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FINANCIAL EDUCATION, INVESTOR PROTECTION AND INTERNATIONAL PORTFOLIO DIVERSIFICATION

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Financial education, investor protection and international portfolio diversification*

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Abstract

This paper investigates the tension between regulation and financial education in explaining one of the major puzzles in international finance, that is the lack of international diversification. We show that both dimensions are relevant: higher investor's financial education fosters international investment and stronger minority investor protection legislation attracts inward investment. More interestingly, these factors appear to be substitute in enhancing investor's portfolio diversification: the role of financial education is particularly pronounced where information problems and monitoring costs are likely to be more severe, that is in countries where protection of minority shareholders' rights is weaker. We interpret this evidence as supportive of the conjecture that the main channel through which financial education contributes to international diversification consists of loosening the informational constraints binding foreign investors.

Keywords: Financial education, Home bias, International Portfolio Investments, Investor Protection Legislation

JEL Classifications: G11, G15, G30

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1 Introduction

The urgent need to provide adequate protection for investors facing increasingly complex choices in financial markets, has given birth to a lively debate on which remedy is more appropriate: regulation of financial products and institutions versus investor's financial education. Recent literature has highlighted a significant impact of financial literacy on economic behavior (Lusardi and Mitchell (2007); Guiso and Jappelli (2009); van Rooij et al. (2011); van Rooij et al. (2012)). However, the evidence is much more controversial when turning to evaluation of policies aimed to improve investors' financial knowledge: a recent strand of literature questions the effectiveness of financial education programs (Hathaway and Khatiwada (2008); Willis (2009); Gale and Levine (2010)) and claims the superiority of regulation remedies (Willis (2008); Willis (2011)).

This work aims to contribute to this debate bringing to light the joint contribution of these factors in explaining one of the major failures in investor's optimizing behavior that is international portfolio under-diversification. The benefits from international diversification of equity portfolios have been documented long ago (Markowitz (1952); Sharpe (1964); Grubel (1968); Levy and Sarnat (1970); Solnik (1974)) and persist despite increased stock market integration and systemic crises (Santis and Gerard (1997); Das and Uppal (2004)). However, investors actually hold a disproportionately small amount of foreign equities. The evidence of lack of diversification, often referred to as "home equity bias", is documented by many authors (French and Poterba (1991); Tesar and Werner (1995), among others). Several attempts have been made to rationalize this evidence. As reviewed in Lewis (1999) and Karolyi and Stulz (2003), proposed explanations refer to barriers to international investment (Stulz (1981); Tesar and Werner (1995)), hedging of background risk such as inflation risk (Cooper and Kaplanis (1994)) or human capital risk (Baxter and Jermann (1997); Pesenti and van Wincoop (2002)), information asymmetry between domestic and foreign investors and finally the behavioral bias consisting in over-optimism of domestic investors toward domestic assets (French and Poterba (1991); Strong and Xu (2003); Li (2004)). While the first two motives have found weak support in recent empirical evidence, the latter two explanations of home bias, the one focused on information asymmetry and the other centered on behavioral motives, benefit stronger support.

A priori, financial education can affect foreign investment because it reduces the costs of gathering information about foreign investment opportunities and, at the same time, improves awareness of the benefits and risks of international portfolio diversification. Our findings suggest that financial education influences international portfolio diversification mainly by alleviating information constraints.

We find that regulation and financial education both contribute to explain foreign investment and are substitute in enhancing investor's portfolio diversification: the role of financial education appears particularly pronounced where information problems and monitoring costs are likely to be more severe, that is in countries with weaker protection of minority shareholders' rights. We interpret this evidence as supportive of the conjecture that financial education lessens the informational constraints of foreign investors, blamed as a major cause of international portfolio under-diversification.

Our findings challenge the standard view spoused by the financial literacy literature: puzzling investing behaviors, such as stock market non participation, lack of portfolio diversification, lack of planning, are often ascribed to behavioral biases mainly related to ignorance or misunderstanding of benefits. Financial literacy is therefore expected to play a significant role by helping the removal of these biases. Our findings about international portfolio under-diversification, point to an alternative prevailing channel through which financial education operates. The role of financial literacy appears to be more pronounced in foreign environments featuring lax corporate governance standards. Since information asymmetries between foreign and local investors are particularly severe with respect to the evaluation of a firm's governance structure (Leuz et al. (2009); Kho et al. (2009)), we infer that financial education contributes to international portfolio investment mainly by loosening the informational constraints binding foreign investors.

The assessment of the channels through which financial education affects international diversification is far from being a purely speculative exercise. Education in finance and investor protection legislation are two instruments in the hands of policymakers to encourage more efficient investment choices by individuals. If financial education and investor protection were complement in enhancing international portfolio diversification, then the effect of financial market regulation would be fueled by investors' financial education and vice versa. This would entail a commonality of intents by authorities in charge of endorsing improvements in individuals' optimizing behavior. Conversely, a substitutability relation exacerbates potential conflicts between those in favour of regulation remedies and those upholding the education recipe.

The remainder of this paper is structured as follow. Section 2 reviews those contributions in the existing literature on financial education and investor protection that are related to international portfolio diversification issues. After describing the conceptual framework and its main implications in Section 3, we present the data in Section 4 and main descriptive statistics in Section 5. Section 6 shows the results of our empirical analysis whose implications are drawn in Section 7. Section 8 summarizes the main findings and concludes.

2 Literature and contribution

2.1 Financial education

The literature has shown that an improved knowledge of notions and products is related to more virtuous financial behavior, such as planning and saving for retirement (Lusardi and Mitchell (2007); van Rooij et al. (2012)), stock market participation (van Rooij et al. (2011)), and portfolio diversification (Guiso and Jappelli (2009); Kimball and Shumway (2010)). Existing contributions on portfolio diversification, relying almost exclusively on survey-based information that typically does not provide details on portfolio holdings, fail in providing any formal test on the causal linkage between financial education and portfolio allocation. Indeed, the analysis of portfolio diversification has been restricted either to broad asset classes (von Gaudecker (2011)) or to diversification indexes based on the fraction invested in mutual funds and on the number of individual stocks in portfolio (Guiso and Jappelli (2009)). Calvet et al. (2007) use a dataset with information on the overall wealth of all Swedish resident households to evaluate the risk properties of household portfolios. The data records not only all asset classes (real estate, bonds, stocks, funds and bank accounts) but also portfolio holdings at individual asset level. Notwithstanding the reliable, highly detailed and comprehensive information on the portfolio holdings of the Swedish population, this dataset does not contain information on individual financial knowledge. Financial sophistication is proxied by variables such as wealth, income and education and results emphasize that less sophisticated households tend to hold less diversified portfolios. Though international portfolio diversification is not the focal issue in Calvet et al. (2007), an indirect linkage between investor sophistication and international diversification rests on the evidence that households with standard predictors of financial sophistication hold more diversified portfolios of equity and balanced mutual funds, most of which are internationally diversified[1].

To our knowledge this is the first paper studying the relationship between financial literacy and international portfolio diversification. As the only exception, we cite the work by Kimball and Shumway (2010). This paper exploits a US investors' cross-sectional survey in 2005 to create an index of financial sophistication and correlate it to puzzling investing behaviors, among which home bias[2]. Specifically, they study how

[1] The disaggregation of Swedish households' foreign portfolio by destination country could potentially be inferred from households' direct stockholdings and international allocation of intermediaries but, being probably this information of little use at a micro-level analysis, it is not reported in Calvet et al. (2007).

[2] Graham et al. (2009) follow a similar perspective studying the effect of self-assessed and objective competence on trading behavior (trading frequency, home bias). Their results indicate that investors who feel more competent about investing in foreign assets are more willing to shift a portion of their assets overseas.

financial literacy affects the probability to diversify portfolios by investing in global or international funds. The existence of a correlation between these anomalous behaviors and lack of financial sophistication make the authors conclude that the latter generates misunderstanding of how multiple assets combine to yield a portfolio's overall risk and returna.

Our paper adds to this contribution on several dimensions. First, we adopt a macro-level approach and relate country-average financial education to aggregate portfolio holdings, capturing both the extensive and the intensive margin of foreign investment. Second, while the cross-sectional nature of their dataset generates many endogeneity issues that are only tentatively solved, we can exploit the panel dimension to address them. Third, our multinational investment opportunity set allows us to adopt a powerful identification strategy to seize which is the prevailing channel through which financial education affects international portfolio investment.

Indeed, the basic idea behind the investment barriers' explanation to home bias is that international diversification is beneficial but entails also some costs. Financial education can enhance international diversification by allowing a better understanding of diversification benefits, by reducing information acquisition costs, or both of them. Our dataset allows to discriminate between these two competing explanations or at least to pinpoint which of these explanations prevails.

2.2 Investor protection legislation

Since domestic sources of outside finance are limited in many countries around the world (Giannetti and Koskinen (2010)), foreign capital has become increasingly important (Bekaert et al. (2002)). Recent international finance literature has emphasized the existence of a role of corporate governance in stimulating external finance by reducing information asymmetry (Leuz et al. (2009); Kho et al. (2009)).

Foreign investors are more vulnerable to information asymmetry than domestic investors. Corporate governance can partially offset this lack of information by signalling the quality of the institutions in terms of rights guaranteed to the investor (La Porta et al. (1998), LLSV (1998) henceforth), and hence, can be particularly influential on those investors, the foreign ones, more heavily affected by information costs.

The index of shareholder rights adopted (antidirector rights, ADR) follows LLSV (1998) and measures how strongly the legal system favours minority shareholders against managers or dominant shareholders in the corporate decision making process[3].

[3] As discussed below, we consider as alternative measure to shareholder rights, the "revised" antidirector rights index as

Standard asset pricing models assuming a representative agent predict that differences in observable characteristics of the asset, such as investor rights and financial development of the issuing firm or country, should be capitalized in share prices such that investing in any stock will be a fair investment regardless of the issuer's level of investor protection (Dahlquist et al. (2003)). However, when accounting for heterogeneity across investors, the equilibrium price discount discloses only the average behavior thus inducing under- or over-investment by those investors for which the price discount is, respectively, too low or too high (Leuz et al. (2009); Giannetti and Koskinen (2010)). In particular, as noted by Leuz et al. (2009), this price discount is likely not sufficient for investors, such as foreign ones, that plausibly face information problems beyond those of domestic investors. Indeed, the pervasiveness of "home bias" can be read as evidence of the asymmetric perception of asset characteristics by home and foreign investors thus pointing to a break in the representative agent hypothesis[4]. If all investors, domestic and foreign equally perceived the level of investor protection in country j, this would be perfectly priced and should have no impact on portfolio allocation decisions. Stronger antidirector rights would be simply reflected in lower returns and all investors would hold the same portfolio irrespective of their nationality. The evidence of a significant positive role played by investor protection in shaping foreign portfolios conversely underlines its stronger influence on foreign investors.

