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ABSTRACT

Privatization and Stock Market Liquidity*

Using panel data of 19 developed economies in the period 1985-2000, we show that share issue privatization (SIP) strongly affects a fundamental aspect of financial development: market liquidity. First, we identify the channels through which a sustained SIP program boosts the liquidity of the overall market. Then, we explicitly test whether SIP has a positive spillover effect on the liquidity of private companies' shares. Liquidity appears to be sensitive to the amount of shares sold to retail investors, whose trading reduces the adverse selection component of the price impact. The cross-listing of shares exhibits an even stronger effect, suggesting that international offerings eliminate informational barriers and attract foreign investors to the domestic market, thereby reducing its risk premium.

JEL Classification: F30, G14, L33 and O16
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1. Introduction

Financial market development is often mentioned as one of the objectives of share issue privatization (SIP) programs in developed economies. One of the first experiments to foster the domestic stock market through privatization was carried out in Germany during the 1960s by the Adenauer government (Esser, 1994). More recently, the promotion of investors' participation and the revitalization of national exchanges have been top priorities of privatization programs not only in the United Kingdom, but also in France, Spain, and Italy (Vickers and Yarrow, 1988; Dumez and Jeunemaitre, 1994; Chiri and Panetta, 1994)

A remarkable wealth of evidence shows the correlation between financial market development and privatization. For instance, stock trading volume in developed countries outside the US grew from a little over $460 billion in 1983 to more than $17 trillion in 1998, while massive privatization plans were in progress (Boutchkova and Megginson, 2000). Yet, stock markets develop also in the absence of privatization. Indeed, the US experienced an exponential growth in capitalization and turnover during the same years with only limited privatization. So does privatization contribute to the development of stock markets?

Several theories suggest that it does. Due to the positive externalities generated by listing decisions, privatization initial public offerings (IPOs) may launch an economy's stock market by improving investors' diversification opportunities (Pagano, 1989; Subrahmanyam and Titman, 1999). Since privatization shares are usually sold at substantial discount (Dewenter and Malatesta, 1997), SIPs also increase the participation of uninformed retail investors, and consequently reduce adverse selection in the market and improve its liquidity (Kyle, 1985). Finally, SIPs involving the floating of shares in both domestic and international exchanges (SIPs with cross-listings) eliminate informational barriers to foreign investment, thereby boost liquidity in the domestic market (Hargis and Ramanlal, 1998; Chiesa and Nicodano, 2003).

Despite the relevance of these issues, a comprehensive empirical analysis concerning the impact of privatization on financial market development is still missing in the literature. This paper aims at filling this gap. It relates financial market development to different measures of privatization, in order to identify the primary transmission mechanism between the two.

Liquidity is a fundamental aspect of stock market development. A deeper secondary market allows companies to raise capital at a lower price (Ellul and Pagano, 2004). Furthermore, market liquidity – rather than market size[1] – provides incentives for information acquisition to financial analysts, whose private signals are aggregated and partially mirrored in stock prices. This in turn stimulates the use of stock-based managerial incentive schemes, which may enhance corporate performance, economic efficiency and growth (Hölmstrom and Tirole, 1993). Moreover, liquidity appears to be a priced risk factor (Pastor et al., 2003). We focus on liquidity also for methodological reasons: most theories of market microstructure bear implications concerning the behavior of liquidity rather than other market characteristics.

Market liquidity is difficult to measure and compare across countries. The conventional notion of market liquidity in the literature is the *price impact*, which coincides with the price response associated with a unit trade in auction markets (Grossman and Stiglitz, 1980; Kyle, 1985) and with the effective bid-ask spread in dealer markets (Glosten and Milgrom, 1985; Biais, 1993; Dennert, 1993). The computation of the price impact however requires transaction data which are usually not available. Moreover, market microstructure varies across countries, making transaction data hardly comparable. These difficulties can be circumvented by using the ratio of absolute return to dollar volume (Amihud, 2002), a proxy for the price impact, which has recently been shown to perform well on daily data relative to other conventional measures (Hasbrouk, 2003). This measure is in the core of our empirical analysis. However, we also examine the turnover ratio, i.e. the ratio of trading volume to capitalization, a widely used proxy for market liquidity in cross-country empirical studies of financial development (Levine, 1997).

