and on the newly released *Institutional Profiles* database, which details a large number of institutional features in 51 countries, most of which are emerging and developing countries. Collinearity between institutions and GDP per capita is tackled through an orthogonalization procedure.

Our results highlight the significant impact of the public liberties, central bank independence, competition and information on bilateral asset holdings. A "socially responsible" feature of portfolio investment also emerges through the significant impact of variables such as freedom, plurality and autonomy of trade unions, social mobility or people equality of treatment. However the impact of institutional variables depends on the nature of the host country. For industrial countries, the impact of institutional variables is not significant whereas it is generally strong in developing ones. Competition in good and capital markets but also public liberties are important factors there.

### ABSTRACT

Since the late 1990s, developing countries as a whole have become net exporters of capital, a pattern which contradicts neoclassical models but can be explained by investors risk aversion. Because they can be seen as a major determinant of country risk, institutional features of target countries are then expected to impact on international portfolio choices. This paper explores the institutional determinants of international portfolio allocation. We rely on bilateral portfolio investment data together with the newly released Institutional Profiles database which details institutional features for 51 countries. We find that a number of institutional variables do impact on

portfolio investment, especially competition and public liberties.

*JEL* Classification: F21, O17

Keywords: Portfolio Investment, Gravity model, Institutions, Developing countries.

## INSTITUTIONS ET AVOIRS FINANCIERS BILATÉRAUX

### RÉSUMÉ LONG

Contrairement aux enseignements de la théorie néoclassique selon laquelle le rendement du capital est plus élevé dans les pays les moins développés du fait de sa relative rareté, attirer les investissements étrangers reste un problème majeur pour les pays en développement. Ce phénomène s'explique sans doute au moins partiellement par l'aversion des investisseurs pour le risque. Or une composante majeure du risque pays est l'insécurité liée à un environnement institutionnel faible (corruption, faiblesse de la justice, manque d'information sur les entreprises financières et non financières, etc).

Nous présentons ici une étude détaillée des déterminants institutionnels des investissements bilatéraux de portefeuille en évaluant l'impact d'un grand nombre de variables institutionnelles au sein d'un modèle de gravité. Nous nous fondons sur un modèle de portefeuille dans lequel le risque perçu par les investisseurs sur leurs avoirs à l'étranger dépend des institutions du pays d'accueil et de la distance géographique entre l'investisseur et le pays d'accueil. Ce modèle débouche sur une équation de gravité selon laquelle les avoirs bilatéraux dépendent aussi des contrôles de capitaux, des différentiels d'intérêt, de la variation du taux de change réel, de la volatilité du taux de change et du PIB par habitant.

Les estimations économétriques reposent sur des données d'investissement de la base *Coordinated Portfolio Investment Survey Guide* du Fonds Monétaire International, ainsi que sur les données institutionnelles de la base *Profils Institutionnels* disponible sur le site internet du CEPII. Cette dernière base détaille les caractéristiques institutionnelles de 51 pays, principalement émergents ou en développement. Les estimations sont réalisées en coupe sur l'année 2002.

Nous utilisons la modélisation tobit pour prendre en compte un éventuel biais de sélection lié à la présence d'avoirs bilatéraux nuls. Notre analyse permet de dégager les principales caractéristiques institutionnelles des pays destinataires susceptibles d'attirer l'investissement de portefeuille étranger. Nous traitons aussi le problème de la colinéarité entre les institutions et le PIB par habitant en orthogonalisant les deux variables (procédure en deux étapes).

Nos résultats traduisent l'importance des libertés publiques, de l'indépendance de la banque centrale de la concurrence et de la circulation de l'information comme déterminants des investissements de portefeuille. Un caractère "socialement responsable" de l'investissement de portefeuille se dégage également via l'impact significatif de variables reflétant la liberté, la pluralité et l'autonomie des syndicats, la mobilité

sociale ou la faiblesse des discriminations. Cependant, l'impact des variables institutionnelles dépend du niveau de développement du pays hôte. Dans les pays en industriels, l'impact des variables institutionnelles n'est pas significatif tandis qu'il est généralement fort dans les pays en développement. Le degré de concurrence sur les marchés de biens et de capitaux ainsi que les libertés publiques y jouent un rôle important.

#### **RÉSUMÉ COURT**

Depuis la fin des années 1990, les pays en voie de développement sont devenus globalement exportateurs nets de capitaux, une tendance en complète contradiction avec les modèles néoclassiques, qui peut s'expliquer par l'aversion au risque des investisseurs. Les caractéristiques institutionnelles, parce qu'elles peuvent avoir une influence déterminante sur le risque pays, font certainement parties des éléments pris en compte dans les choix de portefeuilles internationaux. On s'intéresse dans cet article aux déterminants institutionnels de l'allocation internationale des portefeuilles, à partir de données bilatérales d'investissement de portefeuilles et de la base *Profils institutionnels*, qui détaille les caractéristiques institutionnelles de 51 pays. On montre qu'un certain nombre de variables institutionnelles ont effectivement un impact sur l'investissement de portefeuille, notamment les libertés publiques et la concurrence sur les marchés de biens et de capitaux.