Previous work originating from LLSV (1998) underlines how investor protection affects financial market development, that is, the supply of equity, leaving the demand side mostly unexplored. This latter perspective is relevant insofar as one accounts for heterogeneity across investors. Recent work has highlighted the asymmetric impact of corporate governance on different categories of investors (Leuz et al. (2009); Giofré (2012); Giannetti and Koskinen (2010)). Leuz et al. (2009) investigate the impact of firm-level corporate governance on foreign holdings and find that US investors invest less in foreign firms with poor outsider protection and opaque earnings. In particular, they find that foreign holdings in firms with poor governance are driven by information asymmetry. Their identification strategy relies on comparison across countries with different degree of investor protection: the role of firms' corporate governance within each country is present only where national level institutions are poor. Giofré (2012), on the one hand, generalizes Leuz et al. (2009)'s results to different investing countries and to debt securities finding that strong shareholder

redefined in Djankov et al. (2008) and the "Doing Business" Index of Investor Protection Strength (World Bank). Our results hold under any specifications.

[4] Gehrig (1993) and Kang and Stulz (1997), among others, focus on the role played by information asymmetry in determining the home bias evidence. See Lewis (1999) for a comprehensive review on the home bias literature.

rights (creditor rights) stimulate foreign equity (bond) portfolio investments. On the other hand, she highlights how laws protecting different interests asymmetrically affect foreign stakeholders. More specifically, foreign shareholders show to appreciate strong creditor rights, which potentially mitigate the riskiness of projects, while bondholders are negatively affected by strong shareholder rights, which might induce the firm to engage in excessively risky behavior. Giannetti and Koskinen (2010) show that investor protection impacts financial market development by influencing the demand for equity, because different classes of investors –specifically controlling shareholders and outside shareholders– can differ in the benefits accruing to them and therefore in their willingness to pay for stocks.

The above-mentioned evidence emphasizes that the same corporate governance rules unevenly affect various categories of investors thus suggesting that their impact may crucially depend on investor's characteristics. Among these, we focus on the role of investors' financial knowledge: we contribute to this strand of literature by investigating how far heterogeneity in investor financial knowledge can affect the sensitivity of cross-border investment to foreign corporate governance.

3 A conceptual framework

Our theoretical framework relies on equilibrium portfolio allocations in which investors are supposed to face different information costs when investing in various financial markets. According to Gehrig (1993), foreign investments appear on average more risky to domestic investors –leading to an information-based justification to home bias– and portfolios differ among investors depending on their perceived variance-covariance matrix. We adopt this approach allowing for a different investor-specific variability of return for each foreign index included in the investment opportunity set.

Absent any investor-specific factor, the "unbiased" portfolio holding of an asset depends, as in standard portfolio choice theory, on asset characteristics (risk and return)[5]. When considering equilibrium asset holdings without investment barriers, all investors ought to hold the same portfolio, i.e., the value-weighted portfolio, in which each asset is weighted according to its share in world stock market capitalization. The same portfolio is still universally optimal in equilibrium even in the presence of investment barriers, provided that these barriers identically affect all investors. Conversely, heterogeneity in bilateral-specific investment barriers generates a wedge between the investor-specific portfolio and the value-weighted portfolio. This

[5]Details on the derivation of our stylized model are available in Appendix B.

wedge depends, in particular, on the distance between the investment barrier of country l investing in country j and the average barrier calculated over all countries investing in the same asset j.

The optimal portfolio weight in asset j (w_{lj}) by country l is

$$w_{lj} = \frac{1}{D_{lj}} MS_j \quad \text{or} \quad \frac{w_{lj}}{MS_j} = \frac{1}{D_{lj}} \tag{1}$$

where MS_j is the market share of asset j in the world market capitalization and D_{lj} captures the relative (to the world average) investment barrier of country l investing in asset j[6]. Investors residing in country l will demand a share of asset j greater than its market share in proportion to $\frac{1}{D_{lj}}$[7].

The ratio $\frac{w_{lj}}{MS_j}$ can be interpreted as the foreign bias in asset j of a representative investor in country l. A portfolio share w_{lj} larger than j's market share signals that asset j is over-weighted in country l's portfolio, while a ratio lower than 1 signals that country j is under-weighted[8].

3.1 Estimable equation and testable implications

To estimate (1) we must provide an empirical counterpart to the variable D_{lj}, which is not directly observable. Our estimable regression is as follows

$$\left(\frac{w_{lj}}{MS_j}\right) = \alpha + \sum_{i=1,..,I} \beta^i X^i_{lj} + \sum_{n=1,..,N} \lambda^n Y^n_{lj} + \sum_{k=1,..,K} \theta^k W^k_l + \sum_{h=1,..,H} \delta^h Z^h_j + \varepsilon_{lj} \tag{2}$$

Factors that are common to all investors, domestic and foreign, are captured, on the left-hand side, by the market share (MS), which is jointly determined with the market price in equilibrium and that reveals only the *average* perceived variability. Any heterogeneity between foreign and domestic investors in the perception of the same factor creates a wedge between actual positions (w) and market shares.

Our regression specification accounts for both pair-specific and country specific factors. The main variables of interest in this paper are country-specific and are financial education (investing country specific, W_l) and investor protection legislation (destination-country-specific, Z_j): these represent potential devices

[6] Note that if $D_{lj} = 1$, i.e., if the investment barrier of country l in country j is equal to the average, then MS_j is optimally held in equilibrium.

[7] Our theoretical framework is equivalent to the return-reducing approach of Cooper and Kaplanis (1994) and Chan et al. (2005). In fact, in equilibrium, what matters is the investment barrier relative to the average.

[8] Our stylized theoretical setting ignores relevant factors such as inflation and exchange rate uncertainty, like many other models that focus on barriers to international investment (Dahlquist et al. (2003)). Since these factors are unlikely strongly correlated with investor protection laws, they are not expected to undermine our results. See Lewis (1999) and Karolyi and Stulz (2003) for a review of the effects of inflation and exchange rate uncertainty on portfolio choice.

to overcome information barriers and can therefore influence foreign investment.

Among pair-specific variables we include as controls i proxies, denoted by X_{lj} and n dummy variables Y_{lj} which are expected to capture investment barriers. If we consider, for instance, the distance between country l and j as an indicator of investment cost, we expect a negative sign for the associated coefficient: a higher "relative proxy" (e.g., greater distance between investing country l and target country j with respect to average distance) is associated with investor l biasing her portfolio away from country j stocks[9].

Finally, to discriminate between the two possible channels through which financial education can affect foreign investments, we include an interaction term between investing country's financial knowledge and destination country's corporate governance.

$$\left(\frac{w_{lj}}{MS_j}\right) = \alpha + \sum_{i=1,..,I} \beta^i X^i_{lj} + \sum_{n=1,..,N} \lambda^n Y^n_{lj} + \sum_{h=1,..,H-1} \delta^h Z^h_j + \delta^H Z^H_j + \theta W_l + \gamma W_l Z^H_j + \varepsilon_{lj} \qquad (3)$$

In the above specification, financial education is the only investing-specific variable (W_l) and its coefficient θ is expected to be positive[10].

We take the investor protection rights' index (Z^H_j) out of the pool of destination country regressors. If corporate governance helps foreign investors to reduce the informational gap with respect to local investors, then its coefficient δ^H is expected to be positive.

Finally, the coefficient of the interaction term γ can have either sign. A positive sign can be interpreted as financial knowledge spurring international portfolio diversification by improving investors' understanding of financial market mechanisms. In this case, more financial knowledge encourages foreign diversification by allowing investors to appreciate the role of shareholders' rights embedded in corporate governance rules. Conversely, a negative sign can indicate that financial knowledge contributes to foreign portfolio investment by reducing the informational gap of foreign versus local investors. In this case, the role of financial education would be particularly important in those countries where information and monitoring costs are more pervasive, that is in countries where investor protection rules are weaker.

To estimate the above parameters, we adopt, in a first stage, a feasible Generalized Least Squares specification that assumes the presence of cross-section heteroskedasticity and includes fixed effects for

[9] Note that all regressors except dummies enter our specification in relative terms, i.e., relative to the average world investment barrier.

[10] We include both investing country fixed effects and time dummies: they are not explicitly reported in equation (2) to save an additional sub-script for time.

investing countries, time dummies, and cross-section weight correction of the variance-covariance matrix.

As a second step, we adopt an instrumental (IV) variable approach to account for possible sources of endogeneity connected with our two main variables of interests, financial education and investor protection.

4 Data

4.1 Dependent variable

We consider equity portfolio investments by 14 major investing countries – Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Spain, Sweden, United Kingdom, and the United States – for the period 2001–2006[11]. We adopt the *CPIS* (Coordinated Portfolio Investment Survey, by IMF) dataset which has been exploited in many recent papers (Fidora et al. (2007); Lane and Milesi-Ferretti (2007); Sorensen et al. (2007); Giannetti and Koskinen (2010)). This survey collects security-level data from the major custodians and large end-investors. Portfolio investment is broken down by instrument (equity or debt) and residence of issuer, the latter providing information on the destination of portfolio investment[12].

The opportunity set is made up of 20 destination stock markets: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Italy, Japan, Korea, Mexico, Netherlands, Portugal, Singapore, Spain, Sweden, United Kingdom, and the United States[13,14].

Details on the construction of the dependent variable are provided in Appendix A.1[15].

[11] The CPIS survey is now available until 2010. However, since the number of observations is sufficient to provide consistent estimates, we chose to constrain our sample to the pre-financial crisis period. Indeed, properly dealing with the crisis would entail taking into account its asymmetric effect on different economies, according to the evolution of the contagion. This issue obviously deserves a separate much deeper investigation.

[12] While the CPIS provides the most comprehensive survey of international portfolio investment holdings, it is still subject to a number of important caveats. See www.imf.org/external/np/sta/pi/datarsl.htm for more details on the survey.

[13] Since we focus on *foreign* portfolio allocation, the destination stock markets number 19, since the domestic country is excluded from analysis. Regressions are run, therefore, on 1596 observations (19 observations for each year for each investing country, with some missing values). The sample of countries has been selected according to the economic and financial importance of the investing economy and to availability of reliable data. Specifically, we excluded investing countries and destination countries featuring undisclosed "confidential" data that could undermine our results. Switzerland, Luxembourg and Ireland are excluded from the sample since they are considered in the international finance literature as mainly off-shore financial centers.

[14] Notice that even though our investment opportunity set is restricted to 20 out of more than 235 countries available in the CPIS dataset, excluded countries cover on average less than 3 percent of total stock market participation (ranging from less than 1 percent in Canada to slightly more than 6 percent in Austria).

[15] We ignore any direct explanation relative to the *home bias* phenomenon and focus on the determinants of foreign positions. Domestic positions, though not explicitly investigated, indirectly impact our analysis: the weight of each foreign stock index in the overall portfolio also depends on the domestic share. See Giannetti and Koskinen (2010) for an extensive discussion of the implications of minority investor rights on home equity bias.

