Stock exchange consolidation and cross-border investment: an empirical assessment

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Abstract

This paper investigates the effects of stock exchange consolidation on foreign portfolio holdings. Sharing a common stock exchange platform enhances cross-border investments, and the consolidation effect is particularly pronounced among member countries that are smaller in size and closer in geographical, cultural and economic terms. These findings survive different econometric specifications and outlier treatments. After accounting for endogeneity of the consolidation process, the effect of exchange consolidation on cross-border investment is confirmed.

Keywords: Stock exchange consolidation, International Portfolio Investments, stock market information.

JEL Classifications: G11, G15, G30

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1 Motivation and relevance

Since the beginning of the century, increased competition between stock exchanges triggered important structural changes in the securities market industry that underwent a process of gradual consolidation. Increased cross-border capital flows, on the one hand, and the evolution of information and communication technology, on the other hand, have brought to the transformation of trading systems. This process gradually led to more harmonized listing and corporate governance standards, to more intense cross-listing activity, and, finally, to the consolidation of trading systems and exchanges. This transformation drove the integration of stock exchanges, first, within countries, and, then, across countries and continents.

This paper focuses on the effect of stock exchange mergers on international portfolio allocation of intermediaries and retail investors, and fits within the literature on the transaction cost-based explanations of cross-border investments. More specifically, our analysis aims at empirically assessing if stock exchange consolidation can represent a cost-effective incentive to foreign investments.

The seminal contributions by Black (1974) and Stulz (1981a) develop equilibrium models of international asset pricing that explain home bias –that is the disproportionate investment in domestic assets– relying on transaction cost frictions to international capital flows. Tesar and Werner (1995) suggest that transaction costs are unlikely to be an explanation for home bias, as the portfolio turnover rates are much higher for foreign than for domestic assets. Their finding is influential but controversial. Warnock (2002) suggests that this under-weighted but overtraded puzzle in foreign equities could be due to the intrinsic problems in estimating the cross-border holdings (a stock measure) based on the capital flow data (a flow measure). Moreover, Faruqee et al. (2004) show that transaction costs related variables, such as bilateral distance, bilateral phone costs, and communication infrastructure are significant factors that affect international investment.

In the barrier model, transaction costs, as well as taxes on the rate of return to foreign investment, are treated as barriers. By lowering these barriers, the level of expected rate of returns for investors raises, since the cost associated with holding foreign investments declines. Black (1974) and Stulz (1981b) focus on taxes as barriers to international investments. Huizinga (1991) explicitly underlines

that yield differentials between domestic and foreign stocks for foreign investors are significant as a consequence of these barriers, and speculates on the various forms that foreign investment incentives can take. For foreign investment incentives to be cost effective, ideally they should apply only, or at least more strongly, to foreign investors than to domestic investors.

Our analysis builds on this strand of literature and aims at empirically assessing if stock exchange consolidation represents a cost-effective incentive to cross-border investments.

The existing literature has investigated the impact of cross-listing, foreign listing, and stock exchange consolidation from the perspective of firms or exchange shareholders.

Schmiedel and Schönenberger (2006) describe the consolidation process in the securities exchange industry of the Euro area. First, they observe the integration at the national level, and between cash and derivative markets, and then the consolidation process, with the creation of the first pan-European exchange, that is, Euronext.

Nielsson (2009) empirically investigates the effect of the Euronext stock exchange merger on listed firms. The results show that gains from the stock exchange merger are concentrated among big and foreign-oriented firms.

Hasan and Schmiedel (2004) investigate whether the adoption of network strategies by European stock exchanges over the period 1996-2000 created additional value in the provision of trading services. They find that a network strategy is associated with higher market capitalization and lower transaction costs.

More recently, Hasan et al. (2012) investigate the effect of different degrees of stock exchange integration on exchange shareholders' value creation over the period 2000-2008. Their findings emphasize that mergers and acquisitions create more value than alliances and, among alliances, joint ventures generate more value than nonequity alliances. They find that cross-border integration creates more value than domestic, and that horizontal integration creates more value than vertical integration. More value accruing to exchange shareholders is also associated with better shareholder protection, accounting standards, and capital market development of the partner exchanges.

Dorodnykh (2014) systematically analyzes the process of stock exchange integration over the pe-

riod 1995-2010, and investigates the determinants of stock exchange integration. She highlights that financial regulation, cross-membership agreements, and openness are important drivers of mergers and acquisitions in the stock exchange industry, whilst the size of the stock exchanges negatively affects the likelihood of successful mergers.

The above cited literature generally converges on the benefits of stock exchange consolidation accruing to exchange shareholders and listing firms: mergers are the natural response to tough competition, and permit to substantially reduce the costs of trading, to increase liquidity, and then to compete on a world scale. However, regulation market authorities are also concerned that the consolidation process, by reducing the competition among stock exchanges, does not result in abuse of exchange market power, to ensure that also investors benefit from a reduction in transaction costs.

This is the first paper, to the best of our knowledge, which focuses on the effect of stock exchange mergers on international portfolio allocation of intermediaries and retail investors, and analyzes the impact of cross-country stock exchange consolidation on international stock holdings. Giofré (2013a) makes a first attempt to estimate the role of the Euronext creation on the international portfolio holdings of four European investing countries (Italy, France, Spain, Sweden), in the period 2001-2004. She finds a significant role of Euronext only for individual investors, while institutional investors and the aggregate economy appear to be non sensitive to the stock exchange consolidation process. Pownall et al. (2014) compare changes in foreign and domestic ownership of Euronext-traded firms with concurrent changes in foreign and domestic ownership of other EU companies, and find that the integration of the Euronext market is associated with a reduction in home bias for firms listed on the named segments of the Euronext exchange. They interpret this evidence as consistent with the information costs hypothesis: the decrease in information costs, due to the pre-commitments to enhanced transparency, made the segment firms more attractive to all categories of foreign investors.

The exclusive focus on the Euronext consolidation event and on a narrow time span does not permit, however, a rigorous and systematic investigation of the stock exchange consolidation phenomenon.

Over the time span covered by our analysis (2001-2015), several stock exchange consolidations

occurred, involving different countries. Figure 1 provides a graphical representation of the exchange consolidation history.

The first case of stock exchange fusion is the creation of the Euronext stock exchange, in September 2000, from the merger of Amsterdam, Brussels and Paris stock exchange. In September 2002, the Euronext platform further enlarged to include the Lisbon exchange, which in November 2003 successfully migrated to the common trading and clearing systems. In 2003 Euronext also acquired the London-based derivatives market LIFFE. In April 2007, the New York Stock Exchange and Euronext merged to create a new transatlantic project, the NYSE Euronext group. In November 2013 Intercontinental Exchange (ICE), completed the acquisition of NYSE Euronext. In June 2014 Euronext completed an initial public offering making it a standalone company again, separated from the NYSE exchange.

In 2004, the OMX joint company was created, from the merger of the OM Group, controlling the OM Stockholm Stock Exchange, the Helsinki exchange and the Tallin exchange. In January 2005 the Copenhagen stock exchange joined the group, and in October 2006 the company also took a 10 per cent stake in Oslo Holding ASA, the owner of Oslo Stock Exchange. In March 2008, the Nasdaq acquisition of OMX gave birth to the NASDAQ OMX Group.

In March 2007, after a bid of the London Stock Exchange to the shareholders of the Italian Stock Exchange, the fusion between British and Italian stock markets occurred (LSE-BI).

In September 2009 the Central and Eastern Europe Stock Exchange Group (CEESEG) was established, comprising the Budapest, Ljubljana, Prague, and Vienna stock exchanges.

In December 2009, Peru, Colombia and Chile stock exchanges agreed to create the single trading platform Mercado Integrado Latinoamericano (MILA), which started officially its operations in May 2011. The Mexican Stock Exchange joined in December 2014, thus making MILA the largest Latin American market in terms of listed companies, and the second biggest stock market in terms of capitalization, after the Brazilian stock exchange.

The establishment of these mergers can potentially lead to important benefits for the stability of financial markets: the standardization of trading platforms could, on average, reduce the likelihood

of stock price jumps (Yuna (2016)), have a positive effect on stock market information efficiency and turnover (Hellström et al. (2018)), and reduce the costs of cross-border trading through an increase in market liquidity and a reduction in market fragmentation (McAndrews and Stefanadis (2002)).

Our findings contribute to the understanding of the impact of exchange consolidation, not only on listing firms and exchange shareholders, but on investors, in particular the foreign ones, more heavily affected by investment barriers, and then potentially more sensitive to an institutional change that could alleviate them. This paper emphasizes how the creation of a common exchange platform enhances foreign investment among member countries, after accounting for the endogeneity of the consolidation process. A crucial role is played by stock market information: it drives the consolidation process, and then further fosters reciprocal cross-border investments.

The remainder of the paper is structured as follows. In Section 2, we sketch the estimable equation. In Section 3, we describe the data, and provide the descriptive statistics. In Section 4, we report the results of the empirical analysis, with its robustness checks and sensitivity analyses. In Section 5, we extensively deal with the endogeneity issues, provide instrumental variable estimates, and discuss the implications for cross-border investment. Section 6 concludes.

2 Estimable equation

This paper aims to assess the role of stock exchange consolidation on foreign equity portfolios.[1]

Following the literature on investment barriers, the theoretical framework rests on the return-reducing approach of Cooper and Kaplanis (1994) and Chan et al. (2005): in equilibrium, investors are supposed to face different costs when investing in various financial markets, and what matters is the investment barrier relative to the average.

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). When considering equilibrium asset holdings without investment barriers, all investors ought to hold the same portfolio,

[1] Domestic positions and home bias are therefore not investigated, but domestic shares indirectly impact our analysis, since the weight of each foreign stock index in the overall portfolio also depends on the domestic share.

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 optimal portfolio and the value-weighted portfolio. This 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 asset j.

The actual portfolio weight in asset j by country l is w_{lj}, while MS_j is the market share of asset j in the world market capitalization.

We label the ratio $\frac{w_{lj}}{MS_j}$ as "scaled foreign portfolio weight", or "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.

To estimate the effect of stock exchange consolidation on foreign portfolio allocation, we run, in the baseline specification, standard linear estimation techniques, as follows:

$$\left(\frac{w_{lj}}{MS_j}\right) = \alpha + \sum_{n=1,..,N} \beta^n X_{lj}^n + \sum_{k=1,..,K} \theta^k W_l^k + \sum_{h=1,..,H} \delta^h Z_j^h + \varepsilon_{lj} \tag{1}$$

Our regression specification accounts for pair-specific and country-specific factors which potentially capture investment frictions, all expressed in relative terms (except binary variables), scaled by the world average, as predicted by our theoretical framework..

We include N pair-specific covariates, denoted by X_{lj}, which are expected to capture bilateral investment barriers. If we consider, for instance, our main variable of interest, i.e., stock exchange consolidation (EC_{lj}), we conjecture that sharing a common exchange induces higher investment of country l in country j, and therefore we expect a positive sign for the associated coefficient.

The regression specification also includes K investing-country specific variables W_l, such as, international capital mobility out of the investing country, number of listed shares in the investing country's stock exchange, and H destination country-specific variables Z_j, such as, the legal origin

of the destination country and the degree of liquidity of the destination country stock exchange.

To estimate the above parameters, we adopt, in the baseline specification, a feasible Generalized Least Squares specification, correcting for both heteroskedasticity and general correlation of observations across destination countries, with standard errors adjusted for two-way clustering at the investing-country and year levels, as suggested for finance panel data sets (Petersen (2009)). Alternative estimation methods, such as Tobit, Negative Binomial and Quantile regression are also run, to account for censoring, skewness, and high inflation of zeros of the response variable. The treatment of outliers is handled through both a winsorization and a truncation of the response variable's distribution. Finally, when dealing with the endogeneity issues, a GMM estimation is implemented.

3 Data and descriptive statistics

3.1 Data

We consider equity portfolio investments by 40 investing countries in 41 destination stock markets[2], for the period 2001–2015. We adopt the Coordinated Portfolio Investment Survey (CPIS), released by the IMF, a dataset which has been extensively used in many recent papers (Fidora et al. (2007); Lane and Milesi-Ferretti (2007); Sorensen et al. (2007); Giannetti and Koskinen (2010); Giofré (2013b)). 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 investments. While the CPIS provides the most comprehensive survey of international portfolio investment holdings, it is still subject to a number of important caveats.[3] The most important is that the CPIS is unable to address the issue of third-country holdings and round-tripping, very frequent in the case of financial offshore centers.[4] Moreover, the survey does not report domestic positions, which need to be retrieved from other sources, as specified in Appendix A.

[2]See Appendix A, for the full list of investing and destination countries. Note that some countries are included as investing, but not as destination ones, and vice versa, because of data availability.

[3]See data.imf.org/cpis, for more details on the survey.

[4]We will address this specific issue in the Robustness checks of Table 4, column (4).

Appendix A also reports details on the definition of dependent variable and regressors, and information on their sources.

3.2 Descriptive statistics

Table 1 shows the main descriptive statistics of the variables included in our analysis. Panel I reports the descriptive statistics of the dependent variable, that is foreign bias, and of its constituents. The variable capturing the market share (MS_j) measures the size of the destination economy's stock market capitalization relative to the world stock market capitalization. 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. Following Dahlquist et al. (2003), we consider the MSCI market share (MS_MSCI_j), based on the free-float adjusted market capitalization.

The scaled foreign portfolio weight, or foreign bias, is therefore defined as the observed portfolio weight (w_{lj}) scaled by the float-adjusted market share (MS_MSCI_j). To provide an economic interpretation of this measure, consider that a scaled foreign share equal to 1 implies that the foreign asset enters the portfolio with a weight equal to its (float-adjusted) stock market share. The foreign bias mean value is 0.4, thus implying that on average the actual portfolio weight is 40 percent of the float-adjusted market share. The distribution is very skewed, with a median value equal to 6 percent of the float-adjusted market share, a maximum value equal to 26.7 and a standard deviation relatively large, more than three times the sample mean.[5] The low median value points out that foreign assets are generally heavily underweighted, which is the mirror image of the strong home bias reported in the international finance literature (French and Poterba (1991); Tesar and Werner (1995); Lewis (1999); Karolyi and Stulz (2003)).

Panel II of Table 1 reports the descriptive statistics of pair-specific regressors, i.e., variables that

[5] See Appendix A.1 for details on the exclusion of the outliers from the distribution. Sections 4.3.6 and 4.3.7 specifically deal with the peculiarities of the response variable's distribution. The treatment of outliers is also discussed in Section 5, when dealing with endogeneity issues.

are specific of the investing-destination lj couple. The first regressor reported is the main variable of interest in our analysis, the exchange consolidation variable (EC_{lj}), detailed in its sub-components. Then, the table shows the so-called gravity variables, which capture the geographical (distance, common border) and cultural distance (common language, colonial linkage) between the investing and the destination country. The three subsequent regressors are not strictly gravity variables, but still capture, in institutional terms, the closeness of the countries: the "equal law" dummy variable, capturing if two countries share the same legal origin (Common Law, French, German, or Scandinavian), the EMU dummy, which captures the existence of a common currency, and the GAAP variable, capturing the distance in accounting principles. Also the cross-listing variable seizes the closeness between investing and destination countries, as it measures the intensity of cross-listing before the exchange consolidation events. Finally, the trade closeness variable captures the trade linkages between investing and destination economies, as captured by the average between the fraction of the investing country's imports covered by the destination country and the fraction of the investing country's exports covered by the destination country. Within the panel of pair-specific variables, we also report the two instruments proposed to account for the endogeneity of the consolidation process, and that will be widely discussed in Section 5. The instruments are binary variables: the first (J_High_info_{lj}) is equal to 1 if both the investing and the destination country have a high depth of information in the stock market (0 otherwise); the second (J_Low_size_{lj}), is equal to 1 if both the investing and the destination country have a low stock exchange size (0 otherwise).

Panel III of Table 1 reports the descriptive statistics of country-specific covariates, that is, variables specific of the investing and/or destination country. The first regressor reflects the international inward and outward capital mobility, while the second and third regressor refer, respectively, to the common law versus civil law origin of the destination country,[6] and to the antidirector rights legislation, aimed at capturing the degree of protection of minority investors' rights in the destination

[6]Notice that this variable is different from the pair-specific variable "equal law" of Panel II, because it is equal to 1 if the destination country has a "common law" legal origin (0 otherwise), regardless of the legal origin of the investing country.

country. The fourth regressor is the 1-year lag return of the destination country's stock index, aimed at capturing any positive momentum trader or contrarian trader behavior. The subsequent regressors refer to the size of the stock market (number of listed shares), of the economy (GDP), and to other characteristics of the stock markets, such as its openness to foreign listing, and its liquidity (turnover ratio and traded stocks to GDP). The SOX and MiFID regressors refer to the regulatory framework of the destination countries, while the last two lines report descriptive statistics of country-specific variables which are related to country level governance, such as regulatory quality and control of corruption, drawn from the World Bank Worldwide Governance Indicators.

It is worth stressing that the absolute magnitude of the regressors 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, that is scaled by their average.[7]

4 Empirical analysis

4.1 Preliminary findings: size, liquidity and investment

Table 2 reports some preliminary results on the relationship between stock exchange consolidation (EC), and some basic indicators of stock markets: columns (1) to (5a) report the coefficients from the regression of the dependent variable at the head of the column on the regressor at the head of the row, controlling for investing country-fixed effects and time-fixed effects.