Our analysis of nineteen developed economies in the 1985-2000 period shows that privatization positively affects stock market liquidity even if we control for other possible determinants identified by the theoretical literature, as well as for country-specific and time-varying factors. SIP programs focusing on the participation of retail investors and the cross-listings of shares in international exchanges have a particularly strong impact on risk premia and liquidity.

Albeit new relative to previous research, these results could be ascribed to the higher liquidity of privatized stocks themselves. Contrasting this view, we emphasize the existence of

[1] Empirical studies have shown that the initial level of stock market liquidity is a robust predictor of economic growth and capital accumulation, while initial capitalization is not – its significance being attached to a few outliers and to the omission of liquidity in the regression (Levine and Zervos, 1998; Levine, 1997).

a positive externality associated with privatization: the liquidity of *private* companies is shown to be strongly positively related to the extent of SIP. This positive spillover effect lies at the core of most theories of financial market development underlying our empirical analysis. In particular, the sale of shares to retail investors is again confirmed to be a major driver of liquidity, suggesting that increased uninformed trading reduces the bid-ask spread. The other important factor is the cross-listing of privatized stocks, indicating that bid-ask spreads may shrink due to both improved risk-sharing among investors exposed to different country risk and reduced informational barriers.

Our empirical study complements existing evidence on stock market liberalization and development, which mainly refers to developing and emerging economies. In that context, privatization is usually linked to a country's decision to liberalize the stock market by allowing for foreigners' stock purchases. A burgeoning empirical literature has shown the effects of such liberalization on equity prices, on the cost of capital, investment, and systemic liquidity (Henry, 2000; Stulz, 1999; Beckaert and Harvey, 2000; Jain-Chandra, 2002). The OECD countries considered in this study did not have formal barriers to foreign investment during the sample period. This allows us to isolate more accurately the effect of privatization on liquidity, while controlling for the degree of economic openness and for the intense financial integration which took place, especially among the European countries, during the 1990s.

Our research is also related to the vast literature assessing the economic effects of privatization. Several papers document substantial improvements in the economic and financial performance of privatized firms, and point out the sources of these improvements (Megginson and Netter, 2001; Bortolotti et al., 2002). However, to the best of our knowledge, no previous research has analyzed the spillover effect of privatization on liquidity and turnover in developed economies.

In the next section, we review several theories explaining how privatization may affect stock market development and, in particular, liquidity. Section 3 and 4 present the data set and the empirical model we use. The results are discussed in Section 5. Section 6 concludes.

2. Privatization and market liquidity: theory.

A market is illiquid when "sell" orders are filled at a lower price than "buy" orders. Such price premium can be interpreted as the compensation required by traders and intermediaries who satisfy other investors' liquidity needs. The price premium has three main components. The first is the risk premium. It arises due to the fact that liquidity provision implies a temporary deviation from optimal asset holdings, involving excess risk taking. The second component is linked to adverse selection: the order being filled may be placed by a counterpart with private information on the future price. The third component is simply given by material trading costs (see O'Hara, 1995). In what follows, we identify the channels through which SIP affects these components of the price premium.

First, SIP may reduce the risk premium by improving investors' diversification opportunities when, due to a coordination failure among firms and investors, stock markets are trapped in a low liquidity-high risk premium state (Pagano,1993). Investors have opportunities to diversify their portfolios only if many firms go public. However, the equilibrium number of private IPOs may be lower than optimal. This is because each entrepreneur bears the full listing cost, but does not internalize the diversification benefits arising from an additional listing. If investors anticipate too few IPOs, they do not enter the equity market, which results in a small and illiquid stock market. A privatization policy, aiming at increasing the number of IPOs of state-owned enterprises (SOEs), can move away the equilibrium from this under-development trap. Indeed, the government as the single owner of several listed firms can better "internalize" the benefits from additional listings.