4.2 Main regressors: Financial Education and Investor Protection Legislation

Since 1999, the IMD World Competitiveness Yearbook (WCY) has published an indicator of financial education. The indicator is computed from a survey of senior business leaders who represent a cross-section of the business community in the countries examined, and merged with data drawn from international organizations. The sample distribution reflects a breakdown of industry by sectors (manufacturing, services and primary) and the sample size is proportional to each country' s GDP[16].

The "Education in Finance" question asks for an evaluation, on a 0-10 scale, of the statement: "Education in finance does meet the needs of the business economy".

The WCY indexes are based on managers and country experts responses, rather than on standardized survey of individuals. This can cast doubts on the reliability of these indexes. However, recent contributions by Jappelli (2010) and Jappelli and Padula (2011) show that the ranking of economies in this survey is largely consistent with the one obtained by SHARE, which provides detailed information on cognitive abilities at the individual level, for 11 European countries. This evidence increases confidence in the WCY index as reasonable indicator of financial education.

The other main variable of interest captures the degree of protection of minority shareholders' rights. We adopt the antidirector rights (ADR) index that measures how strongly the legal system favors minority shareholders against managers or dominant shareholders in the corporate decision making process (LLSV (1998)). For robustness, we check the validity of our findings also under two alternative specifications of protection rights indexes[17].

5 Descriptive statistics

5.1 Regressors

We show in Table 1 descriptive statistics on the main regressors included in our specification[18]. The first three variables are investing country specific variables and are all drawn from the IMD World Competitiveness Yearbook. It is worth stressing that these variables are all time-varying. The first variable is the main investing country specific variable of interest, investors' financial education. Economic literacy and finance

[16] The survey questions are targeted to top and middle managers (about 4,000 overall in 55 countries), nationals or expatriates, located in local and foreign enterprises in the country in question, who generally have an international experience and outlook.

[17] For more details on the construction of these indexes and the full set of regressors adopted in the paper, see Appendix A.2.

[18] We do not report statistics on pair-specific regressors and dummy variables, since their average or standard deviation are not very informative.

skills are adopted as alternatives to financial education to underline the importance of the financial content in the financial education index[19].

These investing specific variables are followed by three destination-specific variables that capture investor protection afforded in the destination country. The ADR index represents the main destination specific variable of interest. This is mostly used throughout the paper since largely adopted in previous literature. However, for robustness, we test if our results hold under different index specification, that is the Revised ADR and the World Bank Investor Protection Strength Index.

Finally, the last variables reported are country specific variables that capture general country governance and among them, the last three variables are time-varying.

It is worth stressing that the absolute magnitude of the variables included does not affect per se the size of the associated coefficient since all variables, for consistency with the analytical framework, enter our regression specification in relative terms.

5.2 Domestic and foreign bias

We show in Table 2 the time-averaged domestic share in each investing country. For reference, we report in the second column the average market share, that is, the respective fraction of world market capitalization that would prevail as optimal portfolio share under the assumption of no market segmentation. As expected, all countries display home bias, that is, they place a disproportionately high fraction of their financial wealth in domestic assets. All countries invest internally more than 50 percent of their portfolio, with Austria and Netherlands as the only exceptions. The pervasive and persistent home bias corroborates the evidence of asymmetry in the investment behavior of foreign and domestic investors with respect to asset-observable characteristics.

We then devote our attention from the domestic to the complementary foreign portfolio share and turn from home bias to foreign bias, computed as the ratio of actual share to market share, following equation (1). In Table 3 we report in columns (a) and (b), respectively, the average foreign share and the corresponding fraction of world stock market capitalization. Column (c) shows the average bias in several destination countries, obtained by averaging the foreign bias across investing countries. To provide an economic interpretation for this measure, consider that a foreign bias equal to 1 implies that foreign assets

[19] The "Economic Literacy" question asks respondents to evaluate the sentence: "Economic literacy among the population is generally high". Finally the "Finance Skills" question reads: "Finance skills are readily available".

enter portfolios with a weight equal to its stock market share. The pervasive evidence that the average foreign bias is almost always below unity –i.e., the evidence that foreign assets are generally underweighted– is the mirror image of the strong home bias reported in Table 2. Beyond this common picture of major stock markets, a notable degree of heterogeneity in bias toward various foreign assets emerges: there might exist country-specific factors –among which are investor protection laws– making some countries more attractive than others to foreign investors.

The foreign bias ranges from 0.12 for Canada to 1.09 for Sweden which is the only country, jointly with Finland, overweighted on average by foreign investors. Interestingly, the destination countries with a foreign bias above the median (0.43) are mainly members of the European Monetary Union (EMU). These findings are consistent with the evidence reported by Balta and Delgado (2009) and Lane and Milesi-Ferretti (2007), who find a notable increase in investment in the Euro area by EMU countries as a result of monetary integration. Finally, column (d) reports the standard deviation of the foreign bias around the average, a measure providing information on the dispersion of the foreign bias of various investing countries towards a given asset. Also along this dimension the degree of dispersion is quite large being the standard deviation almost 90 percent of the average bias for stocks: there might exist investing countries' specificities – among which financial education– and/or pair-specific factors inducing differing evaluations of the same asset by different investors. This suggests the need to consider both pair-specific and country-specific factors as potential determinants of cross-border investment in our empirical analysis.

6 Results

6.1 Main findings

This paper is centered on the impact of financial education on cross-border investment. In the first column of Table 4 we report the univariate regression of our dependent variable, that is foreign bias (w_{lj}/MS_j), on financial education ($finlit_l$)[20]. The coefficient is positive and statistically significant underlining that when the relative financial education variable increases by 1 unit the foreign bias increases by 0.36. This variable explains 6 percent of foreign bias variability.

To properly pinpoint the impact of our variable of interest we need to control for standard determinants

[20] In Table 1 we report overall standard deviations. However, also time variability is informative. The within-country standard deviation of financial education for the period considered is on average 7 percent, ranging from 2 to 13 percent.

of foreign portfolio investment. In particular, the literature has stressed how market proximity captures the influence of asymmetric information on investor portfolio choice (Gehrig (1993); Brennan and Cao (1997); Kang and Stulz (1997)).

Many empirical contributions find that the cultural and geographic proximity of the market has an important influence on investor stock holdings and trading (Grinblatt and Keloharju (2001); Chan et al. (2005); Portes and Rey (2005)).

In column (2) we report a regression of portfolio bias that includes standard gravity variables such as distance, common border dummy and common language dummy[21]. The common border (language) dummy takes the value 1 if the investing and destination country share a common border (language) and 0 otherwise. The first two variables, distance and common border, simply capture the physical distance between investing and destination country. Since transactions in financial assets are "weightless", a role for distance may be found only if it has informational content (Portes and Rey (2005))[22]. The role of the common language dummy is intuitively interpretable, since foreign languages make collecting information more difficult. These variables play an economically and statistically significant role in explaining the dependent variable with a particularly strong impact of the common border dummy, quantitatively even larger (0.51) than the median value taken by the foreign bias variable (0.43)[23].

We then account for other variables capturing pair-specific linkages: namely, common currency area (EMU), and common legal origin. The EMU dummy takes the value 1 if the investing and destination countries are EMU members and 0 otherwise. The coefficient is positive and significant and its effect is quite large: EMU membership boosts foreign bias by 0.2 compared to non member countries. Our findings are qualitatively consistent with the evidence reported by Lane and Milesi-Ferretti (2007) and Balta and Delgado (2009), who find, as a result of monetary integration, a notable increase in foreign investments in the Euro area by EMU countries.

Finally, sharing the same legal origin might encourage cross-border investment since there is less fear of unknown factors (Lane (2006); Guiso et al. (2009)). We include a dummy variable taking the value 1 if the investing and destination countries share the same legal family (English, French, German or Scandinavian)

[21] We recall that deviations of portfolio investment from the market share are explained by deviations of investment barriers from the average. Accordingly, all regressors, except dummy variables, enter our specification as ratios with respect to the average. See Appendix A.2 for further details.

[22] A separate role for the border dummy can be found insofar as this variable is considered as "correcting" the distance variable, which is measured as the great circle distance between the capital cities of the destination and investing countries.

[23] Note that there are no zeros in the dataset considered. This allows us to disregard problems often encountered in the trade literature, where the presence of many zeroes can dramatically affect the results.

and 0 otherwise. The coefficient is positive as expected and not statistically different from zero but will gain statistical significance in richer specifications[24].

Overall, these pair-specific factors leaves almost unchanged the economic impact of the financial education variable and notably adds to the explanatory power of the regression, pushing the adjusted-R^2 to 0.41.

One may legitimately argue that financial education miscaptures other features of investing countries. Therefore, we include investing country fixed effects to control for all time invariant investors' specificities. Results, reported in column (3), highlight that the coefficient of the financial education variable is smaller in size (0.163) and no longer significant at standard levels of confidence intervals.

In column (4) we introduce a squared term to control if this result is due to non linearity in the effect of $finlit_l$: neither the linear nor the square term turn out to be significant.

The non significant coefficient of investor's financial knowledge may still hide some other form of heterogeneity of its impact, in sign and/or size. In particular, the role of financial literacy can vary along with some characteristics of the invested assets. More specifically, we speculate that the role of financial literacy is related to the extent outside investors are expected to be shielded by investor protection legislation.

We therefore include in column (7) as additional regressor the degree of protection of minority shareholders' rights in the destination country (ADR_j) following LLSV (1998) and its interaction with the level of financial education in the investing country. In columns (5) we report, for comparison, results when only the ADR_j is included (beyond bilateral-specific factors) and in column (6) results when $finlit_l$ and ADR_j are included but not their interaction.

First of all, the statistical significance of the financial education's coefficient is restored in column (7) thus corroborating our conjecture on the different impact of financial education across assets providing a different degree of shareholders' protection.

Secondly, results indicate a positive impact of the relative (to world average) ADR_j index. If foreign and domestic investing countries equally weighed ADR_j, this factor should have no impact on investment and portfolio bias. A non null coefficient of ADR thereby reveals a significant role of investor protection laws in explaining the distance between the foreign portfolio position and what is predicted by market share. Results on the positive effect of shareholder rights on foreign investments are qualitatively consistent with

[24] Our results are consistent with Vlachos (2004), who shows that cultural and regulatory differences generate a negative impact on cross-country portfolio holdings.

recent evidence reported by Kho et al. (2009), Leuz et al. (2009), Giannetti and Koskinen (2010) and Thapa and Poshakwale (2011). Specifically, we find that an increase by 1 unit of the ADR_j index with respect to the average induces a 21 percentage points increase in foreign bias.

Finally, we look at the coefficient of the interacted term. This coefficient is negative and significant, both in statistical and economic term (-0.17). As discussed above, the coefficient of the interacted variable can have, a priori, either sign. Financial education and corporate governance can be complement or substitute in fostering international diversification. A positive sign –that is complementarity between financial education and investor protection – can be interpreted as financial literacy being a prerequisite necessary to understand the role of investor protection in guaranteeing minority investment. Conversely, a negative sign –that is substitutability between financial education and investor protection– would reveal that the role of financial education is particularly pronounced in determining investment in foreign countries where minority investors' rights are less effectively protected. This would point to a role of financial literacy in lowering the relative cost to acquire information so as to reduce the informational gap of foreign investors relatively to local ones and thus corroborating the information-based explanation.