At the head of the rows, three labels for different specifications of the EC indicator are reported. The first one – EC_j – refers to the destination country j, and is related to the status of country j as a member (EC_j=1) or not (EC_j=0) of a consolidated stock exchange. The second one – EC_l – refers to the investing country l, and is related to the status of country l as a member or not of a consolidated stock exchange. The third one – EC_{lj} – is instead the bilateral index of exchange consolidation, and is equal to 1 if the investing and the destination country share, in a given year,

[7] With the exception of dummy variables, cross listing – measured as fraction of cross-listing in one country relative to total cross-listing– and trade closeness –measured as the average between the relative fraction of the bilateral imports to total imports and of the bilateral exports to total exports.

the same exchange platform, and 0 otherwise.

Column (1a) of Table 2 reports the regression coefficient of the share of stock market capitalization of country j (MS_j) on EC_j: the coefficient is positive, as expected, and statistically significant (0.030). In column (1b) of Table 2, we consider an alternative measure of market share, MS_MSCI_j, based on the free-float adjusted market capitalization (Dahlquist et al. (2003)). The coefficient is still positive, statistically significant, and larger in size (0.046). These findings highlight that countries joining a consolidated stock exchange platform witness an increase in stock market capitalization by 3-5 percent.

We can rationalize the positive correlation between the market share and the stock market consolidation as the result of a higher market liquidity of national stock markets that merged in an integrated trading platform. In columns (2a) and (2b) of Table 2, we consider as dependent variables two measures of liquidity of the destination country j, respectively, the relative (to the world average) ratio of stock trades to GDP and the relative turnover ratio. As expected, both measures, display a statistically significant and large correlation (from 0.253 to 0.266) with the EC_j index. Stocks traded in consolidated exchanges display a 25 percent higher liquidity, either measured by the turnover ratio or by the traded assets to GDP ratio.

On the demand side, we are interested in understanding which investors actually hold the larger supply of stocks associated with the merging process. In particular, we check if the larger size is paired with a prevalent increase in the foreign or in the domestic component. In column (3), we observe the behavior of investors residing in those countries involved in the consolidation process. We report the correlation between the domestic portfolio share w_{ll} and the index of consolidation of the investing country EC_l. Since we include both investing country and time-fixed effects, we are partialling out the effects of a general decrease in "home bias" over time, or eventual peculiarities of the investing countries involved in the consolidation processes. Interestingly, those investors residing in countries whose stock exchanges undergo a consolidation process, show a 11% significantly lower domestic portfolio position.

Since countries belonging to a consolidated platform show larger market shares but lower domestic

holdings, then a sharp increase in foreign investment must have occurred.

In columns (4) and (5) of Table 2, we investigate the linkage between stock exchange consolidation and foreign investment. In columns (4), we report the correlation of the foreign share held by country l's investors in country j's stock market (w_{lj}) with the EC_j of the destination country, the EC_l of the investing country, and the bilateral specific consolidation index EC_{lj}. The correlations are positive and statistically significant: the coefficient of EC_l is economically negligible, and the coefficient of EC_{lj} is four times larger than the coefficient of the destination-specific index, EC_j.

In order to scale the demand side by the supply side effect, we consider in column (5), the "foreign bias" measure, as defined in Section 2, that is, the ratio of the foreign portfolio share w_{lj} to country j market share (MS_MSCI_j). This normalization allows us to control for the size of the recipient stock market, which in turn may depend on the consolidation process. The two country-specific factors EC_j and EC_l lose statistical significance, and only the role of the bilateral consolidation index EC_{lj} persists large and significant (0.788): recalling that a value of the foreign bias equal to 1 points to an actual portfolio weight equal to the market share, and that the sample mean of the foreign bias is 0.4, we can appreciate the economic relevance of this coefficient.

4.2 Main findings

The preliminary evidence displayed in Table 2 suggests that belonging to the same trading platform can help explain the wedge between the actual foreign portfolio share and what is predicted by the value weighted portfolio. However, this finding might miscapture other bilateral linkages among the countries under investigation: we need to seize the bilateral exchange consolidation effect, after partialling out other competing explanatory factors.

In Table 3, we report the results of a multivariate regression which considers the foreign bias as a dependent variable, and which controls for time-fixed effects.

The literature has widely documented that the cultural and geographic proximity of the markets has an important influence on investor stock holdings and trading (Brennan and Cao (1997); Kang and Stulz (1997); Grinblatt and Keloharju (2001); Chan et al. (2005); Portes and Rey (2005)).

Column (1) of Table 3 reports the results from a regression including, beyond the exchange consolidation, standard gravity variables such as distance, common border, common language. The variable distance is measured as the great-circle distance between the capital cities of the destination and investing countries. 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, and show, as expected, a significant negative (-0.105) and positive (0.438) role, respectively. The role of the common language dummy is intuitively interpretable, since foreign languages make collecting information more difficult (0.124)

We also include binary variables that capture cultural and institutional linkages. To seize cultural and historical ties, we control whether countries are tied by colonial heritage. The dummy common colony variable takes the value 1 if the considered pair of countries shares a similar colonial history, and 0 otherwise. As expected, the coefficient is positive and statistically significant (0.123).

We also include the common currency area (EMU) dummy, taking 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 portfolio share by 0.590 compared to non-member countries. Our findings are 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.

The literature dating back to La Porta et al. (1998), has emphasized that civil law provides inferior protection for minority shareholders. Since portfolio shareholders are by definition minority shareholders, we expect them to be attracted, ceteris paribus, by destination countries better guaranteeing their rights. We include a dummy variable taking the value 1 if the destination country's legal system has a "common law" origin, and 0 otherwise. The coefficient is, expectedly, positive and statistically significant (0.094)

A closely related covariate is the "equal legal origin" binary variable, that is a dummy variable taking the value of 1 if source and host countries share the same legal origin (Common Law, French,

German, or Scandinavian), and 0 otherwise. A rationale for a role of the "equal legal origin" on cross-border investment, regardless of which is the origin, can be drawn from the literature (Lane (2006); Guiso et al. (2009)). Guiso et al. (2009) find that commonality in legal origin, among other determinants, is a source of trust: also building on Cornell and Welch (1996), they argue that citizens of countries having similar legal systems trust themselves more, because it is easier for them to obtain legal justice in case of deviation from the legal contract. In line with this literature, an equal legal origin would capture a basic level of institutional similarity between the source and destination country: if more similarity implies more attraction, it might directly influence reciprocal foreign investments. The coefficient is instead significant at 5% and negative (-0.019), though this significant negative effect disappears or becomes positive in richer specifications.

Finally, in line with the gravity approach, we include the size of investing and destination countries. We cannot rely on the most obvious measure, that is, the stock market capitalization, because this is already accounted for in the denominator of the foreign bias ratio, the dependent variable. We therefore adopt two alternative proxies. The first one, more strictly related to the size of the stock market, relies on the number of publicly listed companied in a country (listed shares). The second measure is instead more generally related to the size of the economy, and is the Gross Domestic Product (GDP). To avert endogeneity concerns, we consider the size measures in a time-invariant fashion, fixed at their beginning of period level.[8] While the number of listed shares is positively related with the dependent variable, as expected in a gravity-like specification, the GDP is instead negatively related with foreign investments. The latter less-obvious finding is consistent with the more urgent need of relatively smaller countries to diversify their portfolios internationally.

The above described variables play an economically and statistically significant role in explaining the dependent variable, but the coefficient of the bilateral consolidation index EC_{lj}, after size, gravity variables, and institutional proximity factors are accounted for, is still statistically significant and economically large (0.546).

Institutional barriers to capital mobility can deter investment in foreign countries. In column

[8]Notice that, to estimate time-invariant country specific factors, such as size, we cannot control for investing and destination country fixed-effects.

(2) of Table 3, we control for inward and outward capital mobility, proxied by an index measuring the restrictions imposed by different countries on capital flows, derived from the Economic Freedom Network (Chan et al. (2005)). This index ranges from zero to 10, and measures the restrictions countries impose on capital flows, assigning a lower rating to countries with more restrictions on foreign capital transactions. We find that a higher capital mobility in the destination country attracts more inward investment (0.039), and a higher capital mobility in the investing country pushes foreign investment (0.124). The coefficient of EC_{lj} is only marginally reduced to 0.530.

Among regulatory barriers to information acquisition by foreign investors, Barth et al. (1999) highlight the importance of the costs faced by foreign investors in understanding other countries' accounting principles. Bae et al. (2008) propose a measure of country-pair differences in 21 accounting rules based on an international survey of Generally Accepted Accounting Principles (GAAP), in 2001. This measure does not attempt to assess the quality of any given set of accounting rules, but the extent to which accounting standards differ between two countries. Bae et al. (2008) suggest that analysts tend to avoid following foreign firms adopting accounting rules that are significantly different from the accounting rules used in their home country, because they incur costs to gain expertise in understanding other countries' GAAP. If this is the case, the "distance" in accounting standards between two countries could deter bilateral foreign investments. We construct the measure of bilateral distance in GAAP and test its impact on foreign equity portfolio investment. We show in column (3) of Table 3 that indeed more distant accounting principles significantly deter bilateral investment (-0.046). The coefficient of the EC_{lj} index is further reinforced (0.567).

Since the '80s, an increasing number of firms have listed their shares on foreign stock exchanges. A growing literature has investigated the cross-listing phenomenon, studying the determinants of the decision to list on foreign stock exchanges, and of the foreign location (Saudagaran (1988); Saudagaran and Biddle (1995); Pagano et al. (2001)), and evaluating the firms' gains from foreign listing (Sarkissian and Schill (2009); Sarkissian and Schill (2016)). In column (4) of Table 3, we include the number of bilateral cross-listing of country j in country l relative to the total cross-listing in country l, relying on the data reported in Sarkissian and Schill (2009) and relative to bilateral

cross-listing in December 1998, then prior to the analyzed period. This measure theoretically ranges from 0 (no bilateral cross-listing between l and j) to 1 (all cross-listing in country l are by country j's firms). We find that, as expected, an increase of the relative cross-listing from 0 to 1 is associated with a sharp increase in bilateral foreign bias (0.463). The coefficient of the exchange consolidation coefficient is significantly reduced (0.330), thus stressing the strong correlation between the two regressors.[9]

Table 2 suggests a significant correlation between liquidity and stock exchange consolidation. In column (5) of Table 3, we include the stock turnover ratio as a measure of stock market liquidity for both the investing and the destination economy. To prevent endogeneity concerns, we consider the turnover ratios fixed at their beginning of period level. This covariate displays a positive coefficient relative to the destination country and a negative coefficient relative to the investing economy: economies with more liquid stock markets invest less abroad, while more liquid stock markets attract more inward investments.

Following the literature on the trade-finance nexus (Mundell (1957), Pol and Caballero (2009), Belke and Domnick (2018)), we also include, in column (6), a variable capturing the trade linkages among countries. Indeed, from a theoretical point of view, trade and financial flows might behave either as substitutes (Mundell (1957)), or –in more recent models incorporating financial frictions– as complements (Pol and Caballero (2009)). This can be an important factor in our analysis, because an increase in trade integration might either reduce or increase the incentive for capital to flow. However, it can also introduce a strong source of endogeneity due to reverse causality. We therefore consider trade flows at their beginning of period levels, and construct a measure of trade closeness ($trade_{lj}$) equal to the average of two ratios: the bilateral exports (lj) divided by the total exports of the investing country l, and the bilateral imports (lj) divided by the total imports of the investing country l, as drawn from the Direction of Trade Statistics (International Monetary Fund). This average theoretically ranges from 0 (no bilateral trade between l and j) to 1 (all foreign trade of

[9]The inclusion of the cross-listing variable entails a cost in terms reduction in number of observations. Facing the trade-off between inclusion of a correlated covariate and number of observations, in the light of the strong undercutting effect of this covariate on our coefficient of interest, we chose to include the cross-listing in the baseline econometric specification, at the cost of giving up a large number of observations.

country l occurs with country j). This factor plays a significant role: an increase of the ratio from 0 to 1 would determine an increase in foreign bias by 0.218, half of its mean value.

Column (6) also includes lagged returns (past 1-year return) as in Chan et al. (2005), to detect any "return-chasing" (or "contrarian trader") behavior of investors, that is a tendency to underweight (or overweight) countries whose stock markets have performed poorly in the past. This covariate is included as a ratio to the world average past 1-year return and does not appear to significantly affect the foreign bias.[10]

Fraudulent transactions, bribery, unenforceable contracts, legal and regulation complexity can significantly affect portfolio investment (Gelos and Wei (2005); Leuz et al. (2009)). In column (7), we include institutional variables generally related to country level governance, such as "political stability" and "control of corruption", drawn from Worldwide Governance Indicators (WGI, World Bank).[11]

In column (7), after partialling out the regressors above-described and time-fixed effects, we are left with a coefficient of exchange consolidation still positive, statistically significant and economically relevant (0.316).

The interpretation of our main findings is quite straightforward: investors sharing a common exchange platform can access foreign assets issued by member countries at a cost closer to the one faced by domestic investor and share the same trading rules. The standard asymmetry between domestic and foreign assets is therefore dampened, and foreign investment is enhanced. Column (7) of Table 3 will represent the baseline specification for further robustness checks (Section 4.3), and the benchmark regression when dealing with endogeneity issues (Section 5).

[10] We have also included past 5-year return and past 3-year returns, with no significant effect on our findings.

[11] As an alternative, we have included time-invariant institutional variables drawn from La Porta et al. (1998): "control of the risk of expropriation", that seizes the government stance towards business, and "efficiency of the judicial system" in attracting foreign investments. Our findings are not affected by this alternative definition of country governance.

4.3 Robustness and sensitivity

In Table 4 to 9, we run robustness checks, sensitivity analyses, and interaction tests. We consider different specifications or country sample, and investigate the role of crises and regulation reforms (Table 4), perform sensitivity analyses on the exchange consolidation definition (Table 5), study the interaction effects with the consolidation index (Tables 6 and 7), explore alternative econometric specifications (Table 8), and the treatment of outliers (Table 9).

4.3.1 Additional controls and sample specification

In columns (1) and (2) of Table 4, we control for additional country-specific factors potentially correlated with the included covariates.

Recent literature has stressed the effect of minority shareholder protection on foreign investment (Leuz et al. (2009); Giannetti and Koskinen (2010); Giofré (2013b)). We therefore include the "revised" antidirector rights index (Djankov et al. (2008)), a measure that revises the antidirector rights index (ADR) proposed in the seminal paper by La Porta et al. (1998), and that captures how strongly the legal system favours minority shareholders against managers or dominant shareholders in the corporate decision making process. Consistent with the literature, the effect of the revised ADR of the destination economy on foreign investment is positive (column (1), Table 4). Expectedly, the inclusion of the revised ADR index reduces the role played by the "common law" legal origin of the destination country, as they both proxy the degree of protection of minority investors, and then play a similar role on foreign investment. Compared to the baseline specification, its inclusion has a very marginal effect on the coefficient of the EC_{lj} factor (from 0.316 to 0.318).[12]

The role of stock exchange consolidation may depend upon the level of financial openness of the national stock exchanges before the merger. We consider as a measure of openness, the percentage of foreign securities traded on the domestic market (relative to the domestic share) in 2000, prior to

[12] As pointed out in the literature, the direction of causality between the index of minority shareholder rights and financial development, as captured for instance by the stock market capitalization, is ambiguous (La Porta et al. (1998)). This potentially creates a problem of endogeneity, because the market capitalization enters as denominator of the dependent variable. Given the modest impact of the revised ADR on the coefficient of the EC_{lj} variable, we will therefore not include it in the baseline specification, in order to prevent unnecessary sources of endogeneity.

the period considered in our analysis. Column (2) of Table 4 reports the results after including a measure of openness for both the destination and the investing country. The coefficients are negative and statistically significant only at 10%, and their inclusion reduces the coefficient of EC_{lj} (from 0.316 to 0.280).[13]

In column (3) of Table 4, we allow for a nonlinear influence of gravity variables on foreign investment. We add the square of the two continuous gravity variables considered (being binary the other gravity variables considered), i.e., the geographical distance and the "accounting" distance (GAAP). The positive and significant coefficients of the squared terms point to a nonlinear effect of these variables on foreign bias: interestingly, the strength of the negative effect seems to decelerate with extreme values of the distance. The magnitude of the coefficient of the main variable of interest, EC_{lj}, is however left almost unaffected by the nonlinearity of gravity variables (from 0.316 to 0.311).

Finally, we test the robustness of our findings to the sample specification. In column (4), we exclude potential offshore financial centres, which might have the effect of distorting investors' decisions for reasons beyond the scope of this analysis. We exclude Ireland, Switzerland, Singapore, Hong Kong, United Kingdom and Uruguay.[14] We observe that the coefficient of the consolidation variable is boosted (0.459), after the exclusion of potential offshore centers diverting foreign investments.

4.3.2 Crisis and regulation

The time period we consider may be non-neutral for our findings, since it encompasses the global financial crisis and the evolution of financial market regulation in major economies. These events need to be accounted for, both because they might have had a direct impact on international diversification incentives, and, more importantly, because these factors can affect the way international portfolios respond to stock exchange consolidation.

During the global financial crisis of 2007-2009, an unprecedented large number of financial insti-

[13] The inclusion of this covariate affects the coefficient of EC_{lj} but not dramatically, while entails a substantial loss of observations (by about two thousands). We chose therefore not to include it in the baseline specification.

[14] Note that, in the light of the concerns of third-country holdings and round-tripping in the CPIS survey mentioned above, and consistently with the literature (Lane (2006)), Luxemburg is excluded from our sample, either as a source or a destination country, in view of its predominant role as an offshore center.

tutions collapsed or were bailed out by governments.

In 2010, with increasing fear of excessive sovereign debt, lenders demanded higher interest rates from eurozone states with high debt and deficit levels, such as Greece, Spain, Portugal, Ireland, and subsequently, Italy. During this crisis, several of these countries had their sovereign debt downgraded to junk status by international credit rating agencies, worsening investor fears.