Classification *JEL* : F21, O17.

Mots clés : Investissements de portefeuille, Modèle de gravité, Institutions, Pays en voie de développement.

## INSTITUTIONS AND BILATERAL ASSET HOLDINGS

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### 1 Introduction

Since the late 1990s, developing countries as a whole have become net capital exporters. This pattern contradicts the neoclassical view saying that capital return is higher in less developed economies because of its relative scarcity. Introducing risk aversion can help explaining such pattern of net capital flows. However all facets of risk must be accounted for.

Over the last decade, growing attention has been paid to the role of institutions in economic development (see Hall and Jones, 1999, Rodrik et al., 2002, Easterly and Levine, 2003). For instance, Rodrik and Rigobon (2004) find that both rule of law and democracy, which stand respectively for economic and political institutions, have a positive effect on economic growth but that the former has a much more significant impact.

Much less has been said on the impact of institutions on portfolio asset holdings. LaPorta et al. (1997 and 1999) show that the legal protection of investors is positively related with the development of capital markets. Using a gravity approach, Portes and Rey (2005) find that bilateral equity trade depends negatively on bilateral distance taken as a proxy for information asymmetry. Hence an increase in information transparency in both private and public sectors could have a positive impact on bilateral asset holdings.

In the present paper, we provide a detailed study of institutional determinants of bilateral asset holdings by measuring the impact of a wide range of institutional variables within a gravity model. We tackle the possible selection bias by running tobit estimations. This methodology makes it possible to highlight the institutional features of the recipient country that matter most for attracting foreign investment. We rely on bilateral portfolio investment data from the *Coordinated Portfolio Investment Survey Guide* (CPIS) and on the newly released database *Institutional Profiles*, which describes a number of institutional features in 51 countries, most of which are low-developed or emerging economies.

We rely on a portfolio-choice model where the risk on foreign returns which is perceived by an investor is positively related to the "quality" of institutions in the host country and negatively related to the geographic distance between the investor and the target country. This model yields an gravity equation where bilateral holdings also depend on institutions, capital controls, exchange-rate volatility, inflation, interest-rate differentials and GDP per capita. We control for collinearity between institutions and GDP per capita by an orthogonalization procedure.

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The paper is organized as follows. Section 2 presents the theoretical framework. Section 3 describes the data used. The econometric results are discussed in Section 4. Section 5 concludes.

## **2 Theoretical framework**

### **2.1 Literature overview**

One major puzzle of the portfolio-choice literature is the persistence of a home bias, i.e. the fact that international diversification is lower than suggested by asset valuation models (French and Poterba, 1991). One candidate for explaining such bias is information asymmetry: investors typically have more information on domestic assets than on foreign ones. Such interpretation is reinforced by Portes and Rey (2005) who find geographic distance, a proxy for information asymmetry, to impact negatively on cross-border equity flows for a sample of 14 countries. Flavin, Hurley and Rousseau (2001) also find that distance or, even better, the number of overlapping opening hours have a significant impact on cross-country stock market correlation. Still, such results could stem from a tight link between capital flows and trade flows. Since distance is generally found to impact negatively on trade flows due to transportation costs, capital flows can also be indirectly affected by distance.

According to Rose and Spiegel (2002), default risk can explain why financial flows and trade flows are linked and thus can be explained by the same type of model. They show that, when sovereign default is only penalized through trade retaliation, creditors from countries with strong trading relations with the indebted nation benefit from a comparative advantage. Their empirical findings highlight a positive, significant effect of bilateral trade flows on bilateral loans. Aviat and Coeurdacier (2004) obtain a similar result on asset holdings. They find that bilateral asset holdings and trade are strongly correlated but suggest a different interpretation of this phenomenon. They argue that this result could come from scale economies if transaction costs are negatively correlated to the volume of transactions in both markets. A large volume of trade between two countries would make the foreign exchange market more liquid and more efficient and thus reduce transaction costs for financial investments too, and vice versa.

However daily transactions on the foreign exchange market (USD billion 1880 in April 2004 according the Bank of International Settlements) represent 95 times the daily amount of international trade, approximately. Hence if distance impacts on capital flows, it is likely to do so mostly directly, not through its impact on trade. Here we rely on a simple portfolio-choice model where the perception of country risk rises with geographic distance because private information received by each investor is less precise the higher the distance. However good institutions, e.g. economic freedom, security of property rights or transparency, are also expected to impact on perceived country risk, for a given distance.