A similar effect on stock market liquidity arises when agents receive on-the-job costless information concerning their own companies' payoffs, as in Subrahmanyam and Titman (1999). Since it may not be possible for investors to trade shares of private firms, opportunities to profit from such "serendipitous" information exist only if firms go public. In turn, going public firms may benefit from a large number of informed investors who require a lower risk premium because their information enables them to forecast firms' payoffs more accurately. This increases liquidity. Again, a coordination failure may lead to a low-welfare-low-liquidity equilibrium in which agents correctly anticipate too few IPOs and firms do not

consequently list their shares. An established SIP program may induce both informed investors and firms to enter the stock market.[2]

These theories suggest that stock market liquidity is positively related to the number of privatization share issues.

H1: *Privatization IPOs increase liquidity, especially the liquidity of non-privatized companies, in markets caught in a liquidity trap.*

Second, SIPs could also affect the adverse selection component of the price premium. Privatization IPOs may reduce the likelihood of information trading, through increasing the participation of retail investors, who typically have smaller holdings than financial institutions and hence less incentives to acquire costly information. The lower is the likelihood of dealing with a sophisticated counterpart, the smaller are anticipated losses, and the lower is the bid-ask spread, i.e. the premium that speculators and dealers charge to liquidity traders (Glosten and Milgrom, 1985; Kyle, 1985). Several privatization programs were designed to attract a large number of small investors by choosing the fixed-price offering method combined with the underpricing of shares (Benveniste and Busaba, 1997; Jones et al., 1999). Due to these attempts, privatization turned out to be an important method of reducing ownership concentration in many large companies: almost two-thirds of the 54 non-US firms with over 500.000 shareholders are privatized firms (Boutchova and Megginson, 2000).

These arguments yield the following empirical implication:

H2: *SIP programs increase stock market liquidity by fostering the participation of retail investors.*

Third, SIPs may reduce the risk premium by stimulating the participation of foreign investors. Privatization has typically been associated with the cross-listing of shares such that the shares of a large state-owned enterprise are issued both on the local and on at least one

[2] Most of the effects described in this section obtain only when transaction costs, such as information costs or foreign taxes, prevent domestic investors from internationally diversifying their portfolios. Home bias of domestic portfolios has been widely documented and may be associated with inefficient risk diversification (Lewis, 1999).

foreign exchange. Road-shows performed in connection with the listing in the international exchange may be particularly good means to increase foreign participation in the domestic market. These shows are typically aimed at providing investors information not only about the firm on sale but also about the country of its location.[4] They usually bring along enhanced investor recognition, which leads to greater investments and reduced risk premium (Merton, 1987; Foerster and Karolyi, 1999).

Even though it concerns primarily the cross-listed firms, foreign participation will also benefit the liquidity of shares traded only in the local market. If the returns of privatized and local companies are positively correlated, foreigners will share some of the risk borne only by domestic investors prior to privatization. This reduces the required risk premium and thereby increases the value of domestic shares (Chiesa and Nicodano, 2003).

H3: *A SIP program implemented through cross-listings increases both aggregate liquidity and the liquidity of non-privatized companies by enhancing the participation of foreign investors.*

Considerations of order flow migration to foreign markets may yield a competing empirical explanation with respect to H3. By definition, order flow migration decreases the domestic turnover of cross-listed stocks. At the same time, enhanced competition among market makers located in different exchanges may reduce bid-ask spreads. The net effect on domestic liquidity depends on transparency, i.e. inter-market information linkages (Domowitz et al, 1998). The more markets are informationally related, the lower are the liquidity costs of order-flow migration. Under (full) transparency domestic liquidity and the turnover of cross-listed stocks are both unambiguously high because the beneficial effect of increased competition dominates.