Column (5a) of Table 4 reports the results of an econometric specification including a time dummy for the 2007-2009 crisis, and its interaction term with the EC_{lj} index. Column (5b) of Table 4, extends the crisis period to encompass also the 2010–2012 sovereign debt crisis.[15] We can observe that neither the coefficient of the crisis periods, nor their interaction with EC_{lj} is statistically significant.

In the time span of our analysis, major changes also occurred in the regulatory framework of developed economies.

In the aftermath of a number of high-profile scandals, in 2002 the United States' Congress passed the Sarbanes–Oxley Act (SOX). The Act is the most important legislation affecting corporate financial reporting enacted in the United States since the 1930s. It not only imposed additional disclosure requirements, but more importantly, proposed substantive corporate governance mandates.

In response, major economies emulated the Sarbanes Oxley Act and the related rules adopted by US exchanges and securities regulators.[16]

While the welfare impact of more stringent securities legislation is still under debate, these mandatory statutes brought about deep changes on the regulatory and supervisory framework, which might have affected our findings.

We construct a binary variable for the financial system regulation, which is equal to 1 for the countries involved, in the relevant years, and 0 otherwise. In column (6a) of Table 4, we check for a direct effect of this variable on foreign investment and its indirect effect through the stock exchange consolidation. We find no effect of the SOX legislation on foreign bias, but its interaction with EC_{lj}

[15] Note that, to estimate the effect of the crisis, the specifications in columns (5a) and (5b) of Table 4 do not include time-fixed effects.

[16] In Appendix A.2, we specify the legislative measures adopted by various countries at different times.

appears negative and significant. This evidence can be interpreted as the exchange consolidation being especially effective as an incentive to foreign investment in those countries lacking transparency and strict regulatory norms.

Another important legislative act in the period under consideration might crucially have affected our findings, the Markets in Financial Instruments Directive (MiFID). The MiFID is a directive, taking effect in November 2007, aiming at integrating the European Union's financial markets, and increasing the amount of cross border investment orders. The MiFID planned to implement new measures, such as pre- and post-trade transparency requirements and capital requirements that firms must hold. The new environment created by the MiFID could trigger drastic changes in the architecture of capital markets, and in the organization of financial intermediation in Europe. A major feature of MiFID is, in fact, to open the execution and settlement of equity transactions to a variety of operators, through competing trading venues, in order to foster competition. Since this could potentially lead to a more fragmented and opaque infrastructure, then best execution requirements, increased transparency and information are demanded for the benefit of market and to protect investors.

Results in column (6b) of Table 4, show that countries that adopted the MiFID Directive attract more foreign investment, but the MiFID does not operate indirectly through stock exchange consolidation, as revealed by the non significant coefficient of the interaction term.

4.3.3 Sensitivity to EC composition

In Table 5, we check the sensitivity of our findings to the specification and composition of the exchange consolidation index.

In column (1) of Table 5, we test for an alternative definition of the Euronext platform including also the UK among the member countries. As mentioned above, in 2002, Euronext also merged with the futures exchange LIFFE (London International Financial Futures and Options Exchange). Since LIFFE is not strictly a stock exchange, the decrease in the coefficient size (0.246) was expected and can be interpreted as supportive of our thesis.

In October 2006 the OMX Group also took a 10 per cent stake in Oslo Holding ASA, the owner of Oslo Stock Exchange. In column (2) of Table 5, we specify the OMX platform as including also Norway from 2007 onward, and the coefficient of the EC_{lj} factor becomes even larger than in the baseline regression (0.484).

Finally, we test whether our findings are driven by a particular stock exchange merger.

In columns (3a) to (3e) of Table 5, we display the results when NYSE Euronext, Nasdaq OMX, CEESEG, LSE-BI, or MILA consolidation are, respectively, excluded from the EC_{lj} indicator.

The results suggest that a single merger does not drive our results, but the coefficients display a notable variability after the exclusion of one of the consolidated platforms. Columns (3a) and (3b) suggest, respectively, that the role of NYSE-Euronext is relatively weak, while the role of Nasdaq-OMX is relatively strong.

To interpret this evidence, we need to acknowledge the existence of specific motives behind individual mergers and, more generally, some peculiarities differently affecting cross-border holdings.

On the one hand, since the Euronext-NYSE group comprises relatively large exchanges, we can conjecture that the size of member exchanges plays an adverse effect on the sensitivity of cross-border holdings to exchange consolidation.

On the other hand, the Nasdaq-OMX group is the result of a merger between two groups which represented, before the consolidation, the principal suppliers of technology to stock markets, in their respective continents (Bottiglia et al. (2010)). The model by Chemmanur and Fulghieri (2006), dealing with dual listing, emphasizes that the types of firms that are likely to take advantage of dual listing are those about which foreign investors have a significant amount of information available to them.[17] Consistently with the Rochet and Tirole (2004)'s theory of the two-sided competition for exchanges, the more attractive it is for firms to list on the exchange, the more attractive it is for investors to trade on the exchange. Accordingly, we might expect in the Nasdaq-OMX group, a strong incentive of firms to be listed in a foreign exchange where a stronger attraction is exerted on investors by more "familiar" foreign firms: since these firms share characteristics similar to the

[17] Accordingly, Blass and Yafeh (2000) find that high-tech firms from Israel are more likely to be listed on the Nasdaq.

domestic ones, the investors have a cost advantage in evaluate them (Chemmanur and Fulghieri (2006)).

Following the above reasoning, we conjecture that some country characteristics of member countries, such as size or familiarity in a broader sense, might make the effect of one stock exchange merger more effective than another.

4.3.4 EC and size

Table 6 reports the results of the interaction of EC_{lj} with the size of investing and destination countries.

We focus first on the measure more strictly related to the stock market, that is, the number of publicly listed companies (columns (1a) and (1b)).

In column (1a) of Table 6, we consider the number of publicly listed companies in the investing stock exchange. The coefficient of EC_{lj} is equal to 0.389, the coefficient of the (relative) investing country's size measure is non significant, while the coefficient of the interaction term is -0.027: the effect of the bilateral consolidation index EC_{lj} is decreasing in the relative size of the investing country's stock exchange. When considering the size of the destination economy's stock exchange, we observe that in general foreign investors underweight relatively large stock exchanges (-0.018), and the negative coefficient of the interaction effect confirms that the bilateral consolidation index EC_{lj} is decreasing also in the relative size of the destination country's stock exchange.

The second size measure is GDP, and is more generally related to the size of the economy (columns (2a) and (2b) of Table 6).

The results are qualitatively similar to the ones in columns (1a) and (1b), as the larger is the size of destination and investing countries, the weaker is the effect of stock exchange consolidation. Interestingly, the negative coefficient of the interaction term is half than in columns (1a) and (1b), which is not surprising being the GDP, a measure more loosely related to the size of the stock exchange.

4.3.5 EC and familiarity

Beyond the size of the economies, their "familiarity" or "closeness" might also play a role. In Table 7, we study whether closer countries benefit more or less from joining a common platform. We consider variables capturing physical, cultural, institutional and economic distance.

In columns (1) and (2) of Table 7, we consider among gravity variables, the classical measures of physical distance. The coefficient of the interaction is negative for distance and positive for the border dummy: the EC_{lj} effect is therefore stronger the closer are the member countries. In column (3), (5) and (6) we observe that, similarly to what observed for physical distance, the EC_{lj} effect is stronger for countries closer in cultural terms (language, colonial linkages, legal origin). In column (4), instead, we observe that the coefficient of the interaction term is negative: the common currency makes the EC_{lj} effect weaker. This evidence can also contribute to explain the results of column (3a) of Table 5, revealing the weaker effectiveness of NYSE-Euronext -involving many EMU members- on foreign investment. Columns (7) and (8) take into account the familiarity among countries in terms of financial linkages: countries with more distant accounting principles (GAAP) or lower historical cross-listing ties display a weaker EC_{lj} effect on foreign investments.

Finally, column (9) of Table 7 takes into account the closeness of countries in terms of trade flows. Saudagaran (1988) and Saudagaran and Biddle (1995) find a strong association between the foreign listing location of a given firm and the level of its exports to that country. As mentioned above, Chemmanur and Fulghieri (2006) predict in their model that the firms that will mostly take advantage of dual listing are those about which foreign investors have a significant amount of information available to them, for instance, because they purchase the goods exported by these firms. Consistently, our findings suggest that closeness in terms of goods markets is significantly associated with closeness in financial markets, as it translates into larger cross-border investments.[18]

The contribution of Tables 6 and 7 is two-fold. On the one hand, the evidence that small exchange size and strong familiarity sharpens the effect of consolidation help understand the strong

[18]Recall that the cross-listing and the trade closeness indexes range theorically from 0 to 1. The large size of the coefficient of the interaction terms reflects therefore the two extreme values they can take (0, in case of no bilateral cross listing or trade, and 1, in the case all cross-listing or trade flows of country j are with country l).

role played by consolidations such as Nasdaq-OMX, relative to NYSE-Euronext: indeed, abstracting from the US which is present in both consolidation processes with two different exchanges, the OMX member countries are relatively smaller and "closer" in financial and cultural terms, compared with the Euronext ones. On the other hand, these tables provide useful hints to define the candidate instruments for exchange consolidation, which will be further discussed in Section 5.

4.3.6 Sensitivity to the econometric specification

In Table 8, we undergo our results to sensitivity checks relative to the econometric specification. Column (1) of Table 8 reports the results of the baseline regression (Table 3, column (7)), but under a Tobit rather than a FGLS model: since a large number of bilateral observations is equal to zero, we allow for the possibility that the observed distribution of equity holdings is censored at zero. Such censoring is plausible, given the restrictions on shorting equity holdings in many countries. However, as reported by the IMF, in some cases within the CPIS, negative values are reported for the value of residents' holdings of securities issued by a particular economy. Such entries reflect short positions in securities, usually resulting from the sale of securities acquired under repurchase agreements.[19]

Though lower than in the baseline specification (from 0.316 to 0.201), the results under the Tobit specification confirm that exchange consolidation is associated with a significantly larger foreign bias.

In column (2), we run a Generalized Least Squares Model estimation specifying a log link and a Negative Binomial distribution of residuals: this model can fit a skewed distribution, a high inflation of zeros and overdispersion, which is the case of our dependent variable, as shown in Table 1. We observe that the coefficient of the EC_{lj} factor is positive, statistically significant and equal to 0.214. The results in column (1) and (2) of Table 8 show, on the one hand, that the exchange consolidation effect survives to alternative econometric specifications, and, on the other hand, that when taking into account the skewness of the distribution and the presence of zeros, the size of the coefficient is dampened, though remaining still large and significant.

[19]Since in our country sample, the number of negative positions would be very low (less than 50 out of about 12 thousands of observations), and their absolute value would be very low, too, we exclude these observations, for consistency with the theoretical framework.

To address the issue of skewness of the distribution and the presence of outliers in the dependent variable, in columns (3a) to (3d) of Table 8, we report the results of a Quantile regression. An advantage of the quantile regression relative to the least squares regression is precisely that the quantile regression estimates are more robust against outliers in the response measurements: whereas the method of least squares estimates the conditional mean of the response variable, quantile regression estimates its conditional median (or other quantiles). In columns (3a), (3b), (3c) and (3d) we report, respectively, the conditional 25th percentiles, median, 75th percentile, and 90th percentile of the response variable.[20] We observe that the coefficient of the EC_{lj} factor varies across percentiles, increasing from 0.156 to 0.282, to reduce then to 0.234 at the 90th percentile. In the next table, we will more directly investigate how far the presence of outliers and zeros affect the conditional mean of the response variable.

4.3.7 Sensitivity to outliers' treatment

The evidence of Table 8 suggests the need to properly address the issue of outliers. We will handle them both by winsorizing data, that is, replacing the extreme values with a certain percentile value from each end, and by trimming (or truncating) data, that is, removing those extreme values from the distribution.

If we consider the truncated distribution, we take a clear stance and decide that we are not interested in the tails of the distribution, because we believe that the "outliers" are anomalous, and we want to focus on the "true" distribution. If we consider instead the winsorized sample, we think the outliers belong to the distribution, but we want to reduce the skewness of the distribution, and then replace their extreme values with the upper (lower) values taken by the distribution. It is worth stressing that the treatment of outliers is usually symmetrical, that is the winsorization or truncation involves both the top and the bottom of the distribution. In our case, since the lowest 15% of the distribution consists of zeros, our treatment will be necessarily asymmetrical. In the case of winsorization, we can only operate on the upper part of the distribution. In the case of truncation,

[20] Note that the bottom 15% of the distribution of the dependent variable is represented by zeros.

conversely, we can either ignore the low end of the distribution and then trimming only the top, or we can trim the high end and all the zeros of the distribution. We will proceed both ways.

In Table 9, we handle the outliers by winsorizing (column (1) and (2)), or by truncating (columns (3a) to (4b)) the distribution according to the rule shown at the head of the column. From columns (1) and (2), we observe that a winsorization of the sample at top 1% or 5%, leads to a coefficient of the EC_{lj} factor equal to 0.327 and 0.221, respectively. The fact that the coefficient in column (1) is larger than the coefficient of the baseline regression (0.316) suggests that in the upper 1 percent of the distribution many outliers refer to country pairs not involved in the consolidation process: their winsorization makes the exchange consolidation effect even stronger. When instead the winsorization process involves the upper 5 percent of the distribution, it leads to a reduction of the coefficient of the EC_{lj} factor: it evidently curtails the outliers related to consolidating country pairs.

Columns (3a) and (3b) refer to the results when the distribution is truncated at the top 1% only, and at the top 1% plus all zeros, respectively. Similarly to what found in column (1), when focusing on the top 1%, the outliers seem to refer proportionally more to countries not involved in the merger of exchanges, and this further reinforces the coefficient of the EC_{lj} factor. When considering instead the last two columns (4a and 4b), the results highlight again that the top 5% of the distributions includes a substantial presence of outliers related to country pairs involved in the merger: the coefficient of EC_{lj} is halved compared with the baseline regression, though the effect remains statistically significant and economically relevant.

It is worth emphasizing that handling the outliers, either through winsorizing or trimming, on the one hand, boosts the fitting of the model, as captured by the adjusted R^2, and, on the other hand, likely provides the distribution with more desirable statistical properties and robust statistics, as discussed in the instrumental variable analysis in the next section.

5 Endogeneity of the exchange consolidation

According to the empirical evidence shown so far, the exchange consolidation appears strongly positively associated with cross-border investment. The direction of causality between consolidation and cross-border holdings can go either way. Such an evidence indeed can be interpreted as a stock exchange consolidation being a response to increasing cross-border investments and, subsequently, becoming a means to further promote them. If, on the one hand, the process of exchange consolidation can lead to stronger cross-country investment due to the reduction of transaction costs, on the other hand, strong financial linkages, captured by cross-border holdings, can expedite exchange consolidation by reducing the trading costs of existing cross-border traders.

We are aware that disentangling directions of causality can represent an overwhelming challenge, especially in macroeconomics studies, because economic and financial systems are strongly intertwined and it is almost impossible to unravel one-way only, or even just preferred, routes. With these caveats in mind, in the remainder of the paper, we will proceed to investigate further the consolidation process, in order to shed some light on the role of the event, and to identify, drawing from related theoretical frameworks, exogenous factors potentially leading to an agreement on the merger of stock exchanges.

5.1 An event-study approach

To preliminarily investigate the issue, we follow an event-study approach by exploiting the staggered nature of the consolidation processes, i.e., the fact that the mergers are completed, or progressively include new members, at different points in time.

In Table 10, we include country-pair fixed-effects for countries undergoing an exchange consolidation process in the same platform (e.g., fe_EC_{lj}=1 for Mexico and Colombia in every point in time, regardless of the year they join the same platform), to control for unobservable country-pair linkages not captured by the covariates included in the regression. The "pure" consolidation event is instead equal to 1 only after the consolidation (e.g., p_EC_{lj}=1 for Mexico and Colombia only after they both

join the same platform), that is, p_EC_{lj} = fe_$EC_{lj} \cdot time_event$, where the dummy $time\_event$ is equal to 1 after the merger, and 0 before. Notice that the construction of the binary variable p_EC_{lj} coincides with the definition of EC_{lj} used so far, but, after the inclusion of the country-pair fixed effect fe_EC_{lj}, its coefficient captures the specific reaction of foreign investment to the consolidation event, on top of the time-invariant fixed-effect fe_EC_{lj}. If the coefficient of p_EC_{lj} is statistically significant, it means that, on top of the unobservable linkages that can exist within the pair-countries involved in the merger and captured by fe_EC_{lj}, the consolidation event per se has tilted the bilateral cross-border investments, thus providing indirect support to the existence of causality going from the event to the response variable.

In column (1) of Table 10, we report the results of a regression following the baseline specification (Table 3, column (7)), in which the consolidation is captured by the two binary variables described above, p_EC_{lj} and fe_EC_{lj}. We observe that, on top of the fixed-effect equal to 0.215, the p_EC_{lj} factor, contributes to increase the foreign bias by 0.116. Since we have shown in Tables 8 and 9 that the presence of outliers drastically modifies the effect of exchange consolidation on foreign investment, in columns (2) to (5b), we replicate the same analysis of column (1), on the winsorized and truncated distributions. We observe that, after differently handling the outliers, the "pure" consolidation event p_EC_{lj} acquires an even larger importance relative to the fe_EC_{lj} fixed-effect, up to becoming more than twice as large, in the 5% truncated distribution (columns (5a) and (5b)).

5.2 The determinants of EC

5.2.1 A theoretical framework

In this section, we formally deal with the endogeneity of the exchange consolidation process. While the theoretical and empirical literature on the determinants of stock exchange mergers is still scarce, a vast literature is available on cross-listing. Although cross-listing is different from a stock exchange merger, it shares many analogies with the exchange consolidation process, and can therefore provide us with a suggestive theoretical framework.