## 2.2 The model

We consider the choice of an asset holder located in country  $i$  who can invest in a riskless, domestic asset and in a risky, foreign asset. Her holdings of domestic and foreign assets are noted  $B_i$  and  $F_i$ , respectively. We consider three sources of risk simultaneously: a country risk, an inflation risk and an exchange-rate risk. The domestic value of the investor's wealth is:

$$W_i = B_i + S_i F_i \quad (1)$$

where  $S_i$  is the nominal exchange rate of country  $i$  against the foreign country price of the foreign currency in investor  $i$ 's currency. Denoting  $\tilde{B}_i$ ,  $\tilde{F}_i$  the real values of both assets and  $P_i$ ,  $P^*$  the general price level in each country, we have:

$$W_i = P_i \tilde{B}_i + S_i P^* \tilde{F}_i \quad (2)$$

We assume a utility function of the form (see Branson et al., 1985):

$$U_i = E_i \left( \frac{dW_i}{W_i} \right) - \frac{a}{2} V_i \left( \frac{dW_i}{W_i} \right) \quad (3)$$

Where  $E_i$  and  $V_i$  are the expectation and variance operators conditional on the information received by individual  $i$ ,  $\frac{dW_i}{W_i}$  represents the relative variation of investor  $i$ 's nominal wealth during one period, and  $a > 0$  stands for risk aversion, which is assumed identical across all investors.

It is assumed that there is no uncertainty concerning inflation in the domestic country, but that foreign inflation is random:

$$\frac{dP_i}{P_i} = \pi_i dt \quad (4)$$

and

$$\frac{dP^*}{P^*} = \pi^* dt + \sigma_p^* dz_{p^*} \quad (5)$$

where  $\pi_i$ ,  $\pi^*$  represent expected inflation in the domestic and in the foreign country, respectively,  $\sigma_p^*$  is the standard deviation of foreign inflation and  $dz_{p^*}$  is a white noise. Note that all investors  $i$  are supposed to have the same information on the foreign inflation risk.

Nominal exchange-rate variations are also random:

$$\frac{dS_i}{S_i} = \omega_i dt + \sigma_{s_i} dz_{s_i} \quad (6)$$

where  $\omega_i$  is the expected exchange-rate variation,  $\sigma_{s_i}$  the standard deviation of exchange-rate variations and  $dz_{s_i}$  is a white noise. This second source of risk is  $i$  specific not

because of information asymmetries, but due to the fact that the exchange rate is different for each source country  $i$ .

We now turn to real returns. Since the domestic asset is riskless, we have:

$$\frac{d\tilde{B}_i}{\tilde{B}_i} = r_i dt \quad (7)$$

where  $r_i$  is the real rate of return on domestic assets in country  $i$ . We assume that each investor has unbiased expectations on the foreign return  $r^*$ , but the risk attached to this return depends on her private information. Specifically, each investor  $i$  receives a private signal  $X_i$  on the foreign return, which is centered on  $r^*$  but with a noise  $\epsilon_i$ :

$$X_i = r^* + \epsilon_i \quad (8)$$

where  $E(\epsilon_i) = 0$  and  $V(\epsilon_i) = \sigma_{f_i}^2$ . Hence, the expected return by investor  $i$  over one period is:

$$E_i \left( \frac{d\tilde{F}_i}{\tilde{F}_i} \right) = E_i \left( \frac{d\tilde{F}_i}{\tilde{F}_i} / X_i \right) = r^* \quad (9)$$

and the conditional variance is

$$V_i \left( \frac{d\tilde{F}_i}{\tilde{F}_i} \right) = V_i \left( \frac{d\tilde{F}_i}{\tilde{F}_i} / X_i \right) = \sigma_{f_i}^2 \quad (10)$$

The perceived uncertainty concerning the foreign return,  $\sigma_{f_i}^2$ , is higher the lower the quality of institutions in the destination country, because weak institutions lead to specific uncertainties concerning expropriation, contract enforcement, bribery, financial supervision, etc. In addition, higher geographic distance between investor  $i$  and the foreign economy is likely to lower the the information accuracy of the investor on the foreign economy.

Investor  $i$  sets the optimal share of foreign assets in her portfolio,  $f_i$ :

$$f_i = \frac{S_i F_i}{W_i} \quad (11)$$

The conditional expectation and variance of  $i$ ' wealth variation can now be recovered:

$$E_i \left( \frac{dW_i}{W_i} \right) = (1 - f_i)(\pi_i + r_i) + f_i(\pi^* + r^* + \omega_i) \quad (12)$$

The conditional variance is:

$$V_i \left( \frac{dW_i}{W_i} \right) = f_i^2 (\sigma_{p^*}^2 + \sigma_{s_i}^2 + \sigma_{f_i}^2 + 2\sigma_{f_i s_i} + 2\sigma_{f_i p^*} + 2\sigma_{s_i p^*}) \quad (13)$$

where  $\sigma_{f_i s_i}$ ,  $\sigma_{f_i p^*}$  and  $\sigma_{s_i p^*}$  represent the covariances between country, exchange-rate and inflation risks. The first order condition leads to:

$$f_i = \frac{r^* + \pi^* + \omega_i - r_i - \pi_i}{a(\sigma_{f_i}^2 + \sigma_{s_i}^2 + \sigma_{p^*}^2 + 2\sigma_{f_i s_i} + 2\sigma_{f_i p^*} + 2\sigma_{s_i p^*})} \quad (14)$$

Hence the proportion of foreign assets in investor  $i$ 's portfolio is lower the higher the three types of risks and their covariances. To the extent that distance between the investor and the destination country impacts negatively on her knowledge on the country risk of the destination economy, higher distance leads the share of foreign assets to decline (because  $\sigma_{f_i}$  is higher for a specific  $i$ ). By contrast, to the extent that good institutions reduce country risk, institutional development in the host country leads to a higher share of this country's assets in the international portfolio, independently of bilateral distance (because  $\sigma_{f_i}$  is higher for all  $is$ ).