Our findings, confirmed below by a series of robustness checks, lend support to the hypothesis that information asymmetry between foreign and local investors is levied by foreign investors' financial education that turns out to be particularly effective in informationally hostile foreign environments.

6.1.1 Alternatives to "education in finance"

The way to measure financial literacy is often a subject of debate. Indeed, research often fails to distinguish financial literacy from related concepts. Many concepts, such as numeracy, share features with financial literacy. To the extent that financial literacy involves skills, rather than just knowledge, these skills likely depend on the ability to work with numbers. However, numeracy applies much more broadly than to just financial matters and is more closely aligned to cognitive abilities (Hung et al. (2009)). Defining and appropriately measuring financial literacy is essential to understand educational impact as well as barriers to effective financial choice. Huston (2010) reviews the broad range of financial literacy measures used in research over the last decade and highlights the existence of severe current limitations.

Consistency of results applying either alternative measure of knowledge or skills is controversial. On the one hand, Ardle et al. (2009) and Delawande et al. (2008) show that more numerate individuals are more adept at complex decision making including financial decisions. On the other hand, von Gaudecker (2011)

finds that while low cognitive skills are associated with losses from under-diversification, financial knowledge does not seem to have an effect.

Since the type of knowledge matters, we check whether international portfolio diversification is related specifically to financial knowledge. We claim that financial education influences international portfolio diversification by lessening the asymmetry aggrieving foreign investors when they try to gather information relative to firms' corporate governance. If it is the case then we expect that a variable capturing financial knowledge should play a stronger and more precisely defined role than a measure capturing more generally economic knowledge.

In column (1a) of Table 5 we adopt, as an alternative to the variable "education in finance", the variable "economic literacy"[25]. The figure 1a) shows that, as expected, financial knowledge and economic literacy are strongly positively correlated. However, when estimating the impact of economic literacy on foreign portfolio investment we find that both its impact and its interaction term with ADR_j, though showing the expected sign, are statistically non significant. This suggests that the peculiar content of finance in the measure of knowledge we adopt matters to determine our results. To corroborate this consideration we adopt another variable drawn from the same dataset, related to finance skills though not directly referred to education. Figure 1b) shows that this "finance skills" measure is again strongly correlated with the education in finance measure and regression analysis (column (1b)) delivers its significant positive influence on foreign investment and a significant negative coefficient of this variable with ADR_j. These findings, on the one hand, recommend caution when using alternatively indicators capturing concepts apparently similar to financial literacy and, on the other hand, comforts us on the non-spurious relation between financial education and foreign investment.

6.1.2 Destination country governance controls

The interpretation of the role played by financial education in alleviating informational issues for foreign investors crucially rests on its interaction with destination country's investor protection. Since ADR_j is the only destination country's variable included in the regression it captures all time-invariant destination specific factors. To be able to disentangle the role of corporate governance, in Table 5 we add other destination-specific institutional factors that may be correlated with ADR_j and that, if omitted, can bias the coefficients of included regressors.

[25] See Appendix A.2 for further details on these alternative indicators.

First of all we include a variable capturing the degree of ownership concentration in the destination economy (column (2)). In so doing we also control for the mechanical fact that only the fraction not directly held is available to portfolio investors: the higher is the concentration the lower should be, other things equal, portfolio investment and, consequently, foreign portfolio investment (Dahlquist et al. (2003); Kho et al. (2009); Giannetti and Koskinen (2010)). Some concentration of ownership within a firm is typically efficient in providing managers incentives to work and in providing large investors incentives to monitor managers and thus increase the value of the firm (Shleifer and Vishny (1986)). In the presence of poor investor protection, ownership concentration becomes indeed a substitute for legal protection (LLSV (1998)). On the other hand, some dispersion of ownership is also desirable to diversify risk. Moreover, investor protection laws could influence the level of ownership concentration: Shleifer and Wolfenzon (2002) assess that ownership is more concentrated when investor protection is weaker and LLSV (1998) argue that the weaker the investor protection, the higher the incentives toward ownership concentration are. Including ownership concentration is then compelling as it is expected to be correlated with investor protection and its omission could severely undermine our estimates. Results in column (2) assess a significant negative relationship between ownership concentration and foreign portfolio investment and confirm sign and significance of our main variables' coefficients.

We then include in column (3) other institutional variables more generally related to country level governance. Previous literature has documented that fraudulent transactions, bribery, unenforceable contracts, legal and regulation complexity can significantly affect portfolio investment (Gelos and Wei (2005); Leuz et al. (2009)).

We account for two institutional variables that capture the soundness of the economic environment from a more general to a more specific level: the first one is related to (control of) expropriation risk while the second one captures the transparency of accounting rules. Control of the risk of expropriation captures government stance toward business while accounting standards are critical to corporate governance in that they render company disclosure interpretable. Aggarwal et al. (2005) find that countries with better accounting standards, shareholder rights, and legal frameworks attract more US mutual fund investment relative to benchmark indices. Their results emphasize that high-quality accounting information allows foreign investors to monitor and protect their investments and to efficiently allocate capital. Our results in column (3) emphasize a strong effect of good accounting practices and a non-significant impact of risk of expropriation on foreign portfolio investment.

Finally, a solid system of legal enforcement could substitute for weak "law on the books": active and well functioning courts can serve as recourse for investors aggrieved by management (LLSV (1998)). We control for the role of the efficiency of the judicial system in attracting foreign investments and show that this variable has a positive and precisely estimated effect.

Overall, the introduction of these control factors does not affect our main result: it moderately dampens the impact of ADR_j but leaves substantially unchanged the negative impact of this variable interacted with $finlit_l$.

6.1.3 Endogeneity issues

Our findings are potentially biased by endogeneity issues. Importantly, our main variables of interest, financial education and investor protection are both suspected to be affected by endogeneity.

The literature on financial literacy has widely recognized the difficulty in assessing a causal rather than a correlation relationship between financial literacy and economic or financial outcomes, such as wealth, stock market participation, pension funds participation, portfolio diversification. Existing works are often based on cross-sectional survey thus making unfeasible the identification of which variable is the driver and which is the effect. It may be the case that what is expressed as an effect of financial literacy is actually a driver to acquire financial literacy thus biasing coefficients' estimates. In our case, the concern is that more familiarity with foreign investment creates higher incentives to accumulate financial knowledge. To address this issue, we exploit the panel dimension of our dataset to instrument current financial literacy with its lagged value thus to ensure that the direction of causality goes from education to stock market investment.

Another possible source of endogeneity comes from the investor protection variable. Indeed, since the seminal paper by LLSV (1998), the literature has raised a severe endogeneity critique against the identification of a causal link between investor protection and financial market development. In LLSV (1998) the direction of causality between investor protection laws and development of financial markets (aggregate asset supply) is arguably controversial. Our dependent variable is related to the demand side as it is the ratio between portfolio position and market share. The channel through which this endogeneity problem might operate is therefore by affecting the denominator of the dependent variable (market share) thus eventually acting against our expected results.

To account for this latter source of endogeneity we draw on the large literature on the legal and institutional origin of investor protection and adopt as an instrument the legal origin – common law or civil law –

of the destination country[26]. Indeed, if financial development can influence investor protection it is unlikely it had a role in determining countries' legal origin, dating back to a period where financial markets were undeveloped.

In Table 6 we report results taking into account endogeneity problems. In column (1) we instrument financial literacy with its lagged value: the IV regression's estimates are left substantially unchanged compared to the FGLS results. In column (2) we instrument investor protection with legal origin. Here the endogeneity issue appears to be more relevant as the IV coefficients differ from the FGLS ones. In particular, both the coefficients of ADR_j and $finlit_l$, and the negative coefficient of the interacted variable is larger, in absolute value. Though quantitatively affected, our results survive once endogeneity issues are accounted for. Finally, column (3) displays results when both sources of endogeneity are corrected through IV estimation[27]. Only the coefficient of $finlit_l$ is slightly increased compared to column (4), while other coefficients are left unaffected.

6.1.4 Alternative indexes of investor protection

Our findings on the role of financial education crucially rests on its interaction with the degree of investor protection afforded in the host country. To provide convincing results we need to control their validity when alternative indicator of investor protection are adopted. In column (3a) of Table 6 we replace the ADR index (LLSV (1998)) with its more recent revised version (Djankov et al. (2008)). In column (3b) we adopt, instead, the strength of investor protection rights index released by the World bank (Doing Business)[28]. In both specifications we find a positive impact of financial education and a negative coefficient of the term obtained as interaction of this variable with investor protection rights.

6.2 Robustness

Table 7 reports additional results to check the robustness of our findings. All specifications follow an IV variable approach.

First we check whether our results are affected by the existence of closely held share. Then we consider alternative time-varying institutional factors. Finally, we control how our findings are affected by the

[26] Note that this destination-country specific instrument is different from the pair-specific variable "common legal origin" considered above.

[27] Note that here also the interaction term is properly instrumented.

[28] Note that the World Bank index is a time-varying variable. However, the time series starts in 2004 and, more importantly, it displays an almost negligible variability for countries included in our sample.

exclusion of Hong Kong and Singapore. Results below confirm that our main findings are robust to these alternative specifications.

6.2.1 The world float portfolio

Here we correct our dependent variable for the fraction of closely held shares. Dahlquist et al. (2003) estimate the fraction of shares closely held across 51 countries, finding that on average 32 percent of shares are not available for trading and cannot therefore be held by foreign investors. This induces a measurement error in the size of domestic and foreign bias that was neglected by previous literature. These authors construct the world *float* portfolio, which considers only shares that can actually be held by investors. Following Dahlquist et al. (2003), we consider the fraction of closely held shares as exogenous, correct the asset supply and compute the corrected bias measure. In column (1) of Table 7 the share in the world *float* portfolio replaces the market share as denominator of the foreign bias measure[29]. Results after adopting the world float portfolio confirm previous findings with an even stronger impact of financial education, investor protection rights and a more negative interaction effect[30].

6.2.2 Time-varying country controls

In previous econometric specifications we control for (time-invariant) institutional factors specific of the destination economy to dispel the legitimate doubt that the index of investor protection rights captures other characteristics of the destination economy. Here we replace these institutional variables with alternative ones drawn from Worldwide Governance Indicators (WGI, World Bank). These indicators are available since 1996 to 2010 and allow us to introduce time-varying country controls. In particular we choose, among these indexes, those closer to the time-invariant ones included before. We consider the "political stability" (as an alternative to the "control of risk of expropriation"), the "control of corruption" (as an alternative to the "accounting rules standards") and the "rule of law" variable (as an alternative to the "efficiency of

[29] Note that this is a way to account for the fraction of controlling shareholders. In previous specifications, we seized this factor through the "ownership concentration" variable that in this specification is excluded. When this factor enters as a regressor, we can control for its role in influencing the demand of foreign investors while when is considered as correcting the supply side, we implicitly assume it has an equal impact on all investors.