Domowitz et al. (1998), dealing with costs and benefits of cross-listing of the Mexican equity market, point out the fundamental role of intermarket information. They find that when markets are informationally linked, the precision of intermarket price information signals is high and, therefore, the entry by new investors following cross-listing improves the measures of market quality in both markets. Conversely, if the precision of signals across the two markets is very low, that is markets are not informationally linked, international cross-listing results in migration of investors away from the domestic exchange (diversion of order flow abroad), which is not a desirable outcome.

In line with this reasoning, we can imagine that the contracting parties, when deciding the merger, will carefully take into account costs and benefits of the consolidation process. Indeed, beyond the fixed costs in terms of homogenization of the procedures, the consolidation process needs to take into account the incentives for the involved exchanges, and in particular the risk of diversion of investment from domestic firms to equivalent foreign firms. Accordingly, we might expect that a consolidation process is more likely to occur when the level of information in both markets is high enough.

The theoretical model by Chemmanur and Fulghieri (2006) studies the firm's choice about the exchange to list equity and the exchanges' choice of listing standards. Interestingly for our purposes, they also develop a model for competition and cooperation among exchanges which analyzes their incentives to merge to ameliorate their competitive position, and predicts that under certain conditions, a merger between two exchanges may result in a higher listing standard for the combined exchange relative to that of either of the merging exchanges. The key factor in their model is the improvement in (costly) information available in the consolidated exchange compared to the two distinct ones and, in particular, the ability of traders to efficiently produce information to evaluate a listed firm. These predictions, would go in the same directions as in Domowitz et al. (1998), identifying a crucial role of market information produced by the investors trading in the stock exchanges. As an implication, the model by Chemmanur and Fulghieri (2006) predicts that, through a merger process, smaller exchanges can improve their competitive position against a third larger exchange by merging and thereby pooling their informed investor base.

From these theoretical contributions, we draw some testable conjectures: we expect that, on the

one hand, the small size, and, on the other hand, the information depth of the involved stock markets can structurally influence the probability of the merger.

5.2.2 Discussion on the instruments

To be able to assess a causal link between stock exchange consolidation and foreign investments, it is not enough to find variables driving the exchange merger, but we need these variable not to directly affect cross-border investment, but only through the exchange consolidation.

According to the theoretical framework described above, we conjecture that a valid instrument must be structurally connected with the agreement process to the merger by the two contracting exchanges, and therefore can be related to the size and the depth of market information in the stock exchanges.

Let us consider, first, the role of market information. One can expect that more informationally deep markets attract more inward investments, thus directly affecting the response variable and then invalidating the instrument. The depth of information of the investing economy's stock exchange could instead, ex-ante, induce more or less foreign investment. It is worth recalling that in our regression specification, we already explicitly control for the turnover ratio of investing and destination countries: this is commonly recognized as a measure of market liquidity, which in turn, is correlated with market information. Regardless of the balance of positive and negative effects, we acknowledge it can directly affect foreign investment.

Let's now consider instead a 0-1 variable capturing whether both exchanges in a country-pair feature an informationally deep stock exchange. It is now less straightforward to find a direct link to foreign portfolio bias: if more informed markets attract more inward investment, this attraction should hold regardless of the degree of information on the investing country. On the contrary, the joint high information of the exchanges can make the merger more likely, because of the incentives of listing firms to be part of a consolidated platform to increase their informed investors' base, thus creating the ideal conditions for an agreement. If the joint high information of the exchanges is proven to influence the probability of the merger, then it could be a candidate instrument, because

we expect this factor to influence foreign portfolio investment not directly, but only through favouring the success of the merger.

We follow a similar reasoning for the role of the exchange size. In our regression specification, we already explicitly control for the dimension of the investing/destination economy, as captured by the number of listed shares and by the GDP. Different predictions can be made on the role the size can play on foreign investment: on the one hand, in standard gravity models, the larger the economies the larger should be the investments; on the other hand, small countries should invest more abroad for diversification reasons.[21] In any case, regardless of the balance of positive and negative effects, we allow for the size to directly affect foreign investment.

Let's now consider instead a 0-1 variable capturing whether both exchanges in a country-pair have a small size. It is now less straightforward to find a direct link to foreign portfolio bias: for diversification motives, we can expect small countries to invest more abroad, but not necessarily in small countries. On the contrary, the small size of the exchanges can make the merger more likely, since the contracting countries have higher incentives to create a more competitive exchange to attract listed firms and increase the informed investors' base. If the joint small size of the exchanges is proven to influence the probability of the merger, then it could be a candidate instrument, because we expect this factor to influence foreign portfolio investment not directly, but only by increasing the probability of the merger.

Moreover, the size of the exchanges can also affect the probability of the merger because of exogenous anti-trust supervisory controls on the agreement. Indeed, some mergers, though rated convenient and beneficial by the contracting parties, have been blocked by supranational authorities, because of concerns about the violation of the concentration norms.[22] The fact that the involved exchanges are small enough makes indeed the consolidation process also viable on a regulatory view point. While we are not able to disentangle the two interpretations of the joint small size, it affects the

[21] Moreover, since in our analysis the dependent variable is not the foreign investment, but its ratio to market share, any prediction is even less obvious.

[22] Notable recent examples of merger blocks have been carried on by the European Commission for violation of the European Competition Law: in 2012, the block of the merger between the NYSE Euronext Inc. and the Deutsche Borse AG; in 2017, the block of the merger between the London Stock Exchange and Deutsche Boerse, after two failed attempts in 2000 and 2005.

response variable not directly, but only through the success of the merger, and therefore it represents a potentially valid instruments for the exchange consolidation.

5.3 Instrumental variable regression

5.3.1 Candidate excluded instruments

The excluded instruments must be strong and exogenous. To find strong instruments, we search for measures of size and information which are strictly connected with the stock markets. To find exogenous instruments, we need them to seize the mechanisms behind the agreement to ensure the latter is the only channel through which the instruments affect foreign investments.

The endogenous variable, EC_{lj} is dichotomic. Following the theoretical framework described above, we propose dichotomic instruments related with the joint size and information of the stock markets involved, taking into account their driving role in the agreement.

We propose the following instruments: J_small_size$_{lj}$ and J_high_info$_{lj}$, where "J" stands for "joint", and the subscript lj signals that the dummy variable refers to both the investing and the destination country, a pre-requisite for this variable to influence the agreement process.

Let's start from the first instrument capturing the joint small size of the exchanges in the country-pair. A bilateral-specific 0-1 variable is constructed, considering the market capitalization of the investing and destination stock exchange. This variable is equal to 1 if both the investing and the destination country have a low exchange capitalization, i.e., if both their market capitalization are below the mean, and 0 otherwise.[23] As underlined above, if the condition is jointly met by both countries, it facilitates the agreement on the merger, and can affect the response variable only through the exchange consolidation channel. We recall that our baseline specification also includes country-specific size measures captured by GDP and number of listed shares (at their beginning of period levels), which are allowed, instead, to directly affect foreign investment.

The second instrument is aimed at capturing the depth of information in the stock exchanges.

[23]To avoid endogeneity problems, we construct this variable considering the validity of these conditions at their beginning of period values.

We rely on the literature studying the linkages between information and attention-grabbing stocks. Barber and Odean (2008) underline that attention is a scarce resource, and when there are many alternatives, options that attract attention are more likely to be considered. van Nieuwerburgh and Veldkamp (2010) predict that investors should pay more attention to the assets that have a higher squared Sharpe ratio and market capitalization, and more recently Gargano and Rossi (2018) confirm that investors pay more attention to stocks of companies with a larger market capitalization. Yuan (2015) highlight that investors' attention is mostly attracted by more visible indexes, and that market-wide attention events raise the attention level investors pay to their portfolios, causing them to become more active in processing information and making trade decisions.

Accordingly, to capture the joint high information in the exchanges within the country-pair, we consider the average market capitalization of the stock listed in each country index, i.e., the domestic market capitalization divided by number of listed shares. Listed stocks with larger market capitalization, being associated with more visibility, in line with Yuan (2015), will raise the attention of the investors, then enhancing the production of information in the market.

Relying on this measure, a bilateral-specific 0-1 variable is constructed, considering the average market capitalization of listed stocks in the investing and destination country. This variable is equal to 1 if both the investing and the destination country have a large market capitalization per stock listed, i.e., if it is placed above the mean, and 0 otherwise. As discussed above, if this condition is jointly met by both countries, it can ease the agreement on the merger, and can affect the response variable through the exchange consolidation channel. We recall that our baseline specification also includes country-specific liquidity measures captured by the respective turnover ratios (at their beginning of period levels), which are allowed, instead, to directly affect foreign investment.

5.3.2 GMM and instruments' validity tests

As anticipated above, to be good instruments, the candidate variables described above, beyond being economically sound, must possess two basic statistical properties: they must be highly correlated with the endogenous variable (i.e., the hypothesis of weak explanatory power of instruments must be

rejected), and uncorrelated with the error term (i.e., the hypothesis of exogeneity of the instrument must not be rejected).

Since our system has one endogenous variable and two candidate instruments, our system is overly identified: we can therefore test, beyond the hypothesis of weakness, also the hypothesis of exogeneity of the instruments.

In Table 11, we report our IV estimates when the EC_{lj} endogenous dummy regressor is instrumented by the two excluded instruments described above.

In column (1) of Table 11, we report the results of the FGLS regression as in the baseline specification of Table 3, column (7). In columns (2a) to (2c) we report the first stage of the endogenous regressors, considering one instrument at a time (columns (2a) and (2b)), and both instruments together (column (2c)). Column 3 reports the second stage of the overidentified system estimated through a GMM, where the endogenous regressors is instrumented by the two excluded instruments above described.

Following Angrist and Pischke (2009), we estimate the first stage in columns (2a) to (2c) through a Linear Probability Model (LPM). A LPM works like a normal linear regression model, but the interpretation changes, because the dependent variable is binary: the coefficient represents the change in the probability that the dependent variable equals one for a one-unit change of the independent variable of interest, holding everything else constant. Taking in mind that the coefficient estimated through LPM is only an approximation of the average marginal effect, we can interpret the coefficient of the excluded instruments as follows. When considering one instrument at a time, we observe that countries with a joint high level of information in the stock market ($\text{J\_High\_info}_{lj} = 1$) have a 3.9% higher probability of undergoing an exchange consolidation process than pair-countries for which this condition is not satisfied (column (2a)). By comparing the relevance of its coefficient to other determinants', we observe that it is about a half of the common border, close to the common currency, and larger than the cross-listing variable. When considering the second instrument, we observe that countries with a joint small size of the exchanges ($\text{J\_Low\_size}_{lj} = 1$) have a a 2.4% higher probability of undergoing an exchange consolidation process than pair-countries for which

this condition is not met (column (2b)). By comparing the relevance of its coefficient to other determinants', we observe that it is one-forth of the common border, half of the common currency, and two-thirds of the cross-listing variable.

When both excluded instruments are considered (column (2c)), their role in the first stage is only marginally affected: countries with a high joint information and a joint small size of exchanges exhibit an increase in the probability of the merger by 4.1% and 2.5%, respectively.

Interestingly, more distant accounting principles (GAAP) increase the probability of a stock exchange merger: this result can be interpreted as countries with distant financial accounting rules having a higher incentive to homogenize their trading rules in order to ease reciprocal investments.

At the bottom of columns (2a), (2b) and (2c), we report the F-statistics that assess the relevance of the instruments, by checking the strength of the correlation between the endogenous regressor and its (excluded) instrument.[24]

To reject the hypothesis of weak instruments, Staiger and Stock (1997) suggest that the F-statistics should be larger than 10. In a more recent paper, Stock and Yogo (2005) provide details on the critical values for the weak instrument test, based on the number of endogenous regressors and excluded instruments. In our case, the critical value is equal to 19.93: the F-statistics unequivocally reject the hypothesis of weak instruments.

In column (3), we report the estimates after the endogenous regressor is instrumented by the two variables just discussed, following a GMM approach. We can immediately notice that the size of the coefficient of EC_{lj} is positive, statistically significant, but disproportionally large (4.711). At the bottom of the second stage's column, we also report the tests of the overidentifying restrictions. Both the χ^2 relative to the standard Hansen test (J-test) and the χ^2 relative to the its heteroskedasticity-robust counterpart (H-R test) (Wooldridge (2002), pp. 122-124) reject the hypothesis of exogeneity of the excluded instruments.

These findings are not surprising. It is well known that the classical instrumental-variables estimator is extremely sensitive to the presence of outliers in the sample (Dehon et al. (2015)): they

[24] In columns (2a) and (2b), where the number of instruments is equal to one, the F-statistics is equal to the square of the t-statistics.

are likely responsible of the very large coefficient of the endogenous regressor, and produce large residuals which, in turn, produce the high χ^2 statistics leading to the failure of the overidentifying restrictions' tests.

In Table 12, we replicate the same analysis as in Table 11, but relative to the truncated distribution at top 5% and zeros.[25]

In column (1) of Table 12, we report the results of the FGLS regression, as in the corresponding specification of Table 9, column (4b). The first stage results (columns (2a), (2b), and (2c)) show that the coefficients of the joint high information instrument is close to 0.03, while the coefficient of the joint small size of the stock exchanges is about 0.02: a high joint information and a joint small size of exchanges determine an increase in the probability of the merger by 3% and 2%, respectively.[26] The F-test for the relevance of the instruments strongly rejects the hypothesis of weakness of the instruments. In column (3), we report the GMM's second stage of the overidentified system estimated on the truncated distribution: the coefficient of the endogenous regressor is equal to 0.324, a value close to the magnitude observed throughout the analysis performed so far. The instruments' exogeneity tests reported at the bottom, both the J-test (0.22) and the H-R test (0.45), do not reject the hypothesis of exogeneity of the instruments, thus confirming the statistical validity of the proposed instruments.[27]

While the statistical tests provide support to the choice of the proposed instruments, we challenge their validity with a counterfactual test.

In Table 13, we perform the same analysis as in Table 12, on the same truncated sample, but with a crucial variation in the construction of the instruments.

[25] In Table 14 (Appendix B), we report the same regression relative to the sample truncated only at the top 5% (with all zeros kept in the distribution). The size of the coefficients and the instruments' validity tests are very close to the ones presented in Table 12.

[26] Notice that the truncation of the distribution implies, consistently, a recomputation of the cross-country mean needed as a benchmark to construct the instruments' binary variables.

[27] Table 15 (Appendix B) reports the relevant coefficients of EC_{lj} (in the FGLS and in the GMM's second stage) and of the instruments (in the first stage), across different treatments of outliers, following the winsorizing and truncation structure of Table 9. The table shows that the IV estimation with the proposed instruments work effectively for the distribution truncated at the top 5%, regardless of the truncation of the zeros or not (Panel II.a and II.b), while for other levels of truncation or winsorization the role played by the outliers jeopardizes the correct validity of the IV method.

As extensively argued above, the key ingredient of the proposed instruments resides in their structural connection with the agreement on the merger by the two contracting countries: it is precisely the joint nature of the instrument to define its role in the agreement, and then its indirect influence on the response variable through the consolidation process.

If we break this joint nature, the agreement channel at the basis of the instruments should break as well: a high depth of information, or a small size, of any of the two exchanges in the country-pair, rather than of both of them, could indeed directly affect the foreign bias -similarly to what observed in our specification for the liquidity measure or the number of listed shares included as covariates-, then potentially invalidating the instrument.

The two instruments adopted in Table 13, while relying upon the same data and the same structure, differ uniquely by the absence of their joint nature: $Or\_\text{High}\_\text{info}_{lj}$ is binary variable equal to 1 if any of the two exchanges has a large market capitalization of listed stocks, and 0 otherwise. Similarly, $Or\_\text{Low}\_\text{size}_{lj}$ is a binary variable equal to 1 if any of the two exchanges has a low size of the exchange, and 0 otherwise. The first major difference with Table 12 is that the coefficients of the two instruments in the first stage are negative and statistically significant (columns (2a), (2b), and (2c)): the fact that any of the two countries in a pair has a small or an informationally deep stock exchange makes the probability of the merger lower by 1% and 1.5%, respectively. Second, the F-test of the instruments in the first stage in column (2c) reveals a problem of weakness of the instruments, if compared with the critical value 19.93 above mentioned. Moreover, when looking at column (3), we observe that the coefficient of the endogenous regressor in the GMM second stage is not significant, i.e., the proposed instruments are not valid. The non significant coefficient in the second stage implies that the fitted value of the first stage, that is the predicted probability of the merger, obtained using the counterfactual excluded instruments, is not helpful in explaining the response variable.

5.4 Implications for foreign investment

The investigation of the mechanisms driving the process of exchange mergers allows us to derive interesting implications for foreign investments, thus complementing and completing the analysis.

Table 6 and 7 have shown that the effect of the exchange consolidation is not even across countries, and that it crucially depends on the size of the involved economies (the lower the size, the stronger the effect of consolidation on foreign bias, Table (6)), and on the "familiarity" among the countries (the closer are the countries, the stronger the effect of consolidation on foreign bias, Table (7)).

The results of the IV regression, provide us with an interpretative key also of these findings.

Let's start with Table 6. As we have noticed in Section 4.3.4, the effect of stock exchange consolidation is stronger for investing and destination countries featuring a relative lower size, seized by GDP or the number of listed firms. Now let's scrutinize these findings from a different perspective. The negative sign of the interaction, can also be interpreted the other way round: the effect of the size on foreign investment is affected by the fact that two exchanges share the same platform. We can notice that the size of the investing country negatively affects the foreign bias only when the consolidation dummy is equal to 1 (columns (1a) and (2a) of Table 6): this suggests that its effect on the response variable passes through the endogenous consolidation agreement. As far as the destination economies are concerned, we observe that the size negatively affects foreign bias directly, but its negative effect is about three times larger when considering its indirect impact through the consolidation process.