Following the monetary view of the exchange rate, the covariance between foreign prices  $P^*$  and the nominal exchange rate  $S_i$ ,  $\sigma_{s_i p^*}$ , is likely to be negative, i.e. the foreign currency depreciates when the foreign price level increases. Following the literature on twin crises, we expect the sign of  $\sigma_{f_i s_i}$  to be positive, i.e. a depreciation of the foreign currency is likely to be concomitant to a fall in the foreign real return. For consistency, the sign of  $\sigma_{f_i p^*}$  would then be negative.

Hence the covariance between prices and exchange rates limits the risk of investing abroad provided foreign assets are indexed on inflation, whereas the covariance between the exchange rate and the real return tends to increase the risk of investing abroad. If the expected return is higher in the foreign country than in the domestic one (which is likely to be the case for an investment in an emerging economy), then the former covariance tends to increase the share of foreign assets in the portfolio whereas the latter one reduces this share.

### 3 The data

#### 3.1 Portfolio investment assets

Bilateral portfolio holdings come from the *Coordinated Portfolio Investment Survey Guide* (CPIS), an IMF database providing bilateral holdings for a total of 70 source countries for end-December 2002 (CPIS 2002), based on country surveys. We exclude countries referred to as SEIFiCs in the database (small economies with an international financial center) since they usually only play an intermediation role. This leaves us with a total of 55 source countries. For each source country, the database provides portfolio investment assets of domestic residents, i.e., securities issued by non-residents and owned by residents. Portfolio investment stocks from country  $i$  to

country  $j$  ( $PI_{ij}$ ) are expressed in USD million, at current exchange rates. Because a number of observations are zero, we use tobit estimations in order to account for the link between the probability of non-zero observation and the amount invested, and we work on  $\ln(1 + PI_{ij})$  rather than  $\ln(PI_{ij})$  which would imply dropping a number of observations.

### 3.2 Gravity variables

Our portfolio-choice model shows that investment from country  $i$  to country  $j$  depends on country  $i$ 's wealth (or size) and on the risk perceived by country  $j$  on assets  $i$ , which itself depends on bilateral distance. However the model could be reversed to explain debtor choices between home-currency and foreign currency indebtedness. This would bring the foreign country's size into the model. On the whole, our portfolio-choice model with imperfect information justifies using a gravity approach.

Following Portes and Rey (2005), we use market capitalization in both the source ( $MC_i$ ) and the host country ( $MC_j$ ) as proxies of size. The data come from *World Development Indicators 2004* (The World Bank). For bilateral distance between source and host countries, we use CEPII's database<sup>3</sup> which provides the distance between the most important towns or agglomerations in terms of population. All these gravity variables are introduced in logarithms.

To this basic gravity equation we add geographic dummies such as  $COLONY_{ij}$  indicating whether  $i$  and  $j$  ever had a colonial link or  $COMLANG_{ij}$  specifying whether a common language is spoken by at least 9% of the population in both countries<sup>4</sup>.

The country sample is detailed in the appendix. With 55 source countries and 50 host countries, there is room for 2,750 observations. However we only have 1,085 observations, 263 of which are zeros.

### 3.3 Portfolio-choice determinants

Consistently with our portfolio-choice model, we include a number of explanatory variables covering return and risk:

- The log-variation of the real exchange rate between 2000 and 2001 ( $VREER_{ij}$ ), based on WDI 2005. A positive sign of the variable can be interpreted as a real depreciation of country  $j$ 's currency against  $i$ . It will positively impact on cross-border investments if investors from country  $i$  expect an appreciation in the following period, i.e. if they have regressive (or conservative) expectations.
- International capital mobility in the source country ( $CAP_i$ ) and in the destination country ( $CAP_j$ ) are expected to raise cross-border investments. In

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<sup>3</sup>available at [www.cepii.fr](http://www.cepii.fr)

<sup>4</sup>Source : [www.cepii.fr](http://www.cepii.fr).

the portfolio-choice model, they play the same role as the inverse of risk aversion. The capital mobility variable is derived from IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions 2003*. Our measure is ranked from 0 to 15 with 15 representing the absence of capital controls. It is taken in 2002.