[30] Previous studies that analyze the effect of governance on foreign investments provide a mixed picture. Dahlquist et al. (2003) find that differences in investor rights and financial development across countries cannot explain the portfolio investment of US investors when including the float portfolio as determinant. However, Leuz et al. (2009) find opposite results when considering heterogeneity in governance practices across US firms: Some firms can be underweighted and other overweighted resulting in no effect in the aggregate. Finally, Giannetti and Koskinen (2010), keeping an aggregate perspective similar to ours and shifting from a US-based perspective to a cross-section of investing countries obtain results consistent with a positive significant effect of investor protection on foreign investment.

judicial system")[31]. In column (2) of Table 7 we report results from this specification. We find that all results are qualitatively unaffected. Compared with the benchmark IV regression reported in column (3) of Table 6, the coefficients of $finlit_l$ and the ADR_j index are marginally increased (respectively, from 0.78 to 0.81 and from 0.42 to 0.45) and also the coefficient of the interaction term is only modestly affected (from -0.61 to -0.65).

Since $finlit_l$ is the only time-varying factor in our regression analysis, one may argue that it spuriously captures other factors that are time-varying but specific of the investing country[32]. In column (3) we add to column (2) specification also institutional time-varying factors specific of the investing country. Our results are almost unaffected: the coefficient of the $finlit$ variable is reduced (from 0.81 to 0.75) while other coefficients are substantially unaltered.

6.2.3 Exclusion of Hong Kong and Singapore

Finally, we run the above regression excluding Hong Kong and Singapore from the pool of destination stock markets for two kind of reasons. The first is that they also play a relevant role as offshore financial centres, which might have the effect of distorting investors' decisions for reasons beyond the scope of this work[33]. The second motive is related to possible (explicit or implicit) constraints, especially for pension funds and life insurance companies (Davis, 2001), restricting non-OECD foreign asset holdings[34]. Column (4) of Table 7 shows results when Hong Kong and Singapore are dropped from the sample of destination countries. The coefficients of our variables of interest preserve sign and statistical significance with some quantitative variation compared with column (3) in Table 6: the coefficient of ADR_j decreases (from 0.42 to 0.27) while the coefficient of $finlit_l$ and the coefficient of the interaction term are only modestly affected (from 0.79 to 078 and from -0.61 to -0.68, respectively).

7 Implications

Our findings deliver some interesting implications on the nature and relevance of information constraints in driving international portfolio under-diversification.

[31] See Appendix A.2 for details on these variables.

[32] Notice that we control for time dummies and fixed investing country effects.

[33] See IMF (2000) for details on the countries included in the list of offshore financial centres.

[34] According to Davis (2001), geographical constraints to institutional investors should be negligible for the sample of investing countries and the period analyzed here.

The literature has highlighted the existence of information barriers for foreign investors and, consequently, a comparative informational advantage of domestic investors. To enhance foreign investment, these information barriers can be dampened on the part of investor or on the part of destination countries. In this respect, the analysis performed in this paper can assess the relative importance of investor-specific financial information –captured by aggregate national level financial knowledge– with respect to destination-specific information – captured by the degree of information disclosure through corporate governance legislation.

Our results, robust to several alternative specifications, highlight a significant role of both sources of information in promoting international portfolio diversification and the interaction between these factors suggests that they are substitute in fostering foreign investment. These findings contribute to the existing literature on several dimensions.

First, our results contribute to the literature studying the impact of investor protection on portfolio holdings. In fact, our findings can be read adopting the perspective of the recipient country rather than that of the investor. Investor protection affects foreign investment insofar as heterogeneity in the perception of this factor by different investors exists. If corporate governance represents a means by which overcoming information barriers, we expect this to be more relevant among less informed investors. The ensuing testable implication is twofold. As a first step, corporate governance should influence foreign investors because the market price reflects the average demand – domestic plus foreign– and the price discount is not sufficient for foreign investors facing information problems and monitoring costs beyond those of domestic investors. Consistently, analyzing the determinants of foreign investment, we find a significant impact of investor protection rights on inward investment that is consistent with recent findings by Giofré (2012), Leuz et al. (2009) and Thapa and Poshakwale (2011). As a second step, among foreigners, we should pinpoint a stronger impact on those suffering more from information constraints, that is those endowed with poorer financial literacy. Indeed, we provide novel evidence in support of this hypothesis that emphasizes the asymmetric impact of regulation rules on foreign investors endowed with different degrees of financial education. Specifically, we find a stronger impact of investor protection laws in promoting international portfolio diversification for those foreign investors endowed with worse finance skills. As a consequence, by improving protection of minority investors, recipient countries can attract investment from economies, such as emerging countries, typically displaying a relatively high availability of resources but a relatively low level of financial education.

Second, our findings confirm a significant role of sophistication as a determinant of foreign portfolio investment. Grinblatt and Keloharju (2001) focus on domestic investments at the individual firm level and

find that familiarity factors – distance, language, and culture – play a stronger role for less sophisticated investors, such as households and nonprofit institutions[35]. We complement their findings by focusing instead on foreign investment and on the role of difference in sophistication – captured by education in finance– among foreign investors. We find that heterogeneity in financial education is reflected in a different sensitivity to information disclosure of the destination country.

More precisely, we contribute to the literature on financial literacy by assessing its impact on foreign investment and, more deeply, by identifying which is the prevailing channel through which education in finance affects international portfolio diversification.

Financial education can a priori affect foreign investment because it reduces the costs of gathering information about foreign investment opportunities (information channel) or because it improves awareness of the benefits and risks of international portfolio diversification (behavioral channel). The multidimensionality of our investment opportunity set can help discriminate which channel prevails.

A positive sign of the interaction term would point to a complementarity relation between financial education and investor protection in enhancing foreign investments. In such a case, higher financial education can be interpreted as helping individuals to better understand diversification benefits and functioning of markets so as to induce higher responsiveness to investor protection rules. Georgarakos and Inderst (2011), dealing with another puzzling behavior in international finance, i.e., lack of stock market participation, underline a complementarity relation between perception of legal protection in the market and investor's perceived capability. They find that trust in financial advice matters only when perceived own capability is low, whereas for households with higher financial capability, only the perception of legal protection in financial markets matters for stock market participation [36]. This would lend support to the behavioral stance, mostly spoused by the financial literacy literature, that relates lack of financial knowledge to investors' misunderstanding of benefits and markets' functioning.

Conversely, a negative sign would point to a substitutability relation between financial education and investor protection. In such a case, higher financial education can be interpreted as helping to alleviate infor-

[35] These findings are also confirmed by Giofré (2008). She highlights that factors that help alleviate information asymmetry –such as transparency and a common exchange trading platform (Euronext)– are more important in predicting foreign portfolio investments of less sophisticated investors (households) than of institutional investors.

[36] The lack of international diversification can be seen as non participation to foreign stock market. In fact, if unawareness (Guiso and Jappelli (2005)) or fixed entry costs (Haliassos and Bertaut (1995);Vissing-Jorgensen (2003)) are plausible explanations for lack of participation to stock market, the same motives –more broadly defined, respectively, as behavioral misunderstanding of diversification benefits and information asymmetry between home and foreign investors– can be seen as responsible of lack of participation in foreign stock market, that is international portfolio under-diversification.

mation asymmetry aggrieving foreign investors, thus making relatively less costly accessing firms' financial information. This mechanism is consistent with the information-based channel, and should be particularly pronounced with respect to the evaluation of firms' governance structure where information and monitoring costs are shown to be particularly binding for foreign investors (Kho et al. (2009); Leuz et al. (2009)).

Our findings provide robust evidence of a negative coefficient of the interaction term between $finlit_l$ and ADR_j thus delivering support to a stronger impact of the latter channel: education in finance positively affects international portfolio diversification mainly by dampening information costs faced by foreign investors in accessing local firms' corporate governance.

Overall, our findings underline the importance of information reasons in explaining puzzling economic behaviors. The logic of our findings is indeed in line with Christelis et al. (2010). They highlight that cognitive abilities are more important in explaining participation in financial markets characterized by more information-intensive assets. The authors interpret these findings as confirming that the association between financial education and portfolio choice is driven by information constraints rather than by preferences or psychological traits. Likewise, our findings about the influence of financial education on international portfolio diversification point to an informationally-driven explanation rather than a behavioral one.

8 Conclusions

This paper investigates the impact of financial education and investor protection on international equity portfolio diversification.

We find that both dimensions are relevant in explaining cross-border investment and that they appear to be substitute: lack of investor protection can be supplemented by financial education or, phrased differently, investor protection legislation is particularly important in attracting investment from less financially literate investors.

Since information asymmetries between foreign and local investors are particularly pronounced with respect to the evaluation of a firm's governance structure, the fact that financial education is more relevant in foreign environments featuring poorer investor protection rights discloses the prevailing mechanism through which financial literacy affects cross-border investment. That is, the information-based channel: financial education contributes to international portfolio investment mainly by loosening the informational constraints binding foreign investors.

Finally, our findings can be of interest to policymakers. From the investing country's perspective, ameliorating financial literacy can allow a wider portfolio diversification, also toward countries where minority investors' rights are less effectively shielded. From the recipient country's perspective, by strengthening minority shareholders' protection, destination economies can attract inflows of outside capital also from countries, namely emerging economies, featuring higher availability of capital to invest but lower standards of financial education.

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Table 1. Descriptive statistics: regressors

This table report descriptive statistics, averaged across countries, relative to the regressors included in the analysis.

Source: IMD World Competitiveness Yearbook, Doing Business Dataset (World Bank), Aggregate Governance Indicators (World Bank), data from LLSV (1998) and Djankov et al. (2008).

	Descriptive statistics				
	mean	*median*	*st.dev*	*min*	*max*
financial literacy	5.8	5.9	1.2	3.4	8.1
finance skills	6.2	6.7	1.8	0.7	8.2
economic literacy	5.2	5.1	1.4	2.5	7.6
ADR index	3.0	3.0	1.5	0.0	5.0
revised ADR index	3.7	3.5	0.9	2.0	5.0
World Bank index	6.3	5.7	1.5	4.0	9.3
control of risk of expropriation	9.3	9.6	0.7	7.3	10.0
accounting standards	66.3	64.5	10.4	36.0	83.0
efficiency of judicial system	8.8	9.8	1.7	5.5	10.0
concentration	0.4	0.4	0.1	0.2	0.6
control of corruption	4.1	4.4	0.7	2.1	5.1
rule of law	3.9	4.1	0.6	2.0	4.4
regulatory quality	3.9	4.0	0.4	2.8	4.4

Table 2. Descriptive statistics: domestic investment

This table reports the domestic share and the market share of each investing country. The reported figure are averages over the period 2001-2006. Figures in bold characters refer to statistically significant correlation coefficients.