This evidence supports, the hypothesis that the consolidation event is a cost-effective incentive to foreign investments: since the merger allows investors to access foreign securities at a lower cost, the advantage is larger the smaller is the initial stock exchange size. On the other hand, it corroborates the idea that the consolidation process, beyond its direct effect on foreign bias, also plays an indirect effect by modifying the influence of other variables, in this case number of listed shares and GDP, on the response variable.

We similarly investigate the interaction of the consolidation with the "familiarity" variables. As noticed in Table 7, the effect of stock exchange consolidation is generally stronger for closer country

pairs. Looking at the interactions' coefficients from a different perspective, we observe that (with the exception of EMU), sharing a common exchange platform makes the role of these variables on foreign bias significantly stronger. Standard gravity variables are shown to influence foreign bias in the expected direction, but their effectiveness is sharpened for countries belonging to the same exchange platform. Particularly interesting is the behavior of $GAAP$ and cross-listing, variables more strictly related to the financial markets: their impact on foreign bias is significant only for country pairs belonging to the same exchange platform. The same evidence is found for the trade closeness variable.[28]

The evidence relative to the different measures of familiarity suggest that they affect foreign investment both directly and indirectly through stock exchange consolidation. Portes and Rey (2005) underline that since transactions in financial assets are "weightless", distance may only be found to play a role if it has informational content. As far as the closeness variables are meant as proxies for intermarket information, we observe that their effect on cross-border investment is significantly steered by the exchange consolidation. Therefore, the depth of information, on the one hand, facilitates the merger agreement, and, on the other hand, through the exchange consolidation, influences more effectively cross-border investments.

6 Conclusions

This paper studies the effect of stock exchange consolidation on foreign portfolio investment. The establishment of these mergers can potentially lead to important benefits for the stability of financial markets, as the standardization of trading platforms could reduce the likelihood of stock price jumps, have a positive effect on the information efficiency of the stock market, and reduce the costs of cross-border trading by increasing market liquidity (McAndrews and Stefanadis (2002); Yuna (2016); Hellström et al. (2018)). Our findings highlight indeed that joining a common stock exchange platform enhances cross-border investments. Being the dependent variable's distribution skewed and

[28] To better disentangle the role of the consolidation event, we report in Table 16 and 17 (Appendix B) the results from a specification following the event-study approach of Table 10. The findings are qualitatively similar to the ones observed in Tables 6 and 7.

with a high inflation of zeros, we also run Quantile, Negative Binomial and Tobit regressions, and handle the presence of outliers, through winsorization and truncation of the sample. The role of exchange consolidation in explaining cross-border investment survives.

Finally, we deal with the endogeneity of the consolidation process. After instrumenting it by two binary variables capturing the incentives of the stock exchanges to merge –their joint high information and their joint small size– the results of the GMM regression and the instruments' validity tests corroborate our initial conjecture. Crucial for the exogeneity of our instruments is their role in the agreement: the candidate instruments must affect cross-border investments only indirectly, that is by increasing the likelihood of the merger.

Our research on stock exchange mergers departs from previous works, focused on listed firms and exchange shareholders, as it takes the stance of investors and spouses the investment barrier perspective. This work shows that, foreign investors, more heavily affected by investment barriers, are sensitive to institutional changes such as a stock exchange merger, which reduces trading barriers, and therefore enhances cross-border investments.

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Tables

Figure 1. Stock exchange consolidation

This figure represents the five stock exchange mergers occurred in the time span considered, with details of the member countries, and their respective year of entrance.

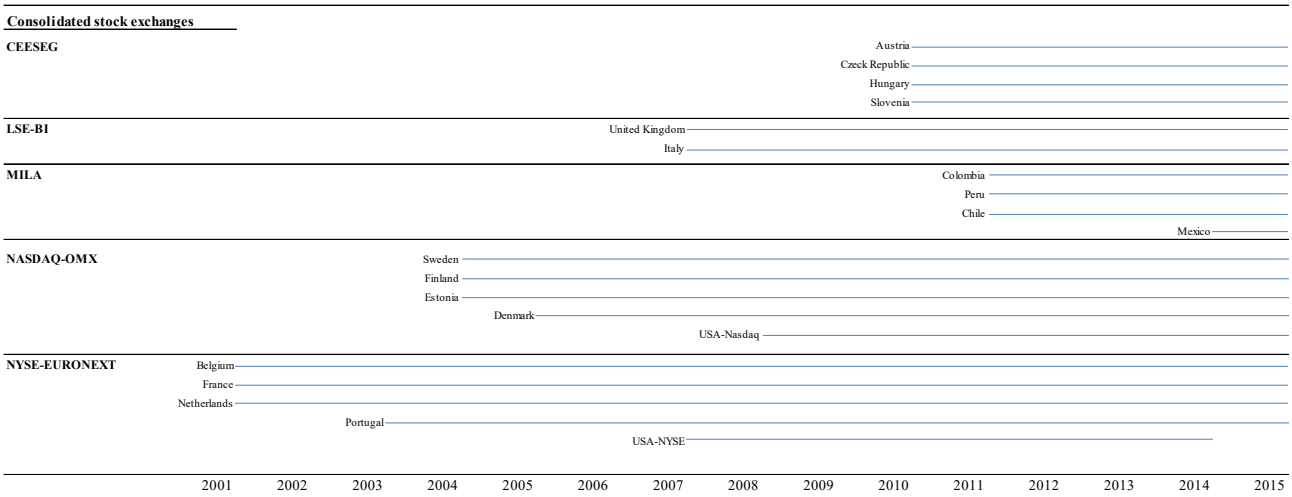

Table 1. Descriptive statistics

This table reports the descriptive statistics of the dependent variable and the regressors used in the analysis. The subscript j refers to the destination country, the subscript l refers to the investing country, the subscript lj refers to the country-pair lj, * indicates that the corresponding variable is included in the analysis for both the destination and the investing country.

	Descriptive statistics				
I. Dependent variable	mean	median	st. dev.	min	max
Foreign stock market portfolio weight (w_{lj})	0.003923	0.000085	0.015287	0.000000	0.314699
Market share (MS_j)	0.017432	0.003679	0.053207	0.000001	0.496470
Float-adjusted market share (MS_MSCI_j)	0.017438	0.003679	0.053245	0.000001	0.530595
Foreign bias (w_{lj}/MS_MSCI_j)	0.404261	0.060166	1.464113	0.000000	26.700178
II. Pair-specific regressors					
Stock exchange consolidation (EC_{lj})	0.013294	0	0.114533	0	1
- EURONEXT	0.005474	0	0.073785	0	1
- CEESEG	0.001760	0	0.041910	0	1
- OMX	0.004985	0	0.070432	0	1
- MILA	0.000635	0	0.025199	0	1
- LSE-BI	0.000440	0	0.020969	0	1
Distance, in Km ($dist_{lj}$)	7444	7968	5004	60	19772
Common border ($border_{lj}$)	0.045211	0	0.207769	0	1
Common language ($lang_{lj}$)	0.087356	0	0.282361	0	1
Colonial linkage ($colony_{lj}$)	0.030268	0	0.171327	0	1
Equal legal origin ($equal\_law_{lj}$)	0.285441	0	0.451630	0	1
European Monetary Union (EMU_{lj})	0.053886	0	0.225795	0	1
Generalized Accepted Accounting Principles ($GAAP_{lj}$)	9.024378	9	3.159531	0	18
Cross listing ($cross\_listing_{lj}/cross\_listing_j$)	0.017457	0	0.089885	0	1
Trade closeness ($trade_{lj}$)	0.019427	0.004675	0.046287	8.63E-07	0.795022
Instruments for endogenous EC $_{lj}$					
Joint High stock market information in l and j ($J\_High\_info_{lj}$)	0.088889	0	0.284587	0	1
Joint Low exchange size in l and j ($J\_Low\_size_{lj}$)	0.631478	1	0.482410	0	1
III. Country-specific regressors					
International capital mobility (cap_mob_*)	4.557592	4.6	2.794185	0	9.230769
Common law ($common\_law_j$)	0.367347	0	0.482091	0	1
Revised Antidirector Rights Index (rev_ADR_j)	3.422414	3.5	1.142488	1	5
Lagged stock returns, % year-on-year (lag_ret_j)	11.1593	7.249153	23.272010	-37.647500	258.561000
Gross Domestic Product, in US$ (GDP_*)	5.66E+11	1.36E+11	1.52E+12	6.23E+09	1.06E+13
Number of listed shares ($listed\_shares_*$)	673	263	1166	17	6355
Stock exchange openness ($exchange\_openness_*$)	0.110761	0.023856	0.184445	0.000000	0.675214
Turnover ratio ($turnover\ ratio_*$)	59.428833	48.07501	64.270360	0.235442	497.402500
Traded stocks to GDP ($traded\ stocks_j/GDP_j$)	52.456039	23.55292	81.871280	0.001551	741.587200
MIFID ($MIFID_j$)	0.198870	0	0.399155	0	1
SOX (SOX_j)	0.268927	0	0.443407	0	1
Regulatory quality (reg_qual_*)	3.213200	3.332994	0.868190	0.615085	4.760543
Control of corruption ($contr\_corr_*$)	3.096317	2.925679	1.092872	1.100438	5.085616

Table 2. Exchange consolidation and the stock market

This table reports the regression coefficients of the stock exchange consolidation, when the dependent variable is, alternatively, size, liquidity, domestic investment, foreign portfolio share (w_{lj}), and foreign bias (w_{lj}/MS_MSCI_j). ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively.

	size		**liquidity**		**domestic investment**	**foreign investment**	**foreign bias**
	market capitalization (destination) country *j*		liquidity (destination) country *j*		domestic share (investing) country *l*	portfolio share	foreign bias
	MS_j	MS_MSCI_j	rel (traded $stocks_j/GDP_j$)	rel ($turnover\ ratio_j$)	w_{ll}	w_{lj}	(w_{lj}/MS_MSCI_j)
	(1a)	(1b)	(2a)	(2b)	(3)	(4)	(5)
country *j* (destination) stock exchange consolidation (**EC**$_j$)	0.030***	0.046***	0.253***	0.266***	-	0.002***	-0.002
country *l* (investing) stock exchange consolidation (**EC**$_l$)	-	-	-	-	-0.110***	0.000***	-0.015
bilateral *l*-*j* stock exchange consolidation (**EC**$_{lj}$)	-	-	-	-	-	0.009***	0.788***
controls: investing country fixed-effects and time fixed-effects							

Table 3. Main findings

This table reports the results of a Feasible GLS regression. The dependent variable is the scaled foreign portfolio (w_{lj}/MS_MSCI$_j$), where the subscript lj represents the couple investing country l-destination country j. Each regressor X (dummy variables excluded) is expressed as the ratio of X to its world average. $\mathbf{EC}_{lj}$ is a bilateral-specific dychotomic variable identifying country-pairs belonging to same consolidated stock exchange platform. Two-way clustered (investing country and time) standard errors are reported in parentheses. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively.

	Main findings						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
EC$_{lj}$	0.546 ***	0.530 ***	0.567 ***	0.330 ***	0.327 ***	0.352 ***	0.316 ***
	(0.033)	(0.032)	(0.036)	(0.036)	(0.036)	(0.036)	(0.034)
dist$_{lj}$	-0.105 ***	-0.082 ***	-0.085 ***	-0.143 ***	-0.151 ***	-0.146 ***	-0.129 ***
	(0.008)	(0.007)	(0.007)	(0.010)	(0.011)	(0.011)	(0.010)
border$_{lj}$	0.438 ***	0.467 ***	0.421 ***	0.417 ***	0.425 ***	0.422 ***	0.428 ***
	(0.018)	(0.017)	(0.017)	(0.024)	(0.024)	(0.024)	(0.023)
lang$_{lj}$	0.124 ***	0.098 ***	0.109 ***	0.120 ***	0.118 ***	0.114 ***	0.077 ***
	(0.013)	(0.013)	(0.013)	(0.017)	(0.017)	(0.017)	(0.017)
EMU$_{lj}$	0.590 ***	0.561 ***	0.544 ***	0.561 ***	0.546 ***	0.528 ***	0.542 ***
	(0.035)	(0.034)	(0.035)	(0.038)	(0.037)	(0.037)	(0.035)
equal_law$_{lj}$	-0.019 **	-0.004	-0.009	-0.012	-0.011	-0.010	0.023 **
	(0.007)	(0.007)	(0.007)	(0.010)	(0.010)	(0.010)	(0.010)
common_law$_j$	0.094 ***	0.086 ***	0.077 ***	0.104 ***	0.113 ***	0.116 ***	0.096 ***
	(0.009)	(0.008)	(0.008)	(0.013)	(0.013)	(0.013)	(0.013)
colony$_{lj}$	0.123 ***	0.110 ***	0.092 ***	0.074 ***	0.081 ***	0.086 ***	0.120 ***
	(0.014)	(0.013)	(0.013)	(0.019)	(0.020)	(0.021)	(0.020)
GDP$_l$	-0.024 ***	-0.016 ***	-0.015 ***	-0.024 ***	-0.027 ***	-0.028 ***	-0.018 ***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
GDP$_j$	-0.020 ***	-0.010 ***	-0.013 ***	0.014	0.013	0.011	-0.010
	(0.004)	(0.003)	(0.004)	(0.015)	(0.015)	(0.015)	(0.014)
listed shares$_l$	0.002 ***	-0.002 **	-0.001	-0.006 ***	-0.005 ***	-0.006 ***	-0.008 ***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
listed shares$_j$	0.012 ***	0.005 **	0.005 **	-0.008	-0.006	-0.008	0.003
	(0.002)	(0.002)	(0.002)	(0.006)	(0.006)	(0.006)	(0.006)
cap_mob$_l$		0.124 ***	0.121 ***	0.109 ***	0.117 ***	0.118 ***	0.005
		(0.010)	(0.010)	(0.016)	(0.017)	(0.016)	(0.017)
cap_mob$_j$		0.039 ***	0.039 ***	0.059 ***	0.058 ***	0.060 ***	0.027 ***
		(0.005)	(0.005)	(0.007)	(0.007)	(0.007)	(0.008)
GAAP$_{lj}$			-0.046 ***	-0.029 *	-0.022	-0.020	-0.008
			(0.011)	(0.016)	(0.016)	(0.016)	(0.016)
cross_listing$_{lj}$				0.463 ***	0.457 ***	0.448 ***	0.383 ***
				(0.041)	(0.041)	(0.041)	(0.039)
turnover ratio$_l$					-0.023 **	-0.024 **	-0.045 ***
					(0.010)	(0.010)	(0.008)
turnover ratio$_j$					0.006 **	0.008 ***	0.001
					(0.002)	(0.002)	(0.002)
trade$_{lj}$						0.218 **	0.240 **
						(0.108)	(0.099)
lag_ret$_j$						-0.001	-0.001
						(0.000)	(0.000)
reg qual$_l$							0.141 ***
							(0.041)
reg qual$_j$							0.065
							(0.109)
contr corr$_l$							-0.014
							(0.029)
contr corr$_j$							0.335 ***
							(0.074)
controls: time fixed effects							
#obs	22231	22231	20598	12261	12261	12211	12211
Adj-R^2	0.18	0.21	0.21	0.26	0.26	0.26	0.30

Table 4. Robustness: specification, sample, crisis, and regulation

This table reports the robustness results of a Feasible GLS regression, as from Table 3, column (7). Columns (1) to (3) consider alternative regression specifications. In column (4), offshore destination countries (Hong Kong, Ireland, Singapore Switzerland, the United Kingdom and Uruguay) are excluded from our baseline sample, according to the IMF 2017 classification. In columns (5a) and (5b), the financial crisis period refers to years 2007 to 2009, while the sovereign debt crisis period refers to years 2010 to 2012. Columns (6a) and (6b) investigate the interaction of EC with the SOX and MIFID regulation. Two-way clustered (investing country and time) standard errors are reported in parentheses. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively.