- Nominal exchange-rate volatility between the source and the host country ( $VOL_{ij}$ ). As shown in the theoretical model, this variable is expected to impact negatively on cross-border investments. It is calculated as the standard deviation of log-returns of weekly exchange rates over the year. To avoid possible reverse causality from investments to the exchange rate, we calculate this variable for year 2001 whereas portfolio investments are taken at end 2002.
- Real interest-rate differential between the host and source country ( $SPREAD_{ij}$ ). Following the portfolio model, we expect a higher spread attract more portfolio investments in host countries. The differentials are calculated with WDI 2005 data for year 2002.
- GDP per capita in purchasing power parity ( $GDPCAP_j$ ) in the host country is taken as a proxy for default risk. Using indebtedness would have encountered the reverse causality problem since large capital inflows are the direct source of indebtedness. The problem with GDP per capita is its collinearity with a number of institutional variables. To deal with this problem, we follow Bénassy-Quéré, Coupet and Mayer (2006) in using a two-stage, orthogonalization procedure.

### 3.4 Institutions

We aim at examining which institutional features matter for portfolio investors. Hence we rely on a newly released, detailed database which covers ten institutional areas: political institutions, public order, public governance, market freedom, investment on future, ability to reform, security of transactions and contracts, regulation, trade and financial openness, and social cohesion. The database was constructed by the foreign network of the French Ministry of Finance in 51 countries including 8 developed countries and 43 developing countries, for year 2001.<sup>5</sup> This *Institutional Profiles* database is available for researchers at [www.cepii.fr](http://www.cepii.fr). It includes 330 elementary questions ranked from 0 or 1 (weak institutions) to 4 ("good" institutions). We use the first aggregation of elementary data which leads to 114 institutional variables.

### 3.5 Econometric methodology

A potential problem with linear estimations is that of a selection bias. Indeed, out of 1085 filled observations on portfolio asset holdings, 263 are equal to zero. Because

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<sup>5</sup>See Bertheliet al. (2003). Taiwan is excluded due to missing data for control variables. This leaves us with 50 countries in our analysis.

the decision to invest may not be independent from the amount invested, we cannot ignore the selection process. Hence we use a tobit methodology.

As already mentioned, two explanatory variables are likely to be correlated: GDP per capita, and institutional variables. In addition, GDP per capita is correlated (60.2%) to market capitalization. Hence we start with an equation where GDP per capita is dropped:

$$\begin{aligned}
\ln(1 + PI_{ij}) = & a_0 + a_1 \ln(MC_i) + a_2 \ln(MC_j) + a_3 \ln(DIST_{ij}) \\
& + a_4 COMLANG_{ij} + a_5 COLONY_{ij} + a_6 VREER_i \\
& + a_7 CAP_i + a_8 CAP_j + a_9 VOL_{ij} \\
& + a_{10} SPREAD_{ij} + a_{11} INST_j \\
& + v_{ij}
\end{aligned} \tag{15}$$

The problem with this first equation is that the impact of institutions may spuriously show up significant, just because GDP per capita is discarded in this regression. To deal with this problem, we then proceed to two-stage estimations. First, we regress the institutional variable of the host country ( $INST_j$ ) on GDP per capita ( $GDPCAP_j$ ):

$$INST_j = b_0 + b_1 \ln(GDPCAP_j) + u_j \tag{16}$$

The residual  $u_j$  can be interpreted as the part of the institutional variance that has no link with the living standard. It can be used as an instrument for  $INST_j$  in the following equation:

$$\begin{aligned}
\ln(1 + PI_{ij}) = & a_0 + a_1 \ln(MC_i) + a_2 \ln(MC_j) + a_3 \ln(DIST_{ij}) \\
& + a_4 COMLANG_{ij} + a_5 COLONY_{ij} + a_6 VREER_i \\
& + a_7 CAP_i + a_8 CAP_j + a_9 VOL_{ij} \\
& + a_{10} SPREAD_{ij} + a_{11} INST_j + a_{12} \ln(GDPCAP_j) \\
& + v_{ij}
\end{aligned} \tag{17}$$

Standard errors are bootstrapped in second-stage regressions in order to account for non-normality (see Pagan, 1984, 1986).

## 4 The results

### 4.1 Benchmark regressions

We start by estimating Equation (15) without any institutional variable to obtain a benchmark. The results are reported in the first column of Table 1. All coefficients

Table 1: Gravity model for portfolio asset holdings (Tobit estimations)

Ln (1+PI <sub>ij</sub> )	(1)	(2)	(3)
Public liberties and autonomy of the civil society	–	0.950*** (0.100)	–
Two stages: public liberties and autonomy.	–	–	0.751*** (0.104)
Ln (GDP per cap)	–	–	0.996*** (0.151)
Ln (Distance)	-0.947*** (0.086)	-0.858*** (0.083)	-0.802*** (0.112)
Ln (Market Cap source country)	1.030*** (0.043)	1.026*** (0.041)	1.024*** (0.046)
Ln (Market Cap host country) previous year	0.922*** (0.037)	0.882*** (0.036)	0.778*** (0.049)
Common language	0.836*** (0.205)	0.886*** (0.196)	0.875*** (0.211)
Colony	0.733* (0.425)	0.615 (0.405)	0.632* (0.329)
Ln (Real exchange rate) variation (previous year)	1.695** (0.816)	2.276*** (0.783)	3.115*** (0.794)
Exchange rate volatility (previous year)	-12.684 (13.060)	-22.344* (12.517)	-11.112 (13.027)
Capital mobility source country	0.222*** (0.020)	0.223*** (0.019)	0.236*** (0.020)
Capital mobility host country	0.045*** (0.016)	-0.020 (0.017)	-0.066*** (0.018)
Real interest rate spread	0.019*** (0.007)	0.020*** (0.007)	0.017** (0.007)
Constant	-13.769*** (0.862)	-16.333*** (0.873)	-21.903*** (1.549)
Pseudo R <sup>2</sup>	0.211	0.228	0.231