Hargis and Ramanlal (1996) extend the previous model taking into account the effect of cross-listings on the liquidity of companies listed only domestically. When securities are listed in several markets, institutional investors allocate trading activity internationally in order to minimize transaction costs. As in Domowitz et al. (1998), under transparency the overall

[4] "Governments have discovered that privatization through a global equity market placement created an unmatched opportunity to get the attention of investors around the world and to tell the country's story. No investment mission has the impact of a global equity road-show." Jeffrey R. Shafer, Salomon Smith Barney, in *Privatisation International Yearbook, 2000.*

impact of foreign listings on domestic liquidity of cross-listed stocks is positive.[5] Cross-listings have however a *negative* effect on the liquidity and turnover of purely domestic stocks. This is because institutional investors will reallocate their portfolios selling stocks traded only domestically and buying cross-listed stocks with lower bid-ask spreads. In this context the effect of cross-listings on the price impact may differ from that on trading volume, due to the presence of strategic informed investors who choose their preferred trading location. These theories have implications with respect to the spillover effect of SIPs:

H4: *A SIP program implemented through cross-listings reduces the liquidity of non-privatized companies as institutional investors shift their portfolio compositions towards more liquid, cross-listed shares.*

Last but not least, a SIP program may affect the risk premium by improving corporate governance and transparency standards. Lombardo and Pagano (2000) show that risk-adjusted returns are affected by investors' legal protection and accounting standards. Doidge et al. (2003) argue that cross-listing in a highly reputable exchange enhances the legal protection of the firm's investors and reduces the agency costs of controlling shareholders. This is reflected in a cross-listing premium, provided that the shares are cross-listed in a highly reputable exchange - such as the NYSE - rather than OTC or upstairs markets. This argument suggests that, for a given number of stocks traded abroad, the positive impact of a cross-listing on liquidity should be stronger for listings in the NYSE than in markets with weaker listing standards. Moreover, we expect that the increase in liquidity will mainly affect privatized companies listed in the NYSE, without generating strong spillover effects to companies that remain domestic and do not commit to alleviate the expropriation of their minority shareholders by accepting stricter corporate governance standards.

Several papers investigate the incentive for a company to list abroad (see Pagano et al., 2002 and references therein). A key finding is that companies that cross-list their shares in US markets have higher growth opportunities than those that issue shares in countries other than

[5] Several papers investigate the incentive for a company to list abroad (see Pagano et al., 2002 and references therein). A key finding is that companies that cross-list their shares in US markets have higher growth opportunities than those that issue shares in countries other than the US or remain domestic. Moreover, companies cross-listed in the US are valued more when they issue shares via public offerings, rather than via private placements (Doidge et al, 2004). Compared to these papers, our focus is different: we investigate the effects of cross-listings on the liquidity of the domestic market.

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H5: *A SIP program implemented through cross-listings at NYSE increases aggregate liquidity by promoting transparency and high standards for corporate governance. It does not affect the liquidity of non-privatized companies listed in the domestic market.*

3. Data

Since our hypotheses concern developed economies with established stock markets, we focus on a group of OECD countries.[6] We exclude from the sample Luxembourg, Iceland and Ireland since their stock markets were not systematically covered by conventional data sources over the entire period. Turkey and Greece are also ignored because of foreign ownership restrictions in some of the sample years.

As a result, the analysis considers 19 economies in a panel with monthly observations over the period 1985-2000. For a few countries stock market data turned out to be available only from a date later than January 1985. Table 2 shows the first day of the period considered for each country included in the sample.

3.1 Privatization and financial market development: descriptive analysis

Our main source for privatization information is *Privatisation International*, which has been part of *IFR-Platinum Database* of Thomson Financial since 1998.[7] It reports qualitative and quantitative information about all privatization transactions (public offers, asset sales, and concessions), worth more than US$500,000, in the world over the 1977-2000 period. The low cut-off transaction value allows us to include virtually the whole population of SIPs implemented over the sample period.

[6] While we sacrifice some observations, the panel data restrictions – concerning equal sensitivity of liquidity to explanatory variables across countries – are less extreme in our relatively homogeneous sample.

[7] This data source is widely used in the empirical literature on privatization (see Jones et al., 1999; Megginson et al., 2001).