	Robustness							
	Specification and sample				**Crisis and regulation**			
	additional controls		nonlinear gravity	no offshore	crisis period		regulation	
	(1)	(2)	(3)	(4)	(5a)	(5b)	(6a)	(6b)
EC$_{ij}$	0.318 ***	0.280 ***	0.311 ***	0.459 ***	0.338 ***	0.349 ***	0.407 ***	0.334 ***
	(0.033)	(0.033)	(0.033)	(0.025)	(0.040)	(0.051)	(0.050)	(0.042)
dist$_{ij}$	-0.129 ***	-0.131 ***	-0.419 ***	-0.107 ***	-0.135 ***	-0.135 ***	-0.128 ***	-0.131 ***
	(0.010)	(0.011)	(0.027)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)
border$_{ij}$	0.428 ***	0.333 ***	0.373 ***	0.501 ***	0.425 ***	0.425 ***	0.428 ***	0.421 ***
	(0.023)	(0.025)	(0.024)	(0.019)	(0.024)	(0.024)	(0.023)	(0.024)
lang$_{ij}$	0.078 ***	0.039 **	0.056 ***	0.075 ***	0.097 ***	0.097 ***	0.076 ***	0.080 ***
	(0.017)	(0.018)	(0.016)	(0.014)	(0.018)	(0.018)	(0.017)	(0.017)
EMU$_{ij}$	0.544 ***	0.558 ***	0.509 ***	0.234 ***	0.559 ***	0.557 ***	0.538 ***	0.519 ***
	(0.035)	(0.033)	(0.034)	(0.019)	(0.036)	(0.036)	(0.035)	(0.034)
equal_law$_{ij}$	0.024 **	0.073 ***	0.025 **	0.037 ***	0.021 **	0.022 **	0.022 **	0.023 **
	(0.010)	(0.011)	(0.010)	(0.008)	(0.010)	(0.010)	(0.010)	(0.010)
common_law$_{ij}$	0.088 ***	0.208 ***	0.109 ***	-0.071 ***	0.103 ***	0.104 ***	0.096 ***	0.117 ***
	(0.012)	(0.018)	(0.014)	(0.009)	(0.014)	(0.014)	(0.013)	(0.014)
colony$_{ij}$	0.119 ***	0.165 ***	0.117 ***	0.047 ***	0.118 ***	0.118 ***	0.121 ***	0.111 ***
	(0.020)	(0.022)	(0.020)	(0.017)	(0.021)	(0.021)	(0.020)	(0.020)
GAAP$_{ij}$	-0.007	-0.005	-0.514 ***	-0.015	-0.006	-0.006	-0.009	-0.013
	(0.016)	(0.018)	(0.089)	(0.011)	(0.016)	(0.016)	(0.016)	(0.016)
cross_listing$_{ij}$	0.382 ***	0.418 ***	0.414 ***	0.528 ***	0.393 ***	0.396 ***	0.383 ***	0.368 ***
	(0.039)	(0.037)	(0.040)	(0.039)	(0.039)	(0.039)	(0.039)	(0.040)
rev_ADR$_{j}$	0.028 *							
	(0.014)							
stock exchange openness$_{i}$		-0.004 *						
		(0.002)						
stock exchange openness$_{j}$		-0.008 *						
		(0.004)						
$(\text{dist}_{ij})^2$			0.096 ***					
			(0.009)					
$(\text{GAAP}_{ij})^2$			0.261 ***					
			(0.045)					
financial crisis					-0.006			
					(0.019)			
(financial crisis)•(**EC**$_{ij}$)					-0.021			
					(0.070)			
financial & sovereign debt crisis						0.015		
						(0.017)		
(financial & sovereign debt crisis)•(**EC**$_{ij}$)						-0.031		
						(0.064)		
SOX$_{j}$							0.005	
							(0.014)	
(SOX$_{j}$)•(**EC**$_{ij}$)							-0.140 **	
							(0.062)	
MIFID$_{j}$								0.113 ***
								(0.019)
(MIFID$_{j}$)•(**EC**$_{ij}$)								-0.064
								(0.061)
other controls: size, capital mobility, liquidity, trade linkages, lagged returns, country governance, time fixed effects (as Table 3, column (7))								
#obs	12211	10245	12211	10747	12211	12211	12211	12211
Adj-R^2	0.30	0.32	0.30	0.44	0.29	0.29	0.29	0.30

Table 5. Sensitivity analysis on EC specification

This table reports the results of a Feasible GLS regression, following the specification of Table 3, column (7). In each column, the definition of EC_{lj} varies. In column (1) the NYSE-Euronext platform also includes the UK LIFFE derivative platform. In column (2), the OMX-Nasdaq group also includes the Norway stock market. In columns (3a) to (3e), one stock exchange consolidation at a time is excluded. Two-way clustered (investing country and time) standard errors are reported in parentheses. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively.

	Sensitivity analysis EC specification						
	NYSE-EURONEXT-LIFFE	NASDAQ-OMX-Oslo	no NYSE-EURONEXT	no NASDAQ-OMX	no CEESEG	no LSE-BI	no MILA
	(1)	(2)	(3a)	(3b)	(3c)	(3d)	(3e)
EC_{lj}	0.246 ***	0.484 ***	0.846 ***	0.090 ***	0.300 ***	0.322 ***	0.316 ***
	(0.028)	(0.033)	(0.056)	(0.034)	(0.034)	(0.034)	(0.034)
$dist_{lj}$	-0.126 ***	-0.126 ***	-0.128 ***	-0.132 ***	-0.129 ***	-0.129 ***	-0.129 ***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
$border_{lj}$	0.436 ***	0.412 ***	0.424 ***	0.438 ***	0.433 ***	0.428 ***	0.428 ***
	(0.024)	(0.023)	(0.023)	(0.024)	(0.023)	(0.023)	(0.023)
$lang_{lj}$	0.079 ***	0.081 ***	0.085 ***	0.076 ***	0.076 ***	0.077 ***	0.077 ***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
EMU_{lj}	0.556 ***	0.522 ***	0.597 ***	0.571 ***	0.543 ***	0.541 ***	0.542 ***
	(0.034)	(0.034)	(0.033)	(0.035)	(0.035)	(0.035)	(0.035)
$equal\_law_{lj}$	0.027 ***	0.015	0.028 ***	0.033 ***	0.024 **	0.023 **	0.023 **
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
$common\_law_{j}$	0.094 ***	0.096 ***	0.095 ***	0.093 ***	0.096 ***	0.096 ***	0.096 ***
	(0.013)	(0.013)	(0.013)	(0.014)	(0.013)	(0.013)	(0.013)
$colony_{lj}$	0.118 ***	0.118 ***	0.120 ***	0.125 ***	0.123 ***	0.120 ***	0.120 ***
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
$GAAP_{lj}$	-0.005	-0.011	-0.002	0.002	-0.007	-0.007	-0.008
	(0.016)	(0.015)	(0.015)	(0.016)	(0.016)	(0.016)	(0.016)
$cross\_listing_{lj}$	0.384 ***	0.381 ***	0.371 ***	0.399 ***	0.383 ***	0.382 ***	0.383 ***
	(0.039)	(0.039)	(0.039)	(0.040)	(0.039)	(0.039)	(0.039)
other controls: size, capital mobility, liquidity, trade linkages, lagged returns, country governance, time fixed effects (as Table 3, column (7))							
#obs	12211	12211	12211	12211	12211	12211	12211
Adj-R^2	0.29	0.30	0.31	0.29	0.29	0.30	0.30

Table 6. Interaction effects: market size

This table reports the results of a feasible GLS regression, following the specification of Table 3, column (7), with additional size regressors, and their interaction with stock exchange consolidation, as explicitly reported in the table. Two-way clustered (investing country and time) standard errors are reported in parentheses. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively.

	Interaction effects Size			
	stock exchange		GDP	
	(1a)	(1b)	(2a)	(2b)
$\mathbf{EC}_{ij}$	0.389 ***	0.375 ***	0.396 ***	0.378 ***
	(0.039)	(0.038)	(0.039)	(0.038)
listed shares$_I$	-0.009			
	(0.014)			
listed shares$_I$ • $\mathbf{EC}_{ij}$	-0.027 ***			
	(0.010)			
listed shares$_j$		-0.018 ***		
		(0.003)		
listed shares$_j$ • $\mathbf{EC}_{ij}$		-0.043 ***		
		(0.009)		
GDP$_I$			0.003	
			(0.006)	
GDP$_I$ • $\mathbf{EC}_{ij}$			-0.013 ***	
			(0.004)	
GDP$_j$				-0.007 ***
				(0.001)
GDP$_j$ • $\mathbf{EC}_{ij}$				-0.020 ***
				(0.004)
other controls: gravity variables, colonial linkage, EMU, common law, GAAP, capital mobility, liquidity, trade linkages, lagged returns, country governance, time fixed effects (as Table 3, column (7))				
#obs	12211	12211	12211	12211
Adj-R^2	0.10	0.10	0.10	0.10

Table 7. Interaction effects: familiarity

This table reports the results of a feasible GLS regression, following the specification of Table 3, column (7), with additional "familiarity" covariates, and their interaction with stock exchange consolidation, as explicitly reported in the table. Two-way clustered (investing country and time) standard errors are reported in parentheses. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively.

	Interaction effects								
	Familiarity								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\mathbf{EC}_{lj}$	0.513 ***	0.225 ***	0.248 ***	0.551 ***	0.287 ***	0.111 *	0.502 ***	0.158 ***	0.173 ***
	(0.044)	(0.038)	(0.037)	(0.047)	(0.036)	(0.062)	(0.116)	(0.037)	(0.057)
$dist_{lj}$	-0.130 ***								
	(0.010)								
$dist_{lj} \cdot \mathbf{EC}_{lj}$	-0.387 ***								
	(0.066)								
$border_{lj}$		0.403 ***							
		(0.024)							
$border_{lj} \cdot \mathbf{EC}_{lj}$		0.365 ***							
		(0.058)							
$lang_{lj}$			0.067 ***						
			(0.017)						
$lang_{lj} \cdot \mathbf{EC}_{lj}$			0.307 ***						
			(0.058)						
EMU_{lj}				0.581 ***					
				(0.037)					
$EMU_{lj} \cdot \mathbf{EC}_{lj}$				-0.493 ***					
				(0.068)					
$colony_{lj}$					0.106 ***				
					(0.021)				
$colony_{lj} \cdot \mathbf{EC}_{lj}$					0.450 ***				
					(0.087)				
equal law_{lj}						0.019 *			
						(0.010)			
equal $law_{lj} \cdot \mathbf{EC}_{lj}$						0.277 ***			
						(0.067)			
$GAAP_{lj}$							-0.008		
							(0.016)		
$GAAP_{lj} \cdot \mathbf{EC}_{lj}$							-0.182 *		
							(0.108)		
$cross\_listing_{lj}$								-0.007	
								(0.016)	
$cross\_listing_{lj} \cdot \mathbf{EC}_{lj}$								2.036 ***	
								(0.151)	
$trade_{lj}$									-0.009
									(0.016)
$trade_{lj} \cdot \mathbf{EC}_{lj}$									1.859 ***
									(0.606)
other controls: size, capital mobility, liquidity, trade linkages, lagged returns, country governance, time fixed effects (as Table 3, column (7))									
#obs	12211	12211	12211	12211	12211	12211	12211	12211	12211
Adj-R^2	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30

Table 8. Sensitivity analysis: econometric specification

This table the reports results following the specification of Table 3, column (7), but under different econometric specifications. Column (1) and (2) report the results under a Tobit and a Negative Binomial specification, respectively. Columns (3a) to (3e), show the results of a Quantile regression, referred to the percentiles reported at the top of the column. Two-way clustered (investing country and time) standard errors are reported in parentheses. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively.

	Sensitivity analysis					
	Econometric specification					
	Tobit	Negative Binomial	Quantile regression			
			p25	p50	p75	p90
	(1)	(2)	(3a)	(3b)	(3c)	(3d)
EC_{ij}	0.201 ***	0.214 ***	0.156 ***	0.255 ***	0.282 ***	0.234 **
	(0.074)	(0.073)	(0.017)	(0.033)	(0.059)	(0.107)
$dist_{ij}$	-0.284 ***	-0.761 ***	-0.059 ***	-0.083 ***	-0.151 ***	-0.270 ***
	(0.018)	(0.050)	(0.003)	(0.004)	(0.006)	(0.015)
$border_{ij}$	0.437 ***	0.500 ***	0.213 ***	0.377 ***	0.818 ***	1.296 ***
	(0.055)	(0.071)	(0.016)	(0.034)	(0.138)	(0.122)
$lang_{ij}$	0.117 ***	0.255 ***	0.039 ***	0.047 ***	0.058 **	0.224 **
	(0.039)	(0.076)	(0.006)	(0.009)	(0.026)	(0.101)
EMU_{ij}	0.717 ***	0.911 ***	0.290 ***	0.377 ***	0.383 ***	0.912 ***
	(0.043)	(0.060)	(0.012)	(0.023)	(0.041)	(0.206)
$equal\_law_{ij}$	0.061 **	0.107 **	0.001	-0.001	0.030 **	0.072 **
	(0.027)	(0.048)	(0.003)	(0.005)	(0.013)	(0.035)
$common\_law_{j}$	0.330 ***	0.628 ***	-0.014 ***	-0.007	0.040 ***	0.279 ***
	(0.028)	(0.048)	(0.003)	(0.005)	(0.010)	(0.042)
$colony_{ij}$	0.132 **	0.160 **	0.029 ***	0.046 ***	0.079 ***	0.058
	(0.055)	(0.071)	(0.011)	(0.013)	(0.024)	(0.054)
$GAAP_{ij}$	-0.003	-0.289 ***	-0.009 **	-0.037 ***	-0.068 ***	-0.110 ***
	(0.035)	(0.096)	(0.004)	(0.006)	(0.011)	(0.035)
$cross\_listing_{ij}$	0.693 ***	0.594 ***	0.062 ***	0.043 **	0.086	2.095 ***
	(0.108)	(0.113)	(0.012)	(0.017)	(0.052)	(0.658)
other controls: size, capital mobility, liquidity, trade linkages, lagged returns, country governance, time fixed effects (as Table 3, column (7))						
#obs	12211	12211	12211	12211	12211	12211
Pseudo-R^2	0.53	0.42	0.14	0.18	0.20	0.22

Table 9. Sensitivity analysis: outliers

This table reports the results of a Feasible GLS regression, following the specification of Table 3, column (7), after treatment of the outliers.. Column (1) and (2) report the results of the winsorized sample, while columns (3a) to (4b) report the results of the truncated distribution Two-way clustered (investing country and time) standard errors are reported in parentheses. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively.

	Sensitivity analysis					
	Outliers' treatment					
	Winsorized distribution		Truncated distribution			
	top 1%	top 5%	top 1%	top 1% and 0	top 5%	top 5% and 0
	(1)	(2)	(3a)	(3b)	(4a)	(4b)
EC_{lj}	0.327 ***	0.221 ***	0.334 ***	0.329 ***	0.132 ***	0.134 ***
	(0.033)	(0.018)	(0.028)	(0.028)	(0.017)	(0.017)
$dist_{lj}$	-0.119 ***	-0.098 ***	-0.102 ***	-0.100 ***	-0.073 ***	-0.068 ***
	(0.010)	(0.006)	(0.008)	(0.009)	(0.005)	(0.004)
$border_{lj}$	0.428 ***	0.283 ***	0.451 ***	0.450 ***	0.206 ***	0.203 ***
	(0.022)	(0.012)	(0.019)	(0.019)	(0.010)	(0.010)
$lang_{lj}$	0.090 ***	0.057 ***	0.068 ***	0.067 ***	0.043 ***	0.045 ***
	(0.016)	(0.009)	(0.013)	(0.013)	(0.007)	(0.007)
EMU_{lj}	0.541 ***	0.410 ***	0.444 ***	0.444 ***	0.339 ***	0.338 ***
	(0.032)	(0.015)	(0.023)	(0.023)	(0.011)	(0.011)
$equal\_law_{lj}$	0.018 *	0.018 ***	0.027 ***	0.025 ***	0.001	-0.002
	(0.009)	(0.005)	(0.008)	(0.008)	(0.004)	(0.004)
$common\_law_{j}$	0.084 ***	0.050 ***	0.055 ***	0.059 ***	0.008 *	0.011 **
	(0.012)	(0.006)	(0.009)	(0.010)	(0.005)	(0.005)
$colony_{lj}$	0.119 ***	0.088 ***	0.124 ***	0.125 ***	0.093 ***	0.091 ***
	(0.018)	(0.012)	(0.016)	(0.016)	(0.010)	(0.010)
$GAAP_{lj}$	-0.004	-0.028 ***	-0.007	-0.008	-0.027 ***	-0.029 ***
	(0.014)	(0.008)	(0.011)	(0.011)	(0.006)	(0.006)
$cross\_listing_{lj}$	0.347 ***	0.092 ***	0.162 ***	0.140 ***	-0.021	-0.022
	(0.037)	(0.020)	(0.029)	(0.029)	(0.015)	(0.015)
other controls: size, capital mobility, liquidity, trade linkages, lagged returns, country governance, time fixed effects (as Table 3, column (7))						
#obs	12211	12211	12129	11662	11507	11040
Adj-R^2	0.32	0.48	0.35	0.35	0.49	0.49

Table 10. Event-study approach

This table reports the results of a Feasible GLS regression, following the specification of Table 3, column (7), with the inclusion of fe_EC_{lj}, the fixed-effect EC component, and p_EC_{lj}, the "pure" event effect (p_EC_{lj} = fe_EC_{lj}·$time\_event$), where the $time\_event$ is equal to 1 after the merger and 0 before. Column (1) considers the full sample, columns (2) and (3) consider the winsorized sample, while columns (4a) to (5b) consider the truncated distribution. Two-way clustered (investing country and time) standard errors are reported in parentheses. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively.