Source: Coordinated Portfolio Investment Survey (IMF), Datastream (Thomson Financial) and IMD World Competitiveness Yearbook

	Domestic market		
	domestic share	*market share*	*financial education*
	(a)	(b)	(c)
Austria	0,362	0,002	6,440
Belgium	0,509	0,007	6,778
Finland	0,603	0,006	7,012
France	0,681	0,046	5,962
Germany	0,502	0,035	5,489
Italy	0,629	0,023	3,971
Netherlands	0,289	0,019	7,145
Spain	0,772	0,018	5,074
Canada	0,825	0,029	7,012
Denmark	0,554	0,004	7,724
Japan	0,709	0,107	4,355
Sweden	0,550	0,010	7,270
United Kingdom	0,652	0,087	4,904
United States	0,814	0,436	6,544

Table 3. Descriptive statistics: foreign investment

This table reports the average foreign share (a), the market share (b), the average foreign bias (c) and the standard deviation of portfolio equity bias (d) displayed by the fourteen investing countries in each destination country index (head of rows) included in the opportunity set. The shareholder rights index of the destination countries is reported in column (e). Figures in bold characters refer to statistically significant correlation coefficients.

Source: Coordinated Portfolio Investment Survey (IMF), Datastream (Thomson Financial) and LLSV (1998).

	Foreign market				
	*average foreign share**	*market share*	*average foreign bias***	*st. dev. foreign bias*	*ADR*†
	(a)	(b)	(c)	(d)	(e)
Austria	0.001	0.002	0.426	0.394	2
Belgium	0.003	0.007	0.469	0.455	0
Finland	0.006	0.006	1.001	0.811	3
France	0.031	0.046	0.665	0.461	3
Germany	0.026	0.035	0.743	0.830	1
Italy	0.010	0.023	0.439	0.263	1
Netherlands	0.017	0.019	0.921	0.542	2
Portugal	0.001	0.002	0.426	0.461	3
Spain	0.009	0.018	0.481	0.284	4
Australia	0.003	0.019	0.160	0.156	4
Canada	0.003	0.029	0.118	0.132	5
Denmark	0.001	0.004	0.367	0.398	2
Japan	0.019	0.107	0.179	0.101	4
Mexico	0.001	0.006	0.192	0.188	1
Sweden	0.011	0.010	1.089	2.018	3
United Kingdom	0.042	0.087	0.481	0.231	5
United States	0.098	0.436	0.224	0.164	5
South Korea	0.003	0.012	0.237	0.189	2
Hong Kong	0.003	0.022	0.151	0.146	5
Singapore	0.001	0.005	0.244	0.196	4

Notes:

†: The index captures antidirector rights (ADR), following LLSV (1998).

*: The average foreign share in country j is computed as simple average of the portfolio share in country j (w_{lj}) by different investing countries l. An alternative specification where each investing country enters the average weighted by its market capitalization delivers similar results.

**: The average foreign bias in country j is computed as simple average of the bias in country j ($w_{lj}\ /MS_j$) by different investing countries l. An alternative specification where each investing country enters the average weighted by its market capitalization delivers similar results.

Table 4. Main results

This table reports results of the feasible GLS regression as in Section 3.1 in the text. The dependent variable is the foreign portfolio bias, i.e., the ratio of portfolio share to market share, $(w_{lj} \ / MS_j)$, where the subscript lj represents the couple investing country l -destination country j. Further details on the derivation of the dependent variable are provided in Appendix A.1. Each regressor X (dummy variables excluded) is expressed as the ratio of X to its world average. Further details on the variables included as regressors are provided in Appendix A.2. Constants, investing country dummies and time dummies are included but not reported. Cross-section weights standard errors (d.f. corrected) are reported in parentheses. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively.

	Foreign bias						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
rel_finlit_l	0.359 ***	0.374 ***	0.163	0.996		0.170	0.341 **
	(0.034)	(0.038)	(0.132)	(0.733)		(0.130)	(0.145)
$(rel\_finlit_l)^2$				-0.403			
				(0.359)			
rel_ADR_j					0.058 ***	0.058 ***	0.214 ***
					(0.015)	(0.014)	(0.060)
$(rel\_finlit_l)(rel\_ADR_j)$							-0.168 **
							(0.067)
$dist_{lj}$		-0.125 ***	-0.077 ***	-0.077 ***	-0.081 ***	-0.081 ***	-0.078 ***
		(0.012)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
dum_lang_{lj}		0.253 ***	0.192 ***	0.194 ***	0.163 ***	0.163 ***	0.167 ***
		(0.041)	(0.037)	(0.037)	(0.039)	(0.039)	(0.038)
dum_border_{lj}		0.509 ***	0.553 ***	0.553 ***	0.560 ***	0.560 ***	0.550 ***
		(0.034)	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)
dum_EMU_{lj}		0.200 ***	0.305 ***	0.305 ***	0.323 ***	0.323 ***	0.323 ***
		(0.026)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)
$dum\_eq\_leg\_origin_{lj}$		0.033	0.037 *	0.037 *	0.050 **	0.050 **	0.054 ***
		(0.021)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
constant and time dummies	YES	YES	YES	YES	YES	YES	YES
investing country fixed effect	NO	NO	YES	YES	YES	YES	YES
#obs	1587	1587	1587	1587	1587	1587	1587
$Adj\text{-}R^2$	0.06	0.41	0.49	0.49	0.49	0.49	0.49

Table 5. Main findings: further controls

This table reports results of the regression as in Section 3.1 in the text. The dependent variable is the foreign portfolio bias, i.e., the ratio of portfolio share to market share, $(w_{lj} \ / MS_j)$, where the subscript lj represents the couple investing country l -destination country j. Further details on the derivation of the dependent variable are provided in Appendix A.1. In column (1) we report for comparison results from column (7), Table 4. Columns (1a) and (1b) report results when adopting, respectively, the "economic literacy" and the "finance skills" variables as alternatives to "financial education". Details on construction of relative regressors and significance of coefficients are the same as in Table 4.

	Foreign bias				
	(1)	(1a)	(1b)	(2)	(3)
rel_finlit $_l$	0.341 **			0.361 **	0.357 **
	(0.145)			(0.147)	(0.149)
rel_ADR $_j$	0.214 ***	0.084	0.400 ***	0.171 ***	0.138 **
	(0.060)	(0.073)	(0.086)	(0.062)	(0.064)
(rel_finlit $_l$*)(rel_ADR* $_j$*)*	-0.168 **			-0.184 ***	-0.180 ***
	(0.067)			(0.068)	(0.069)
rel_eclit $_l$		0.115			
		(0.130)			
(rel_eclit $_l$*)(rel_ADRj)*		-0.025			
		(0.065)			
rel_finskill $_l$			0.783 ***		
			(0.202)		
(rel_finskill $_l$*)(rel_ADRj)*			-0.356 ***		
			(0.091)		
rel_concentr $_j$				-0.196 ***	-0.165 ***
				(0.023)	(0.028)
dist $_{lj}$	-0.078 ***	-0.081 ***	-0.075 ***	-0.075 ***	-0.082 ***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.012)
dum_lang $_{lj}$	0.167 ***	0.163 ***	0.182 ***	0.162 ***	0.124 ***
	(0.038)	(0.038)	(0.038)	(0.038)	(0.040)
dum_border $_{lj}$	0.550 ***	0.558 ***	0.539 ***	0.533 ***	0.529 ***
	(0.033)	(0.033)	(0.032)	(0.032)	(0.032)
dum_EMU $_{lj}$	0.323 ***	0.325 ***	0.326 ***	0.355 ***	0.379 ***
	(0.028)	(0.029)	(0.028)	(0.028)	(0.030)
dum_eq_leg_origin $_{lj}$	0.054 ***	0.052 ***	0.055 ***	0.076 ***	0.122 ***
	(0.020)	(0.020)	(0.019)	(0.020)	(0.022)
rel_contr_risk_expr $_j$					-0.111
					(0.145)
rel_account $_j$					0.292 ***
					(0.067)
rel_eff_judj					0.137 **
					(0.061)
constant and time dummies	YES	YES	YES	YES	YES
investing country fixed effect	YES	YES	YES	YES	YES
#obs	1587	1587	1587	1587	1587
Adj-R ^{2}	0.49	0.49	0.49	0.51	0.54

Table 6. Endogeneity issues

This table reports results of the regression as in Section 3.1 in the text. The dependent variable is the foreign portfolio bias, i.e., the ratio of portfolio share to market share, $(w_{lj}\ /MS_j)$, where the subscript lj represents the couple investing country l -destination country j. Further details on the derivation of the dependent variable are provided in Appendix A.1. In this table to address endogeneity issues we apply an instrumental variable (IV) approach. In column (1) we run a IV approach instrumenting the $finlit_l$ variable with its lagged value. In column (2) we instrument the ADR index with destination country's legal origin. In column (3) we instrument both of them. In columns (3a) and (3b) the ADR index drawn from LLSV (1998) is replaced, respectively, by the "revised" ADR index (Djankov et al., 2008) and the World Bank strength of investor protection index. Details on construction of relative regressors and significance of coefficients are the same as in Table 4.

	Foreign bias				
	IV				
	(1)	(2)	(3)	(3a)	(3b)
rel_finlit $_l$	0.345 **	0.778 ***	0.788 ***	2.061 ***	1.309 ***
	(0.156)	(0.169)	(0.177)	(0.478)	(0.243)
rel_ADR $_j$	0.137 **	0.414 ***	0.415 ***		
	(0.064)	(0.088)	(0.088)		
(rel_finlit $_l$*)(rel_ADR* $_j$*)*	-0.179 ***	-0.608 ***	-0.609 ***		
	(0.069)	(0.096)	(0.096)		
rel_rev_ADR $_j$				0.600	
				(0.379)	
(rel_finlit $_l$*)(rel_rev_ADRj)*				-1.773 ***	
				(0.395)	
rel_WorldBank $_j$					0.739 ***
					(0.177)
(rel_finlit $_l$*)(rel_WorldBank* $_j$*)*					-1.116 ***
					(0.190)
rel_concentr $_j$	-0.165 ***	-0.219 ***	-0.220 ***	-0.303 ***	-0.131 ***
	(0.028)	(0.029)	(0.029)	(0.045)	(0.027)
dist $_{lj}$	-0.082 ***	-0.064 ***	-0.064 ***	-0.049 ***	-0.077 ***
	(0.012)	(0.011)	(0.011)	(0.018)	(0.011)
dum_lang $_{lj}$	0.124 ***	0.144 ***	0.144 ***	0.084	0.083 **
	(0.040)	(0.040)	(0.040)	(0.054)	(0.039)
dum_border $_{lj}$	0.529 ***	0.452 ***	0.452 ***	0.551 ***	0.530 ***
	(0.032)	(0.032)	(0.032)	(0.041)	(0.031)
dum_EMU $_{lj}$	0.379 ***	0.364 ***	0.364 ***	0.260 ***	0.305 ***
	(0.030)	(0.031)	(0.031)	(0.045)	(0.032)
dum_eq_leg_origin $_{lj}$	0.122 ***	0.136 ***	0.136 ***	0.179 ***	0.162 ***
	(0.022)	(0.022)	(0.022)	(0.031)	(0.023)
constant and time dummies	YES	YES	YES	YES	YES
investing country fixed effect	YES	YES	YES	YES	YES
destination country controls †	YES	YES	YES	YES	YES
#obs	1587	1587	1587	1587	1587
Adj-R ^{2}	0.54	0.48	0.48	0.20	0.52

Notes:

†: Destination country controls are those included in Table 5 specification, i.e., control of risk of expropriation, accounting standards and efficiency of judicial system (see Appendix A.2 for further details).