Note: \*\*\* significant at 1%; \*\* at 5%; \* at 10%.

are significant except that on the volatility of the exchange rate. As expected, lower distance, higher market capitalization in source and host countries, colonial links, a common language, high capital mobility in both the source and the host countries, a depreciation of the host country's currency the previous year or a higher real interest differential (in the destination country compared to the source country) all have a positive impact on bilateral portfolio investments.

The second column displays the same estimation now including one institutional variable, namely "Public liberties and autonomy of the civil society". The results are quite similar to the previous regression, except for the coefficients associated to capital controls in the host country and to colonial links: they are no longer significant and the former even becomes negative. This surprising result may be explained by the high, positive correlation between capital mobility and the institutional variable

in the host country (59%). However, "Public liberties and autonomy of civil society" have a strong, positive impact on portfolio investments. Adding this variable makes the pseudo R square of the regression increase from 21.1% to 22.8%.

The results for the two-stage estimation (17) with the same institutional variable are reported in Column (3). A higher GDP per capita in the host country significantly increases portfolio investments there, but the other coefficients remain stable. In particular, the coefficient on the institutional variable is still significant at the 1% level, showing that public liberties tend to attract equity investments independently of the level of development. The coefficient on capital mobility in the host country is negative, this time significant. We can resort to the same type of explanation as previously: the correlation between this variable and GDP per capita reaches 76.5 percent. The pseudo R-squared (23.1%) is also very close that of the single-stage estimation.

## 4.2 Results for institutions

In order to study what institutional features matter most for attracting portfolio investments, Equations (15) and (17) are estimated for each of the 114 institution variables successively. We do not estimate the model with several institution variables at the same time because they are usually correlated with one another. One possibility would be to introduce the first principal component of the 114 variables. However this would amount to assuming substitutability across the various institutional features of each country. Here the institutional variables are introduced one by one and the results are ranked according the contribution of independent variables in explaining the variance of bilateral portfolio investments.

The twenty best fits for two-stage regressions are reported in Table 2.<sup>6</sup> All coefficients but one are positive and significant at the 1% level, meaning that having "good" institutions in the host country increases cross-border equity investment stocks. Interestingly, public liberties matter even more than central bank independence or the termination of contracts by the government. Consistent with Portes and Rey (2000), we find that information transparency plays an important role in attracting portfolio investments. Security, privatization, public action effectiveness, openness to foreign executives, competition and private property rights are also significant determinants of portfolio investments. Among the variables with the best explanatory power also emerges the equality of treatment, trade union plurality and autonomy and social mobility, reflecting a "socially responsible" feature of bilateral portfolio investments.

Only one institutional variable is associated with a negative sign. It stands for the evolution, over the past three years, of the reforms aimed at labor market de-segmentation. Since the coefficient on the corresponding static variable, which measures labor market lack of segmentation, is significant and positive (not reported), we can conclude that efforts to make labor markets less fragmented tend to repel portfolio investments because they concern countries with segmented markets initially. Once more, good

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<sup>6</sup>Single-stage estimations are not reported here but available to the authors.



Table 2: Impact of institutions on bilateral portfolio assets holdings (two-stage estimations)

Institution:	host institution	Pseudo R%
Public liberties and autonomy of the civil society	0.751*** (0.104)	0.231
Central Bank independence	0.391*** (0.058)	0.230
Competition within the banking system	0.504*** (0.077)	0.230
Concentration of the media (press, audiovisual)	0.599*** (0.094)	0.229
Public liberties and autonomy of the civil society: trade union plurality and autonomy	0.523*** (0.084)	0.229
In the past 3 years, evolution of security	0.564*** (0.107)	0.227
Circulation of persons, information etc	0.811*** (0.153)	0.227
Openness to foreign capital and loans	0.576*** (0.128)	0.227
Competition, productive sector: ease of market entry	0.668*** (0.172)	0.226
Termination of contracts by the government (open or underhand)	0.410*** (0.088)	0.226
Existence and observance of arrangements in the field of labour law	-0.325*** (0.077)	0.226
In the past 3 years, reforms aimed at de-segmentation of the labour market	0.458*** (0.110)	0.225
Political right and functioning of political institutions	0.484*** (0.130)	0.225
Centralization/ Decentralization	0.412*** (0.115)	0.225
Transparency of economic policy (fiscal, taxation, monetary, exchange-rate...)	0.535*** (0.148)	0.225
Equality of treatment: segregation based on traditions and beliefs	0.455*** (0.127)	0.225
Arrangements for the protection of intellectual property	0.506*** (0.121)	0.225
Interpenetration of local capital (private and/or public	0.346*** (0.103)	0.225
Share of banking sector in private hands	0.160*** (0.043)	0.225
Depositor guarantees	0.277*** (0.075)	0.225
Concentration/competition within the banking system: concentration		