	Event-study approach						
	Full distribution	Winsorized distribution		Truncated distribution			
		top 1%	top 5%	top 1%	top 1% and 0	top 5%	top 5% and 0
	(1)	(2)	(3)	(4a)	(4b)	(5a)	(5b)
p_**EC**$_{lj}$	0.116 **	0.131 **	0.116 ***	0.188 ***	0.187 ***	0.095 ***	0.096 ***
	(0.054)	(0.053)	(0.031)	(0.045)	(0.045)	(0.028)	(0.027)
fe_**EC**$_{lj}$	0.215 ***	0.210 ***	0.110 ***	0.158 ***	0.154 ***	0.039 *	0.040 *
	(0.043)	(0.042)	(0.025)	(0.035)	(0.035)	(0.021)	(0.021)
dist$_{lj}$	-0.124 ***	-0.114 ***	-0.097 ***	-0.099 ***	-0.096 ***	-0.072 ***	-0.067 ***
	(0.010)	(0.010)	(0.006)	(0.008)	(0.009)	(0.005)	(0.004)
border$_{lj}$	0.419 ***	0.421 ***	0.279 ***	0.445 ***	0.445 ***	0.205 ***	0.202 ***
	(0.023)	(0.022)	(0.012)	(0.019)	(0.019)	(0.010)	(0.010)
lang$_{lj}$	0.084 ***	0.097 ***	0.061 ***	0.073 ***	0.073 ***	0.044 ***	0.047 ***
	(0.017)	(0.016)	(0.009)	(0.013)	(0.014)	(0.007)	(0.007)
EMU$_{lj}$	0.542 ***	0.542 ***	0.411 ***	0.445 ***	0.445 ***	0.338 ***	0.338 ***
	(0.035)	(0.032)	(0.015)	(0.023)	(0.023)	(0.011)	(0.011)
equal_law$_{lj}$	0.018 *	0.013	0.015 ***	0.023 ***	0.021 ***	0.000	-0.003
	(0.010)	(0.009)	(0.005)	(0.008)	(0.008)	(0.004)	(0.004)
common_law$_{j}$	0.095 ***	0.084 ***	0.050 ***	0.055 ***	0.058 ***	0.008 *	0.011 **
	(0.013)	(0.012)	(0.006)	(0.009)	(0.010)	(0.005)	(0.005)
colony$_{lj}$	0.114 ***	0.112 ***	0.084 ***	0.119 ***	0.119 ***	0.092 ***	0.090 ***
	(0.020)	(0.018)	(0.012)	(0.016)	(0.016)	(0.010)	(0.010)
GAAP$_{lj}$	-0.010	-0.007	-0.029 ***	-0.009	-0.010 ***	-0.027 ***	-0.029 ***
	(0.016)	(0.014)	(0.008)	(0.011)	(0.011)	(0.006)	(0.006)
cross_listing$_{lj}$	0.360 ***	0.332 ***	0.088 ***	0.157 ***	0.136 ***	-0.022	-0.023
	(0.039)	(0.037)	(0.020)	(0.029)	(0.029)	(0.015)	(0.015)
other controls: size, capital mobility, liquidity, trade linkages, lagged returns, country governance, time fixed effects (as Table 3, column (7))							
#obs	12211	12211	12211	12129	11662	11507	11040
Adj-R^2	0.30	0.32	0.48	0.36	0.36	0.49	0.49

Table 11. Endogeneity: full sample

This table reports in column (1) the results of a Feasible GLS regression, following the specification of Table 3, column (7). Column (3) reports the over-identified GMM estimation, relying on the two excluded instruments reported in the table, J_High info$_{lj}$ and J_Low size$_{lj}$. Column (2c) reports the corresponding first stage regression, estimated through a Linear Probability Model (LPM). Columns (2a) and (2b) report the first stage on individual excluded instruments. At the bottom of the table, the instruments' validity tests (Relevance and Exogeneity tests) are reported. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively.

		Endogeneity (full distribution)		**overidentified system**	
		excluded instruments			
		J_High_info$_{lj}$	J_Low_size$_{lj}$	Both J_instruments	GMM
	FGLS	first stage (LPM)	first stage (LPM)	first stage (LPM)	second stage
	(1)	(2a)	(2b)	(2c)	(3)
EC$_{lj}$	0.316 ***	-	-	-	4.711 ***
	(0.034)				(0.551)
dist$_{lj}$	-0.129 ***	-0.012 ***	-0.013 ***	-0.012 ***	-0.150 ***
	(0.010)	(0.002)	(0.002)	(0.002)	(0.015)
border$_{lj}$	0.428 ***	0.077 ***	0.084 ***	0.077 ***	0.118
	(0.023)	(0.006)	(0.006)	(0.006)	(0.098)
lang$_{lj}$	0.077 ***	0.005	0.010 **	0.007	0.039
	(0.017)	(0.004)	(0.005)	(0.005)	(0.050)
EMU$_{lj}$	0.542 ***	0.038 ***	0.043 ***	0.037 ***	0.471 ***
	(0.035)	(0.005)	(0.005)	(0.005)	(0.088)
equal_law$_{lj}$	0.023 **	0.048 ***	0.047 ***	0.049 ***	-0.218 ***
	(0.010)	(0.003)	(0.003)	(0.003)	(0.046)
common_law$_{j}$	0.096 ***	-0.015 ***	-0.014 ***	-0.014 ***	0.421 ***
	(0.013)	(0.003)	(0.003)	(0.003)	(0.049)
colony$_{lj}$	0.120 ***	0.022 ***	0.020 ***	0.022 ***	0.102
	(0.020)	(0.006)	(0.006)	(0.006)	(0.062)
GAAP$_{lj}$	-0.008	0.045 ***	0.047 ***	0.046 ***	-0.265 ***
	(0.016)	(0.004)	(0.004)	(0.004)	(0.053)
cross_listing$_{lj}$	0.383 ***	0.030 **	0.031 **	0.028 **	0.323 ***
	(0.039)	(0.013)	(0.013)	(0.013)	(0.113)
excluded instruments					
J_High_info$_{lj}$		0.039 ***		0.041 ***	
		(0.004)		(0.001)	
J_Low_size$_{lj}$			0.024 ***	0.025 ***	
			(0.003)	(0.003)	
other controls: size, capital mobility, liquidity, trade linkages, lagged returns, country governance, time fixed effects (as Table 3, column (7))		***Instruments' validity tests***			
		Relevance: F-test = 55.66 P(F-test) = 0.00	Relevance: F-test = 116.41 P(F-test) = 0.00	Relevance: F-test = 89.38 P(F-test)= 0.00	
				Exogeneity: J-test: $\chi^2_{(1)}$=35.17 P(J-test)= 0.00	
				HR-test: $\chi^2_{(1)}$=32.24 P(HR-test)= 0.00	

Table 12. Endogeneity: truncated distribution (top 5% and 0)

This table replicates the Table 11, but relatively to the truncated distribution (top 5% and 0). Column (1) reports the results of a Feasible GLS regression, following the specification of Table 9, column (4b) of the truncated distribution (top 5% and zeros). Column (3) reports the over-identified GMM estimation, relying on the two excluded instruments reported in the table, J_High $info_{lj}$ and J_Low $size_{lj}$. Column (2c) reports the corresponding first stage regression, estimated through a Linear Probability Model (LPM). Columns (2a) and (2b) report the first stage on individual excluded instruments. At the bottom of the table, the instruments' validity tests (Relevance and Exogeneity tests) are reported. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively.

		Endogeneity (truncated: top 5% and 0)		**overidentified system**	
		excluded instruments			
		J_High_info$_{lj}$	J_Low_size$_{lj}$	Both J_instruments	GMM
	FGLS	first stage (LPM)	first stage (LPM)	first stage (LPM)	second stage
	(1)	(2a)	(2b)	(2c)	(3)
EC$_{lj}$	0.134 ***	-	-		0.324 ***
	(0.017)				(0.118)
dist$_{lj}$	-0.068 ***	-0.012 ***	-0.013 ***	-0.012 ***	-0.123 ***
	(0.004)	(0.002)	(0.002)	(0.002)	(0.005)
border$_{lj}$	0.203 ***	0.036 ***	0.042 ***	0.036 ***	0.195 ***
	(0.010)	(0.006)	(0.006)	(0.006)	(0.017)
lang$_{lj}$	0.045 ***	-0.009 **	-0.005	-0.009 *	0.024 **
	(0.007)	(0.004)	(0.004)	(0.004)	(0.011)
EMU$_{lj}$	0.338 ***	0.038 ***	0.041 ***	0.037 ***	0.246 ***
	(0.011)	(0.005)	(0.005)	(0.005)	(0.015)
equal_law$_{lj}$	-0.002	0.040 ***	0.040 ***	0.041 ***	-0.005
	(0.004)	(0.003)	(0.003)	(0.003)	(0.008)
common_law$_{j}$	0.011 **	-0.005	-0.006	-0.004	0.011 *
	(0.005)	(0.003)	(0.003)	(0.003)	(0.006)
colony$_{lj}$	0.091 ***	0.016 ***	0.013 **	0.015 **	0.089 ***
	(0.010)	(0.006)	(0.006)	(0.006)	(0.015)
GAAP$_{lj}$	-0.029 ***	0.038 ***	0.039 ***	0.039 ***	-0.064 ***
	(0.006)	(0.004)	(0.004)	(0.004)	(0.009)
cross_listing$_{lj}$	-0.022	0.031 **	0.034 ***	0.031 **	0.373 ***
	(0.015)	(0.013)	(0.013)	(0.013)	(0.031)
excluded instruments					
J_High_info$_{lj}$		0.031 ***		0.032 ***	
		(0.003)		(0.001)	
J_Low_size$_{lj}$			0.021 ***	0.022 ***	
			(0.003)	(0.003)	
other controls: size, capital mobility, liquidity, trade linkages, lagged returns, country governance, time fixed effects (as Table 3, column (7))		***Instruments' validity tests***			
		Relevance: F-test: 76.92	Relevance: F-test: 47.51	Relevance: F-test = 64.32	P(F-test) = 0.00
		P(F-test): 0.00	P(F-test): 0.00	Exogeneity: J-test: $\chi^2_{(1)}$= 1.50	P(J-test) = 0.22
				HR-test: $\chi^2_{(1)}$= 0.57	P(HR-test)=0.45

Table 13. Endogeneity: a counterfactual test

This table follows the same structure as Table 12, with the exception of the instruments adopted. The first instrument captures the fact that any of the two exchanges in the country-pair features a high stock market information (Or_High info$_{lj}$), while the second instrument captures the fact that any of the two exchanges in the country-pair has a low stock exchange size (Or_Low size$_{lj}$)

		Endogeneity (truncated: top 5% and 0) excluded instruments		**overidentified system**	
		Or_High_info$_{lj}$	Or_Low_size$_{lj}$	Both Or_instruments	GMM
	FGLS	first stage (LPM)	first stage (LPM)	first stage (LPM)	second stage
	(1)	(2a)	(2b)	(2c)	(3)
EC$_{lj}$	0.134 ***	-	-		-0.144
	(0.017)				(0.547)
dist$_{lj}$	-0.068 ***	-0.014 ***	-0.013 ***	-0.013 ***	-0.128 ***
	(0.004)	(0.002)	(0.002)	(0.002)	(0.009)
border$_{lj}$	0.203 ***	0.040 ***	0.039 ***	0.037 ***	0.199 ***
	(0.010)	(0.006)	(0.006)	(0.006)	(0.018)
lang$_{lj}$	0.045 ***	-0.007	-0.007	-0.007	0.013
	(0.007)	(0.004)	(0.004)	(0.004)	(0.016)
EMU$_{lj}$	0.338 ***	0.042 ***	0.042 ***	0.042 ***	0.285 ***
	(0.011)	(0.005)	(0.005)	(0.005)	(0.042)
equal_law$_{lj}$	-0.002	0.040 ***	0.040 ***	0.041 ***	0.017
	(0.004)	(0.003)	(0.003)	(0.003)	(0.028)
common_law$_{j}$	0.011 **	-0.007 **	-0.007 **	-0.007 **	0.008
	(0.005)	(0.003)	(0.003)	(0.003)	(0.006)
colony$_{lj}$	0.091 ***	0.015 **	0.013 **	0.015 **	0.105 ***
	(0.010)	(0.006)	(0.006)	(0.006)	(0.017)
GAAP$_{lj}$	-0.029 ***	0.038 ***	0.039 ***	0.039 ***	-0.043 *
	(0.006)	(0.004)	(0.004)	(0.004)	(0.022)
cross_listing$_{lj}$	-0.022	0.031 **	0.032 **	0.029 **	0.383 ***
	(0.015)	(0.013)	(0.013)	(0.013)	(0.035)
excluded instruments					
Or_High_info$_{lj}$		-0.015 ***		-0.015 ***	
		(0.003)		(0.001)	
Or_Low_size$_{lj}$			-0.009 **	-0.009 **	
			(0.003)	(0.003)	
other controls: size, capital mobility, liquidity, trade linkages, lagged returns, country governance, time fixed effects (as Table 3, column (7))		Relevance: F-test= 23.42 P(F-test)= 0.00	***Instruments' validity tests*** Relevance: F-test= 4.89 P(F-test)= 0.03	Relevance: F-test= 13.78 P(F-test) = 0.00 Exogeneity: J-test: $\chi^2_{(1)}$=11.85 P(J-test) = 0.00 HR-test: $\chi^2_{(1)}$=5.72 P(HR-test)= 0.02	

A Data appendix

A.1 Dependent variables

The dependent variable in the econometric analysis is w_{lj}/MS_MSCI_j.

Stock market portfolio weight (w_{lj})

The CPIS dataset contains information on foreign holdings only and does not include domestic positions. In order to derive the foreign portfolio positions of country l in country j in the overall portfolio, we need to retrieve the share of foreign assets. To accomplish this objective we need the stock market capitalization of all country indexes, the outstanding foreign equity portfolio investments, and the corresponding liabilities. Accordingly we can derive the "foreign equity share" of investing-country l, FS_l[29]

$$FS_l = \frac{(FA)_l}{(MCAP_l + FA_l - FL_l)} \tag{2}$$

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 (w_{lj}). Source: CPIS (IMF), IFS (IMF), World Federation of Exchanges.

The 40 investing countries are: Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, Czeck Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Indonesia, Israel, Italy, Japan, Malaysia,Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Russia, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Thailand, Turkey, the United Kingdom, the United States, and Venezuela.

The 41 destination countries are: Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, Denmark, Egypt, Finland, France, Germany, Greece, Hong Kong, India, Indonesia, Ireland, Israel, Italy, Japan, Malaysia, Mexico, the Netherlands, New Zealand, Norway, Pakistan, Peru, Philippines, Portugal, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, the United Kingdom, the United States, and Venezuela.

Note that some countries are included as investing but not as destination ones, and vice versa, because of data availability. As reported by the IMF, in some cases within the CPIS, negative values are reported for the value of residents' holdings of securities issued by a particular economy. Such entries reflect short positions in securities, usually resulting from the sale of securities acquired under repurchase agreements. In our analysis, for consistency with the theoretical framework, we exclude negative positions: they are less than 50 out of about 12 thousands of observations and their absolute value is very low, as well.

We also exclude 39 outliers, whose magnitude was up to five hundred times larger than the median value and about 10 times larger than the highest 99.9 percentile value. These outliers refer to extremely large position of countries within the CEESEG group - so that their inclusion would make our results on the effect of stock exchange consolidation even larger-, and to investment in countries, such as Ireland, which in some instances may act as an offshore center. To address this

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

latter issue, in Table 4, column (4), we report results run on a sub-sample of destination countries which exclude potential offshore centers.

Market share (MS_j)

Market capitalization of listed domestic companies (US$). Data are end of year values converted to U.S. dollars using corresponding year-end foreign exchange rates.

Source: World Federation of Exchanges database.(from the World Bank database). Complemented with data from CEIC Data, for countries not covered by the World Bank.

Float-adjusted market share (MS_MSCI_j)

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 (Dahlquist et al. (2003)). The adopted MSCI Investable Market Indexes (IMI) cover all investable large, mid and small cap securities across the Developed, Emerging and Frontier Markets, targeting approximately 99% of each market's free-float adjusted market capitalization.

Source: MSCI.[30]

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. The subscript $*$ indicates that the corresponding variable can be referred to the country-pair lj, the destination country j and/or to the investing country l.

Main regressor

Stock exchange consolidation (EC_*)

CEESEG: Austria, Hungary, Slovenia, Czeck Republic since 2010.

NYSE-EURONEXT: Belgium, France and the Netherlands since 2001, Portugal since 2003, and the USA since 2007 to June 2014. In the specification in column (1) of Table 5, it also comprises the UK exchange since 2002 onwards (because of the fusion with the LIFFE platform).

NASDAQ-OMX: Sweden, Finland, Estonia since 2004, Denmark since 2005, and the USA since 2008. In the specification in column (2) of Table 5, it also comprises the Norway since 2007 onwards (because of the acquisition of the 10% of the ownership of the Oslo Stock Exchange).

MILA: Colombia, Peru, and Chile since 2011. Mexico joined at the end of 2014, then considered in the platform in 2015.

LSE-BI: the UK and Italy since 2007.

$EC_{lj:}$ Dummy variable taking value 1 if the investing and the destination country share a common exchange platform (0 otherwise).

$EC_{l:}$ Dummy variable taking value 1 if the investing country l is part of a consolidated platform (0 otherwise).

$EC_{j:}$ Dummy variable taking value 1 if the destination country j is part of a consolidated platform (0 otherwise).

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Pair-specific regressors

Distance ($dist_{lj}$)

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. ($border_{lj}$)

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

Common Language. ($lang_{lj}$)

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

Colonial linkage ($colony_{lj}$)

Dummy variable taking value of 1 if the investing country and the destination country share a colonial linkage (0 otherwise)

EMU (EMU_{lj})

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.

Common law ($common\_law_j$)

Destination-specific dummy variable equal to 1 if the destination country has a "common law" legal origin (0 otherwise).

Equal legal origin ($equal\_law_{lj}$)

Bilateral-specific 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.

Generalized Accepted Accounting Principles ($GAAP_{lj}$)

Total number of GAAP (Generally Accepted Accounting Principles) differences between investing country l and destination country j. Measure based on the measure *gaapdiff2* in Bae et al. (2008). Source: Bae et al. (2008).

Cross-listing ($cross\_listing_{lj}$)

This variable captures the number of country-to-country listings of the country pair lj (Sarkissian and Schill (2009), Panel A of Table 2). We consider as regressor the number of bilateral cross-listing of country j in country l relative to the total cross-listing in country l. This measure ideally ranges from 0 (no bilateral cross-listing between l and j) to 1 (all cross-listing of country l are with country j).

Trade closeness ($trade_{lj}$)

The measure is constructed as the average of two ratios: the bilateral exports (lj) divided by the total exports of the investing country l, and the bilateral imports (lj) divided by the total imports of the investing country l (in millions of current US $). This measure ideally ranges from 0 (no bilateral trade) to 1 (all trade flows of country l occur with country j)

Source: Direction of Trade Statistics (International Monetary Fund)

Country-specific regressors

Stock exchange openness ($exchange\_openness_*$)

This variable is the ratio of foreign listed companies to domestic listed companies at the end of year 2000. Source: World Federation of Exchanges.