Table 7. Robustness

This table reports results of the IV regression as in Section 3.1 in the text. The dependent variable is the foreign portfolio bias, i.e., the ratio of portfolio share to market share, $(w_{lj}\ /MS_j)$, where the subscript lj represents the couple investing country l-destination country j. Further details on the derivation of the dependent variable are provided in Appendix A.1. We report IV regression's results, where $finlit_l$ and the ADR index are both instrumented. In columns (1) the market share in the dependent variable is corrected for the fraction of shares closely held (Dahlquist et al. (2003)). In column (2) and (3), time-varying country controls (Worldwide Governance Indicators, WGI, World Bank) replace time-invariant controls (only for destination countries in column (2) and for both investing and destination countries in column (4)). Finally, column (4) reports results when only OECD destination countries are considered (excluded Hong Kong and Singapore). Details on construction of relative regressors and significance of coefficients are the same as in Table 4.

	Foreign bias			
	IV			
	(1)	(2)	(3)	(4)
rel_finlit $_l$	1,308 **	0,810 ***	0,753 ***	0,769 ***
	(0,569)	(0,172)	(0,175)	(0,201)
rel_ADR $_j$	0,999 ***	0,450 ***	0,449 ***	0,333 ***
	(0,294)	(0,087)	(0,087)	(0,108)
(rel_finlit $_l$*)(rel_ADR* $_j$*)*	-1,528 ***	-0,646 ***	-0,644 ***	-0,642 ***
	(0,298)	(0,094)	(0,094)	(0,115)
rel_concentr $_j$		-0,408 ***	-0,412 ***	-0,373 ***
		(0,032)	(0,032)	(0,044)
dist $_{lj}$	0,048	-0,052 ***	-0,053 ***	-0,081 ***
	(0,037)	(0,011)	(0,011)	(0,014)
dum_lang $_{lj}$	0,451 ***	0,125 ***	0,123 ***	0,234 ***
	(0,120)	(0,037)	(0,037)	(0,050)
dum_border $_{lj}$	0,403 ***	0,496 ***	0,495 ***	0,416 ***
	(0,103)	(0,030)	(0,030)	(0,034)
dum_EMU $_{lj}$	0,488 ***	0,328 ***	0,328 ***	0,349 ***
	(0,099)	(0,029)	(0,029)	(0,034)
dum_eq_leg_origin $_{lj}$	0,301 ***	0,155 ***	0,157 ***	0,118 ***
	(0,079)	(0,022)	(0,022)	(0,027)
constant and time dummies	YES	YES	YES	YES
investing country fixed effect	YES	YES	YES	YES
destination country controls †	YES	NO	NO	YES
time-varying dest. country controls ‡	NO	YES	YES	NO
time-varying inv. country controls ‡	NO	NO	YES	NO
instruments for finlit $_l$	YES	YES	YES	YES
instruments for ADR $_j$	YES	YES	YES	YES
#obs	1587	1587	1587	1421
Adj-R^2	0,15	0,51	0,51	0,45

Notes:

†: Destination country controls are those included in Table 5 specification, i.e., control of risk of expropriation, accounting standards and efficiency of judicial system (see Appendix A.2 for further details).

‡: Time-varying destination (or investing) country controls are: political stability, control of corruption and rule of law (see Appendix A.2 for further details).

Figure 1. Financial education, economic literacy and finance skills.

This figure plots in panel a) and b) the correlation between financial education and, respectively, economic literacy and finance skills. ***, **, and * indicate significance of the correlation coefficient at the 1, 5, and 10% levels, respectively.

Sources: IMD World Competitiveness Yearbook

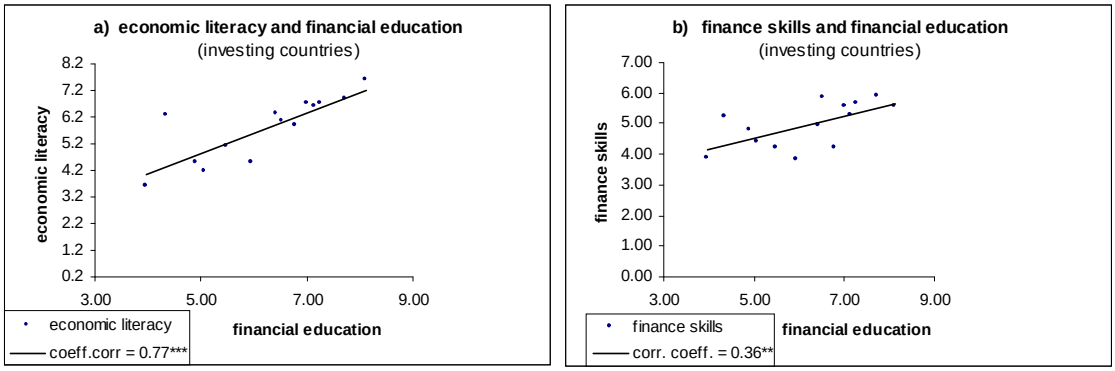
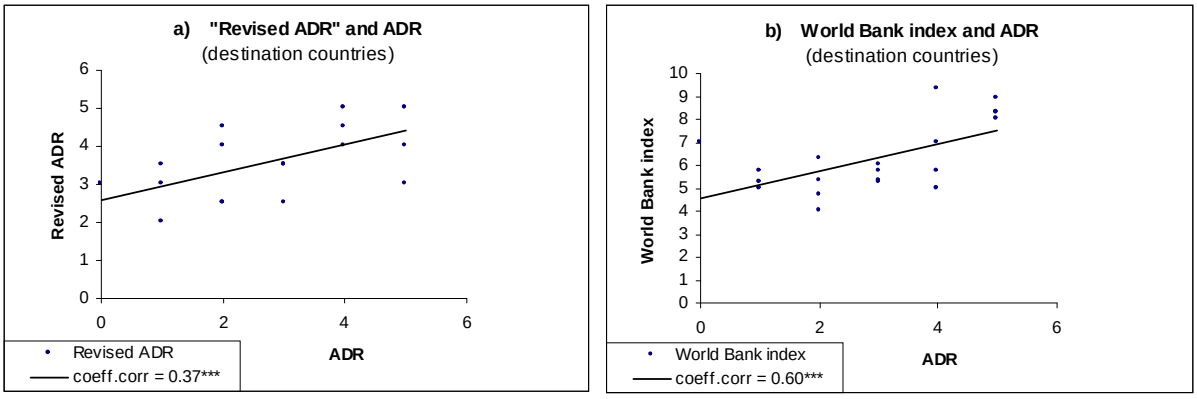


Figure 2. ADR, "Revised ADR" and World Bank index.

This figure plots in panel a) and b) the correlation between the Anti-Director Rights (ADR) Index (LLSV, 1998) and, respectively, the "Revised ADR" (Djankov et al., 2008) and the World Bank investor protection index. ***, **, and * indicate significance of the correlation coefficient at the 1, 5, and 10% levels, respectively.

Sources: LLSV (1998), Djankov et al. (2008), World Bank Database.



A Data appendix

A.1 Dependent variables

Foreign stock market portfolios

The CPIS dataset contains information on foreign holdings only and does not include domestic positions. In order to derive the foreign portfolio positions in the overall portfolio we need to retrieve the share of foreign assets. To accomplish this objective we drew from *Datastream (Thomson Financial)* the stock market capitalization of all country indexes and from the *International Financial Statistics* (*IFS*) the outstanding foreign equity portfolio investments and the corresponding liabilities. Accordingly we can derive the "foreign equity share" of country i at time t, FS_{it}[37]

$$FS_{i,t} = \frac{(FA)_{i,t}}{(MCAP_{i,t} + FA_{i,t} - FL_{i,t})} \tag{4}$$

where FA stands for "foreign equity assets", FL for "foreign equity liabilities" and $MCAP$ for "stock market capitalization". After obtaining the foreign share FS it is possible to recover the share of each foreign asset in the overall portfolio.

Market share

Market shares refer to the values at the end of December of each year.

Source: Datastream, Thomson Financial

World float portfolio

The world float portfolio is a corrected value weighted portfolio obtained by multiplying the market share by a fraction taking into account the fraction of closely held shares drawn from Worldscope (Dahlquist et al. (2003)). We convert our world market portfolio weights into world float portfolio weights (Dahlquist et al. (2003), Table 2). We keep the conversion coefficient invariant over the time period considered being the fraction of country closely-held shares quite stable over a short time horizon while the most important variability dimension, the cross-sectional one, is properly taken into account.

A.2 Regressors

To ensure consistency with the theoretical framework, each variable X (dummy variables excluded) enters our regression specifications as the ratio of X to its world average.

Financial knowledge

The IMD World Competitiveness Yearbook (WCY) is a comprehensive annual report on the competitiveness of nations available for 1995 to 2008. The WCY includes more than three hundreds variables on the Economic Performance, Government Efficiency, Business Efficiency, Infrastructure.

The variables *financial education, economic literacy and finance skills* we adopt in the paper are drawn from the annual Executive Opinion Survey and are referred to in the WCY as Survey Data. The Executive Opinion Survey was designed to quantify issues that are not easily measured, for example management practices, labour relations, corruption, environmental concerns and quality of life. The Executive Opinion Survey is sent to executives in top and middle management in all of the economies covered by the WCY (57 countries in the last issue). The sample of respondents covers a cross-section of the business community in each economic sector: primary, manufacturing and services, based on their contribution to the GDP of the economy. The survey respondents are nationals or expatriates, located in local and foreign enterprises in a country and who, in general, have an international dimension.

[37] Fidora et al. (2007) and Sorensen et al. (2007) follow the same procedure dealing with the CPIS dataset.

Financial education

Question asks respondents to evaluate, on a 0-10 scale, the statement: "Education in finance does meet the needs of the business economy".

Economic literacy

Question asks respondents to evaluate, on a 0-10 scale, the statement: "Economic literacy among the population is generally high".