Note: \*\*\* significant at 1%; \*\* at 5%; \* at 10%.

working conditions (labor laws) seem to attract portfolio investments. This result contrasts with Bénassy-Quéré et al (2005) findings, pointing to a negative impact of labor law on inward foreign direct investment.

### 4.3 Developing versus advanced economies

The *Institutional Profiles* database includes 51 countries, among which eight are advanced economies and 43 are emerging or developing ones. Here we separately estimate the model for developing countries and for advanced economies as the host countries. There are 814 observations in the first case (with 233 censored ones) and 271 (29 censored) in the second one. Benchmark estimations are reported in Tables 3 (developing countries) and 4 (industrial countries). Like previously, the first column displays estimation results without any institutional variable whereas the results for one-stage and two-stage estimations are reported, respectively, in columns (2) and (3).

For investment in developing countries, we get similar results as for the whole sample, except for the lower impact of real exchange-rate variation and non-significance of nominal exchange-rate volatility. Conversely, for advanced economies, distance, the colonial link and capital mobility in the host country are no longer significant in explaining bilateral holdings. Our benchmark institutional variable is not significant either in the two-stage estimation. These results can be related to the limited variance of these explanatory variables for advanced economies, contrasting with developing ones. For instance, the instrumented institutional variable display a variance of 0.06 in advanced economies versus 0.90 in developing ones.

Table 5 reports the ranking of institutional variables according to their contribution in explaining the variance of bilateral portfolio investments in developing countries, using two-stage estimations. We do not display a similar table for advanced countries since no institutional variable proves significant.

For investment in developing countries, the first 20 institutional variables (in terms of fit) are all significant at the 1% level. Competition, reforms in the financial system, but also equality of treatment and public liberties rank first in attracting foreign investment. By contrast, the application of the law regarding business bankruptcy and regulations seem to have a negative impact on portfolio inward investment, as well as "adult vocational training" and technology dissemination.

We conclude that institutions for attracting portfolio investments in developing countries lie in competition and financial reforms together with public liberties. When these reforms have been completed and the countries are more developed, institutional fratures turn out to be less decisive.

Table 3: Tobit benchmark estimations, developing countries (two-stage estimations)

Ln (1+PI <sub>ij</sub> )	(1)	(2)	(3)
Public liberties and autonomy of the civil society	–	0.770*** (0.107)	–
Two stages: public liberties and autonomy.	–	–	0.526*** (0.117)
Ln (GDP per cap)	–	–	1.037*** (0.157)
Ln (Distance)	-1.113*** (0.098)	-1.094*** (0.095)	-0.971*** (0.104)
Ln (Market Cap source country)	1.094*** (0.049)	1.089*** (0.048)	1.082*** (0.051)
Ln (Market Cap host country) previous year	0.751*** (0.049)	0.803*** (0.048)	0.621*** (0.058)
Common language	0.808*** (0.222)	0.782*** (0.213)	0.848*** (0.237)
Colony	0.794* (0.475)	0.687 (0.458)	0.665 (0.407)
Ln (Real exchange rate) variation (previous year)	-0.063 (0.857)	0.904 (0.838)	1.982** (0.869)
Exchange rate volatility (previous year)	9.993 (14.068)	-4.135 (13.720)	18.144 (15.138)
Capital mobility source country	0.209*** (0.022)	0.209*** (0.021)	0.219*** (0.023)
Capital mobility host country	-0.007 (0.017)	-0.035** (0.017)	-0.093*** (0.021)
Real interest rate spread	0.018** (0.007)	0.018** (0.007)	0.014* (0.008)
Constant	-11.209*** (0.968)	-13.662*** (1.004)	-19.945*** (1.652)
Pseudo R <sup>2</sup>	0.209	0.224	0.231

Note: \*\*\* significant at 1%; \*\* at 5%; \* at 10%.