International capital mobility (cap_mob_*)

Index (0-10) measuring the restrictions countries impose on capital flows assigning a lower rating to countries with more restrictions on foreign capital transactions. In decreasing rating order are ranked countries where: a) domestic investments by foreigners and foreign investments by local residents are unrestricted; b) investments are restricted in a few industries within the countries; c) investments are permitted but regulatory restrictions slow the mobility of capital; d) either domestic investments by foreigners or foreign investments by local residents require approval from government authorities; e) both domestic by foreigners and foreign investments by local require government approval. Source: Economic Freedom Network.

Traded stocks to GDP ($traded\ stocks_j/GDP_j$)

Stocks traded refers to the total value of shares traded during the period. The regressor is obtained by dividing the stocks traded by GDP. Source: Financial Sector Indicators (World Bank)

Number of listed shares ($listed\_shares_*$)

Listed domestic companies are the domestically incorporated companies listed on the country's stock exchanges at the end of the year. This indicator does not include investment companies, mutual funds, or other collective investment vehicles. Source: Financial Sector Indicators (World Bank)

Lagged stock returns (lag_ret_j)

Stock market return (%, year-on-year): annual median value. We attribute to each country in each year t, the average of the 3 lagged stock market returns. Source: Global Financial Development (World Bank)

Gross Domestic Product (GDP_*)

GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. Data are in current U.S. dollars. Source: Economy and Growth Indicators (World Bank).

MiFID ($MiFID_j$)

Dummy variable equal to 1 for the destination country j belonging to the European Union since 2008 onwards (0 otherwise).

SOX (SOX_j)

Dummy variable equal to 1 for the destination country j which adopted a significant legislative improvement in corporate financial reporting similar to the Sarbanes-Oxley Act in the US (0 otherwise).

In 2002 the United States' Congress passed the Sarbanes–Oxley Act (SOX). The Act is the most important legislation affecting corporate financial reporting enacted in the United States since the 1930s. It not only imposes additional disclosure requirements, but more importantly, proposes substantive corporate governance mandates.

In 2002, the King Committee on Corporate Governance, issued the revision of the 1994 corporate governance code for South Africa with requirements close to the US SOX.[31]

[31] Unlike other corporate governance codes such as Sarbanes-Oxley, the King Report code is non-legislative and is based on principles and practices. Compliance with the King Reports is however a requirement for companies listed on the Johannesburg Stock Exchange. Because of this peculiarity, we checked for the sensitivity of our findings to the

In 2003, the government of Canada's province of Ontario passed the Budget Measures Act, known as Bill 198, which closely duplicates the regulatory requirements contained in the Sarbanes-Oxley Act.

In Australia, the Corporate Law Economic Reform Program Act, a modification of the Corporations Act 2001 which governs corporate law, was enacted in July 2004.

Clause 49 of the Listing Agreement to the Indian stock exchange came into effect from 31 December 2005. It has been formulated for the improvement of corporate governance in all listed companies, by promoting corporate fairness, transparency and accountability.

In June 2006, the Financial Instruments and Exchange Act, that is the main statute codifying securities law and regulating securities companies in Japan, was promulgated. It is often referred to as the Japanese Sarbanes-Oxley Act.

In July 2008 the 8th EU directive 2006/43/EC of the European Parliament came into force in member states. This Directive is generally considered as the European Sarbanes-Oxley Act.

The Goshen Committee examined the appropriate structure and format for a corporate governance code in Israel, and recommended to partially adopt, with modifications, Sections 302 and 404 of the Sarbanes-Oxley Act of 2002, with full application of the regulations required beginning with the annual financial statements for the period ending on December 2010.

In the empirical analysis, the regulation dummies are therefore equal to 1 since the year of adoption of the legislative measure onward (for the US and South Africa: 2002 onward; for Canada: 2003 onward; for Australia: 2004 onward; for Japan and India: 2006 onward; for the European Union: 2008 onward; for Israel: 2011 onward).

Revised Antidirector Rights Index (rev_ADR_j)

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.

Regulatory quality

Regulatory quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Source: Worldwide Governance Indicators (WGI, World Bank). 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

exclusion of the South African act, and our results persist.

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.

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. Source: Worldwide Governance Indicators (WGI, World Bank). 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.

A.3 Instruments

Joint High stock market attention in l and j ($J\_\text{High}\_\text{info}_{lj}$)

This variable, used as an instrument for the bilateral stock exchange consolidation index (EC_{lj}), is aimed at capturing the depth of information in the involved countries. It is the average market capitalization of the stocks listed in each country index, i.e., $MCAP_*/listed\_shares_*$. A bilateral-specific lj dummy is then constructed, considering the average market capitalization in the investing (l) and destination (j) country. This dummy is equal to 1 if both the investing and the destination country have a high average market capitalization of the stocks listed, i.e., if it is above the mean, and 0 otherwise. Source: Market capitalization of listed domestic companies ($MCAP$): World Federation of Exchanges database.(from the World Bank database), complemented with data from CEIC Data, for countries not covered by the World Bank; listed shares ($listed\_shares$): Financial Sector Indicators (World Bank).

The alternative instrument $Or\_\text{high}\_\text{info}_{lj}$ adopted in Table 13, is instead a dummy variable equal to 1 if any of the stock exchanges in the country-pair has a high average size of the individual listed stock, i.e., if it is above the mean, and 0 otherwise.

Joint Low exchange size of l and j ($J\_\text{low}\_\text{size}_{lj}$)

This variable, used as an instrument for the bilateral stock exchange consolidation index (EC_{lj}), is aimed at capturing the size of the stock exchanges in the involved countries i.e., $MCAP_*$. A bilateral-specific lj dummy is then constructed, considering the size of the investing (l) and destination (j) stock exchange. This dummy is equal to 1 if both the investing and the destination country have a low size of the exchange, i.e., if it falls below the mean, and 0 otherwise. Source: Market capitalization of listed domestic companies ($MCAP$): World Federation of Exchanges database.(from the World Bank database), complemented with data from CEIC Data, for countries not covered by the World Bank.

The alternative instrument $Or\_\text{low}\_\text{size}_{lj}$ adopted in Table 13, is instead a dummy variable equal to 1 if any of the stock exchanges in the country-pair has a low size of the exchange, i.e., if it falls below the mean, and 0 otherwise.

B Additional tables

Table 14. Endogeneity: truncated distribution (top 5%)

This table replicates the Table 12, but considers a distribution truncated only from the high end (top 5%).

		Endogeneity (truncated: top 5%)		**overidentified system**	
		excluded instruments			
		$J\_High\_info_{ij}$	$J\_Low\_size_{ij}$	Both J_instruments	GMM
	FGLS	first stage (LPM)	first stage (LPM)	first stage (LPM)	second stage
	(1)	(2a)	(2b)	(2c)	(3)
$\mathbf{EC}_{ij}$	0.132 ***	-	-		0.275 **
	(0.017)				(0.117)
$dist_{ij}$	-0.073 ***	-0.010 ***	-0.012 ***	-0.010 ***	-0.129 ***
	(0.005)	(0.002)	(0.002)	(0.002)	(0.005)
$border_{ij}$	0.206 ***	0.066 ***	0.070 ***	0.066 ***	0.197 ***
	(0.010)	(0.006)	(0.006)	(0.006)	(0.017)
$lang_{ij}$	0.043 ***	0.010 **	0.016 ***	0.013 ***	0.020 *
	(0.007)	(0.005)	(0.005)	(0.005)	(0.011)
EMU_{ij}	0.339 ***	0.049 ***	0.055 ***	0.048 ***	0.252 ***
	(0.011)	(0.005)	(0.005)	(0.005)	(0.015)
$equal\_law_{ij}$	0.001	0.041 ***	0.039 ***	0.041 ***	-0.001
	(0.004)	(0.003)	(0.003)	(0.003)	(0.008)
$common\_law_{j}$	0.008 *	-0.010 ***	-0.010 ***	-0.010 ***	0.010
	(0.005)	(0.003)	(0.003)	(0.004)	(0.006)
$colony_{ij}$	0.093 ***	0.030 ***	0.030 ***	0.030 ***	0.093 ***
	(0.010)	(0.007)	(0.007)	(0.007)	(0.015)
$GAAP_{ij}$	-0.027 ***	0.050 ***	0.053 ***	0.052 ***	-0.058 ***
	(0.006)	(0.004)	(0.004)	(0.004)	(0.009)
$cross\_listing_{ij}$	-0.021	0.001	0.008	0.002	0.371 ***
	(0.015)	(0.013)	(0.013)	(0.013)	(0.030)
excluded instruments					
$J\_High\_info_{ij}$		0.037 ***		0.037 ***	
		(0.004)		(0.001)	
$J\_Low\_size_{ij}$			0.022 ***	0.022 ***	
			(0.004)	(0.004)	
other controls: size, capital mobility, liquidity, trade linkages, lagged returns, country governance, time fixed effects (as Table 3, column (7))		***Instruments' validity tests***			
		Relevance: F-test: 101.58	Relevance: F-test: 43.06	Relevance: F-test = 71.99	P(F-test) = 0.00
		P(F-test): 0.00	P(F-test): 0.00	Exogeneity: J-test: $\chi^2_{(1)}$=0.02	P(J-test) = 0.89
				HR-test: $\chi^2_{(1)}$= 1.69	P(HR-test)= 0.19

Table 15. Endogeneity: summary of results

This table reports the relevant coefficients (EC_{lj} in the FGLS and in the GMM's second stage) and of the instruments (in the first stage), across different treatments of outliers, following the winsorizing and truncation structure of Table 9.

	Endogeneity (summary over outliers' treatment)			
		overidentified system		
	FGLS	Both J instruments		GMM
		first stage (LPM)		second stage
Outliers' treatment	**EC**$_{lj}$ (endogenous regressor) (1)	**J_high_info**$_{lj}$ (excluded instruments) (2a)	**J_low_size**$_{lj}$ (excluded instruments) (2b)	**EC**$_{lj}$ (endogenous regressor) (3)
I. Full distribution	0.316 ***	0.041 ***	0.025 ***	4.711 ***
	(0.034)	(0.001)	(0.003)	(0.551)
		Instruments' validity tests		
		Relevance:		Exogeneity:
		F-test= 89.38	P(F-test)= 0.00	J-test: $\chi^2_{(1)}$= 35.17 P(J-test) = 0.00
				HR-test: $\chi^2_{(1)}$=32.24 P(HR-test) = 0.00
II. Truncated distribution				
a) top 5% and 0	0.134 ***	0.032 ***	0.022 ***	0.324 ***
	(0.017)	(0.001)	(0.003)	(0.118)
		Instruments' validity tests		
		Relevance:		Exogeneity:
		F-test= 64.32	P(F-test)= 0.00	J-test: $\chi^2_{(1)}$= 1.50 P(J-test) = 0.22
				HR-test: $\chi^2_{(1)}$=0.57 P(HR-test) = 0.45
b) top 5%	0.132 ***	0.037 ***	0.022 ***	0.275 **
	(0.017)	(0.004)	(0.003)	(0.117)
		Instruments' validity tests		
		Relevance:		Exogeneity:
		F-test= 71.99	P(F-test)= 0.00	J-test: $\chi^2_{(1)}$= 0.02 P(J-test) = 0.89
				HR-test: $\chi^2_{(1)}$= 1.69 P(HR-test) = 0.19
c) top 1% and 0	0.329 ***	0.041 ***	0.025 ***	1.654 ***
	(0.028)	(0.004)	(0.003)	(0.273)
		Instruments' validity tests		
		Relevance:		Exogeneity:
		F-test= 83.44	P(F-test)= 0.00	J-test: $\chi^2_{(1)}$= 80.68 P(J-test) = 0.00
				HR-test: $\chi^2_{(1)}$=55.74 P(HR-test) =0.00
d) top 1%	0.334 ***	0.041 ***	0.024 ***	1.578 ***
	(0.028)	(0.004)	(0.003)	(0.269)
		Instruments' validity tests		
		Relevance:		Exogeneity:
		F-test= 85.60	P(F-test)= 0.00	J-test: $\chi^2_{(1)}$= 70.18 P(J-test) = 0.00
				HR-test: $\chi^2_{(1)}$=50.91 P(HR-test) =0.00
III. Winsorized distribution				
a) top 5%	0.221 ***	0.025 ***	0.018 **	0.806 ***
	(0.018)	(0.003)	(0.007)	(0.129)
		Instruments' validity tests		
		Relevance:		Exogeneity:
		F-test= 89.38	P(F-test)= 0.00	J-test: $\chi^2_{(1)}$= 61.42 P(J-test) = 0.00
				HR-test: $\chi^2_{(1)}$=55.12 P(HR-test) =0.00
b) top 1%	0.327 ***	0.025 ***	0.018 **	2.993 ***
	(0.033)	(0.003)	(0.007)	(0.351)
		Instruments' validity tests		
		Relevance:		Exogeneity:
		F-test= 89.38	P(F-test)= 0.00	J-test: $\chi^2_{(1)}$= 68.11 P(J-test) = 0.00
				HR-test: $\chi^2_{(1)}$=30.43 P(HR-test) =0.00

Table 16. Event-study approach: Size interactions

This table reports results of a Feasible GLS regression, following the specification of Table 6, with fe_EC_{lj}, the fixed-effect EC component, and p_EC_{lj}, the "pure" event effect (p_EC_{lj} = fe_EC_{lj}·$time\_event$), where the $time\_event$ is equal to 1 after the merger and 0 before. Two-way clustered (investing country and time) standard errors are reported in parentheses. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively.

	Event-study approach: interaction effects			
	Size			
	stock exchange		GDP	
	(1a)	(1b)	(2a)	(2b)
p_**EC**$_{lj}$	0.177 ***	0.178 ***	0.186 ***	0.181 ***
	(0.057)	(0.058)	(0.057)	(0.058)
fe_**EC**$_{lj}$	0.212 ***	0.212 ***	0.211 ***	0.211 ***
	(0.043)	(0.043)	(0.043)	(0.043)
listed shares$_{l}$	-0.010			
	(0.014)			
listed shares$_{l}$ • p_**EC**$_{lj}$	-0.023 **			
	(0.011)			
listed shares$_{j}$		-0.018 ***		
		(0.003)		
listed shares$_{j}$ • p_**EC**$_{lj}$		-0.042 ***		
		(0.009)		
GDP$_{l}$			0.002	
			(0.006)	
GDP$_{l}$ • p_**EC**$_{lj}$			-0.011 **	
			(0.005)	
GDP$_{j}$				-0.008 ***
				(0.001)
GDP$_{j}$ • p_**EC**$_{lj}$				-0.020 ***
				(0.004)
other controls: gravity variables, colonial linkage, EMU, common law, GAAP, capital mobility, liquidity, trade linkages, lagged returns, country governance, time fixed effects (as Table 3, column (7))				
#obs	12211	12211	12211	12211
Adj-R^2	0.30	0.30	0.30	0.30

Table 17. Event-study approach: Familiarity interactions

This table reports results of a Feasible GLS regression, following the specification of Table 7, with fe$_EC_{lj}$, the fixed-effect EC component, and p$_EC_{lj}$, the "pure" event effect (p$_EC_{lj}$ = fe$_EC_{lj}$·*time_event*), where the *time_event* is equal to 1 after the merger and 0 before. Two-way clustered (investing country and time) standard errors are reported in parentheses. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively.

	Event-study approach: interaction effects								
	Familiarity								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
p_**EC**$_{lj}$	0.307 ***	0.033	0.055	0.346 ***	0.072	-0.083	0.324 ***	-0.047	-0.010
	(0.061)	(0.057)	(0.057)	(0.063)	(0.056)	(0.076)	(0.125)	(0.057)	(0.071)
fe_**EC**$_{lj}$	0.204 ***	0.210 ***	0.211 ***	0.235 ***	0.225 ***	0.212 ***	0.220 ***	0.219 ***	0.212 ***
	(0.043)	(0.043)	(0.043)	(0.044)	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)
dist$_{lj}$	-0.125 ***								
	(0.010)								
dist$_{lj}$ • p_**EC**$_{lj}$	-0.363 ***								
	(0.067)								
border$_{lj}$		0.395 ***							
		(0.023)							
border$_{lj}$ • p_**EC**$_{lj}$		0.350 ***							
		(0.059)							
lang$_{lj}$			0.075 ***						
			(0.017)						
lang$_{lj}$ • p_**EC**$_{lj}$			0.289 ***						
			(0.059)						
EMU$_{lj}$				0.585 ***					
				(0.037)					
EMU$_{lj}$ • p_**EC**$_{lj}$				-0.526 ***					
				(0.068)					
colony$_{lj}$					0.099 ***				
					(0.021)				
colony$_{lj}$ • p_**EC**$_{lj}$					0.470 ***				
					(0.088)				
equal law$_{lj}$						0.015			
						(0.010)			
equal law$_{lj}$ • p_**EC**$_{lj}$						0.271 ***			
						(0.067)			
GAAP$_{lj}$							0.028 ***		
							(0.008)		
GAAP$_{lj}$ • p_**EC**$_{lj}$							-0.210 *		
							(0.109)		
cross_listing$_{lj}$								0.029 ***	
								(0.008)	
cross_listing$_{lj}$ • p_**EC**$_{lj}$								2.027 ***	
								(0.152)	
trade$_{lj}$									0.027 ***
									(0.008)
trade$_{lj}$ • p_**EC**$_{lj}$									1.675 ***
									(0.614)
other controls: size, capital mobility, liquidity, trade linkages, lagged returns, country governance, time fixed effects (as Table 3, column (7))									
#obs	12211	12211	12211	12211	12211	12211	12211	12211	12211
Adj-R^2	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30