Finance skills

Question asks respondents to evaluate, on a 0-10 scale, the statement: "Finance skills are readily available"

Minority Shareholders Rights' Index

Antidirector rights index (ADR)

The index captures antidirector rights, following LLSV (1998). The antidirector rights (ADR) index measures how strongly the legal system favors minority shareholders against managers or dominant shareholders in the corporate decision making process. This is an index formed by adding one when (1) the country allows shareholders to mail their proxy vote directly to the firm, (2) shareholders are not require to deposit their shares prior to a shareholders' meeting, (3) cumulative voting for directors or proportional representation in the board is allowed, (4) an oppressed minority mechanism is in place, (5) the minimum percentage of share capital that entitles a shareholder to call for an extraordinary shareholders' meeting is less than 10 percent, or (6) shareholders have preemptive rights that can be waived only by a shareholders' vote. The index ranges from 0 (weak antidirector rights) to 6 (strong antidirector rights).

Revised Antidirector Rights Index

The index amends the original LLSV (1998) index (Djankov et al. (2008)). The revised index relies on the same basic dimensions of corporate law, but defines them with more precision.Both the original and the revised anti-director rights indices summarize the protection of minority shareholders in the corporate decision-making process, including the right to vote. The index covers the following six areas: (1) vote by mail; (2) obstacles to the actual exercise of the right to vote (i.e., the requirement that shares be deposited before the shareholders' meeting); (3) minority representation on the board of directors through cumulative voting or proportional representation; (4) an oppressed minority mechanism to seek redress in case of expropriation; (5) preemptive rights to subscribe to new securities issued by the company; and (6) the right to call a special shareholder meeting. The general principle behind the construction of the revised anti-director rights index is to associate better investor protection with laws that explicitly mandate, or set as a default rule, provisions that are favorable to minority shareholders. Methodologically, the key difference between the original and revised indices of anti-director rights lies in the treatment of enabling provisions. See Djankov et al. (2008) for further details.

Strength of Investor Protection Index (Doing Business, World Bank)

The Strength of Investor Protection Index (0-10) is constructed as the average of the "extent of disclosure index", "director liability index", and "shareholder suits index". The "extent of disclosure index" (0-10) is formed by adding the scores relative to the following items: a) What corporate body provides legally sufficient approval for the transaction?; b) Immediate disclosure to the public and/or shareholders; c) Disclosures in published periodic filings; d) Disclosures by Mr. James to board of directors. The "director liability index" (0-10) is formed by adding the scores relative to the following items: a) Shareholder plaintiff's ability to hold Mr. James liable for damage the Buyer-Seller transaction causes to the company; b) Shareholder plaintiff's ability to hold the approving body (the CEO or board of directors) liable for damage to the company; c) Whether a court can void the transaction upon a successful claim by a shareholder plaintiff; d) Shareholder plaintiffs' ability to sue directly or derivatively for damage the transaction causes to the company. The "shareholder suits index" is formed by adding the scores relative to the following items: a) Documents available to the plaintiff from the defendant and witnesses during trail; b) Ability of plaintiffs to directly

question the defendant and witnesses during trial. For further details see Doing Business Database, World Bank.

Time-invariant country controls

Expropriation risk

ICR's assessment of the risk of "outright confiscation" or "forced nationalization". Scale from zero to 10 with lower scores for higher risk (LLSV (1998)).

Accounting rules

Index based on information disclosure and accounting practices (LLSV (1998)).

Efficiency of judicial system

Assessment of the "efficiency and integrity of the legal environment as it affects business, particularly foreign firms" produced by Business International Corporation. Scale from zero to 10 with lower scores for lower efficiency level (LLSV (1998))..

Ownership concentration

Average percentage of common shares owned by the top three shareholders in the ten largest non-financial, privately-owned domestic firms in a given country (LLSV (1998))

Time-varying country controls

These variables are drawn from the Worldwide Governance Indicators (WGI, World Bank).

The Worldwide Governance Indicators (WGI) project reports aggregate and individual governance indicators for 213 economies over the period 1996–2010, for six dimensions of governance: Voice and Accountability, Political Stability and Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law, Control of Corruption. The six aggregate indicators are based on 30 underlying data sources reporting the perceptions of governance of a large number of survey respondents and expert assessments worldwide. Details on the underlying data sources, the aggregation method, and the interpretation of the indicators, can be found in the WGI methodology paper (Kaufmann et al. (2010)).

The original indexes range from -2.5 to +2.5 with an average of 0. Since our variables all enter in relative terms, we use the average as denominator and to avoid the zero in the denominator we re-scale the range from 0 to 5 with an average of 2.5. Note that the descriptive statistics' table reports a mean that differs from 2.5 because it reports averages across countries included in our sample rather than global ones.

Political stability and absence of violence

This index measures the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including domestic violence and terrorism. This index captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.

Control of corruption

This index captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.

Rule of law

This index captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.

Bilateral specific controls

Proximity variables

Distance. The distance is measured as the Great Circle distance in miles between capital cities of source (l) and destination (j) country. The average distance from a destination country (j) is obtained as weighted (by market share) average of the distance of investing countries. The variable included in the regression is the ratio of the distance $l - j$ to the average distance.

Common Border dummy. Dummy variable taking value of 1 if the investing country and the destination country share a common border (0 otherwise).

Common Language dummy. Dummy variable taking value of 1 if the investing country and the destination country share a common language (0 otherwise)

EMU dummy (Common Currency dummy)

Dummy variable taking value of 1 if the investing country and the destination country are members of the European Monetary Union (0 otherwise). In our case, it coincides with a common currency dummy since included countries do not belong to any other currency union.

Equal legal origin

Dummy variable taking value 1 if the investing country and the destination country share the same legal origin of the company law or commercial code of each country (0 otherwise). The countries included in our sample belong to four legal families: English, French, German, Scandinavian.

B Theoretical framework

Following Merton (1969) with constant relative risk aversion utility function and constant investment opportunities the vector of optimal portfolio shares takes the well known following form:

$$\mathbf{w}^* = \frac{1}{\lambda}\mathbf{\Sigma}^{-1}(\bar{\boldsymbol{\mu}} - r\mathbf{i}) \tag{5}$$

where λ is the coefficient of relative risk aversion, $\mathbf{w}$ is the vector of weights, $\bar{\boldsymbol{\mu}}$ is the vector of stock returns, r is the risk-free interest rate, $\mathbf{i}$ is a vector of ones and $\mathbf{\Sigma}$ is the variance-covariance matrix of stock returns.

We incorporate in this standard setting investment cross-border barriers following Gehrig (1993) approach. In his contribution foreign investments appear on average more risky to domestic investors -leading to an information-based justification to home bias- and the portfolio of each investor is different depending on the perceived variance-covariance matrix[38]. We consider this approach focusing on foreign investment only, considering a different investor-specific perceived variability of stock returns for each foreign stock index in the investment opportunity set.

Let us denote by $\mathbf{C}_l$ the NxN positive definite diagonal matrix of investment barriers, where the $j-th$ diagonal element C_{lj} is the cost of holding country j's stock by country l's investor. Capturing C_{lj} the investment barrier cost for country l investing in j , its reciprocal $\frac{1}{C_{lj}}$ stands for a variable capturing the investment "advantage" of country l investing in country j. Consequently, the optimal portfolio is no longer universal ($\mathbf{w}^*$) but is investor-specific ($\mathbf{w}_l$)

$$\mathbf{w}_l = \frac{1}{\lambda}\mathbf{\Sigma}_l^{-1}(\bar{\boldsymbol{\mu}} - r\mathbf{i}) = \mathbf{C}_l^{-1}\mathbf{\Omega}^{-1}\frac{1}{\lambda}(\bar{\boldsymbol{\mu}} - r\mathbf{i}) \tag{6}$$

[38] In a standard setting with asymmetric information (Grossman and Stiglitz (1980)) an informed investor has a lower perceived variance due to its private signal but, at the same time, her perceived expected return is generally also different from the uninformed investor's. It implies that we should sometimes observe a "foreign-bias" when the domestic investors observe bad signals. What we, instead, label "information asymmetries" throughout the paper is closer to the concept of "model uncertainty" or "Knightian uncertainty" (Epstein and Miao (2003) and Uppal and Wang (2003)): roughly speaking, the foreign investor's perceived uncertainty is higher than the domestic investor's one, though they observe the same return. This approach may help to understand home bias because small differences in the ambiguity about the return distributions can lead to largely under-diversified portfolio holding. The same reasoning applies when considering allocation in several foreign stock markets rather than the choice between home and foreign assets.

where $\mathbf{\Sigma}_l = \mathbf{\Omega}\mathbf{C}_l$ (and therefore $\mathbf{\Sigma}_l^{-1} = \mathbf{C}_l^{-1}\mathbf{\Omega}^{-1}$)[39]

Therefore the equilibrium condition, equating stock demand and stock supply, will be

$$\mathbf{MS} = \mathbf{\Phi}\mathbf{\Omega}^{-1}\left[\frac{1}{\lambda}(\bar{\boldsymbol{\mu}} - r\mathbf{i})\right] \tag{7}$$

where **MS** represents the vector of market shares of stock market indexes (supply side) and the right hand side is the (weighted) sum of stock indexes' demands (demand side). $\mathbf{\Phi}$ is a diagonal NxN positive definite matrix where the $j-th$ diagonal element, $\phi_j = \sum_{l=1}^{L} MS_l \frac{1}{C_{lj}}$ is the average investment "advantage" in holding asset j across investors, weighted by the market share of each investor's domestic stock market.

Let us define $\mathbf{D}_l = \mathbf{\Phi}\mathbf{C}_l$, where $\mathbf{D}_l$ is again a diagonal NxN positive definite matrix. We can rewrite the above expression (6) as

$$\mathbf{w}_l = \mathbf{D}_l^{-1}\mathbf{\Phi}\mathbf{\Omega}^{-1}\left[\tfrac{1}{\lambda}(\bar{\boldsymbol{\mu}} - r\mathbf{i})\right] \tag{8}$$

where $D_{lj} = \phi_j C_{lj}$ and $\dfrac{1}{D_{lj}} = \dfrac{\frac{1}{C_{lj}}}{\sum_{l=1}^{L} MS_l \frac{1}{C_{lj}}}$

and using the equilibrium condition (7) we get the following result

$$\mathbf{w}_l = \mathbf{D}_l^{-1}\mathbf{MS} \tag{9}$$

or, in terms of individual asset, the following optimal portfolio weights

$$w_{lj} = \frac{1}{D_{lj}} MS_j \tag{10}$$

MS_j is the market share of stock index j in the world stock market, $\frac{1}{D_{lj}}$ represents the inverse of relative (with respect to world average) cost of country l investing in asset j. In other words, the investor l will demand a share of assets greater than the market share in proportion to $\frac{1}{D_{lj}}$[40]. Note that if $C_{lj} = \phi_j$, i.e. if the investment barrier for country l is equal to the average then the investor l will hold the value market share of asset j.

[39] The matrix $\mathbf{\Omega}$ is the universal variance-covariance matrix that would prevail in absence of investment barriers.

[40] As in Obstfeld and Rogoff (2001), the share of country j's equity held by country l is a decreasing (increasing) function of the bilateral trading cost (efficiency) between l and j relative to the average trading cost (efficiency) between country j and all other countries.

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