Table 4: Tobit benchmark estimations, advanced economies

Ln (1+PI <sub>ij</sub> )	(1)	(2)	(3)
Public liberties and autonomy of the civil society	–	1.680** (0.797)	–
Two stages: public liberties and autonomy.	–	–	0.849 (1.783)
Ln (GDP per cap)	–	–	1.850** (0.894)
Ln (Distance)	-0.072 (0.183)	0.030 (0.188)	0.030 (0.304)
Ln (Market Cap source country)	0.872*** (0.078)	0.888*** (0.078)	0.881*** (0.084)
Ln (Market Cap host country) previous year	0.834*** (0.081)	0.863*** (0.082)	0.834*** (0.085)
Common language	1.101** (0.460)	1.007** (0.459)	0.902** (0.429)
Colony	0.632 (0.793)	0.581 (0.787)	0.660 (0.549)
Ln (Real exchange rate) variation (previous year)	7.506*** (2.084)	5.147** (2.349)	6.458* (3.452)
Exchange rate volatility (previous year)	-124.885*** (33.616)	-121.409*** (33.412)	-129.905*** (34.789)
Capital mobility source country	0.267*** (0.041)	0.273*** (0.041)	0.271*** (0.044)
Capital mobility host country	0.079 (0.107)	0.063 (0.106)	0.187 (0.166)
Real interest rate spread	0.036* (0.019)	0.028** (0.020)	0.033* (0.019)
Constant	-17.391*** (2.294)	-25.106*** (4.322)	-39.064*** (10.370)
Pseudo R <sup>2</sup>	0.189	0.192	0.195

Note: \*\*\* significant at 1%; \*\* at 5%; \* at 10%.

Table 5: Impact of institutions on bilateral portfolio assets holding in developing countries (two-stage estimations)

Institution:	host institution	R2a
Competition within the banking system	0.471*** (0.084)	0.234
Competition, productive sector: ease of market entry for new firms	0.764*** (0.155)	0.233
Equality of treatment: segregation on tradition and beliefs	0.705*** (0.143)	0.232
In the past 3 years, reforms to open up the financial system	0.349*** (0.077)	0.232
Public liberties and autonomy of the civil society	0.526*** (0.117)	0.231
In the past 3 years, reform of the financial regulatory system	0.360*** (0.095)	0.230
Adult vocational training	-0.566*** (0.148)	0.230
In the past 3 years, reforms aimed at de-segmentation of the labor market	-0.356*** (0.094)	0.230
Termination of contracts by the government	0.546*** (0.180)	0.229
Application of law regarding business failures	-0.420*** (0.112)	0.229
Regulation of competition	-0.371*** (0.116)	0.229
Circulation of persons, information etc	0.568*** (0.163)	0.229
Technological environment, dissemination of technology	-0.610*** (0.177)	0.229
Competition: distribution sector (household consumption)	0.322*** (0.092)	0.229
Interpenetration of local capital (private and/or public)	0.557*** (0.163)	0.229
Share of banking sector in private hands	0.329** (0.105)	0.229
Innovation: venture capital	-0.264*** (0.074)	0.229
In the past 3 years, evolution of political rights and functioning of political institutions	0.425*** (0.137)	0.228
	0.339*** (0.113)	0.228
In the past 3 years, evolution of security	0.356*** (0.123)	0.228

Note: \*\*\* significant at 1%; \*\* at 5%; \* at 10%.

## 5 Conclusion

In this paper, we have examined the determinants of bilateral portfolio investments in 2001, relying on a portfolio-choice model with information asymmetry and paying special attention to the impact of institutions. We controlled for possible selection bias by using a tobit methodology, and for collinearity between institutional variables and GDP per capita by running a two-stage, orthogonalization procedure.

Our first set of results reveals the importance of public liberties, central bank independence, competition, the transparency and circulation of information to attract portfolio investments. They also highlight a "socially responsible" feature of portfolio investments.

However, the impact of institutional variables depends on the nature of the host country. For advanced economies, the impact of institutional variables is not significant whereas it is generally much stronger in developing ones. In particular, competition in product and capital markets but also public liberties prove to be key determinants of portfolio investment.

## 6 Appendix: country sample

Source countries		Host countries	
Argentina	Lebanon	Algeria	Nigeria
Australia	Luxembourg	Argentina	Norway
Austria	Macao	Brazil	Pakistan
Belgium	Malaysia	Bulgaria	Peru
Brazil	Netherlands	Cameroon	Philippines
Bulgaria	New Zealand	Chile	Poland
Canada	Norway	China	Portugal
Chile	Pakistan	Colombia	Romania
Colombia	Panama	Cote d'Ivoire	Russia
Costa Rica	Philippines	Czech Rep.	Saudi Arabia
Czech Rep.	Poland	Egypt	Singapore
Denmark	Portugal	France	South Africa
Egypt	Romania	Germany	Syria
Estonia	Russia	Ghana	Thailand
Finland	Singapore	Greece	Tunisia
France	Slovak Rep.	Hong Kong	Turkey
Germany	South Africa	Hungary	Uganda
Greece	Spain	India	Ukraine
Hong Kong	Sweden	Indonesia	United States
Hungary	Switzerland	Iran	Venezuela
Iceland	Thailand	Ireland	Vietnam
Indonesia	Turkey	Israel	Zimbabwe
Ireland	Ukraine	Japan	
Israel	United Kingdom	Korea, South	
Italy	United States	Lithuania	
Japan	Uruguay	Malaysia	
Kazakstan	Venezuela	Mexico	
Korea, South		Morocco	

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