We define a SIP as an issue of common stock of a state-owned enterprise on a public equity market. This definition includes both IPOs and secondary offerings. We collect information concerning the date of issue, company industry, the target market (domestic and international), and the percentage of capital sold at the privatization sale. We then follow the history of the company during the sample period in order to track the changes of names, the de-listings, and M&A activity, using *SDC Platinum*, *World Wide Mergers & Acquisitions Database* and company websites. If the privatized company merged with or was acquired by a private company, and was consequently de-listed or listed with shares registered under a new name, we consider as a "privatized company" either the newly created company or the acquiror of the privatized company itself, provided their shares trade on the stock market where the privatized company was initially floated.[8]

The sample includes 228 privatized state-owned enterprises (SOEs). Figure 2 and 3 report the number and cumulative number of privatized companies over the 1985-2000 period. Figure 2 shows the existence of some privatization cycles in the countries in the sample, with the years 1987, 1994, and 1999 associated with more intense privatization efforts. Figure 3 highlights the relatively stable increasing trend in privatization during the sample period. As widely known, the UK is the country mostly involved in the process boasting 33 SOEs privatized. France and Italy follow, with 27 and 26 companies, respectively. Only 2 major privatizations are reported in Belgium, Denmark, and Switzerland. The geographical distribution of privatization reveals that European countries have 79 percent (181) of the privatized SOEs, followed by America, Australasia, and Japan with 21, 20 and 6 companies, respectively.

Table 1 shows that privatized companies represent 14 to 23 percent of the (end of period) total number of listed companies in some countries (Portugal, Austria, Ireland, and Finland). The data on capitalization are also striking. Privatized companies account on average for 21.2 percent of total market capitalization at the end of our sample period. However, there is also a large cross country variability within our sample, with France boasting 83 percent (59 percent if we only consider the free float) while the USA a bare 0.03 percent.

[8] For example, British Petroleum (BP) was initially privatized in 1977. After two other share issues (1983 and 1987) BP merged in 1998 with Amoco, a US oil company. BP-AMOCO is considered as a privatized company also from 1998 onwards. Similarly, Credit Communal de Belgique was privatized in 1996. In the same year, the company merged with Credit Local de France, creating the DEXIA group, with shares listed in EURONEXT. Therefore, DEXIA is considered as a privatized company from 1996 onwards. The relevant information concerning de-listings and M&A activity is contained in an Appendix which is available from the authors upon request.

Privatized SOEs are equally distributed in the financial, manufacturing, and utility industries, with each industry accounting for approximately 25 percent of the companies. Eleven percent of the companies are telecommunications operators while approximately 7 and 5 percent belong to energy and services, respectively.

It has been widely documented that SOEs are usually the largest companies in an economy, and as such they are typically sold in several tranches. This sequencing of sales has been ascribed to several reasons, ranging from the absorption capacity of domestic stock markets to the building of reputational capital by privatizing governments (Megginson and Netter, 2001). Out of 338 share issues in the sample, about half are IPOs (50.3 percent). At the company level, the average number of issues is 1.48. The average cumulative percentage of capital privatized (accounting for the subsequent tranches) is 61.4 per cent, and the median is 50 percent.

The international profile of these issues is also worth noticing. It has been argued that privatization became a key driving force of international financial markets integration, as major sales were often implemented through global offers. The Appendix (available from the authors) provides detailed information about the geography of privatized stocks. The majority (62.3 percent) of the 228 privatized companies in the sample are listed only in domestic markets. However, 55 companies (24.1 percent) are dual-listed (i.e. listed in the domestic and in a foreign exchange), and 28 (12.3 percent) companies are cross-listed in two or more foreign exchanges. Finally, two Canadian companies (PetroCanada and Canadian National) and a Dutch firm (Elsag Bailey) are listed in foreign markets only.

3.2 Measuring privatization on public equity markets

We collect information on daily stock prices, market capitalization, and the value of trades for each privatized company (all expressed in local currency) and for the market as a whole from Datastream. We then construct monthly series at the country level of several privatization variables. In the empirical analysis, we employ several privatization measures in order to disentangle the different transmission channels identified by the theory.

To test H1 we need to focus on the number of privatization IPOs. In this direction, we take the cumulative number of privatized firms scaled by the total number of listed firms (per month and per country), as reported in WFE (World Federation of Exchanges) publications. We will further refer to this ratio as PRIVANUM. This measure is suitable for an empirical test

of the analyses in Pagano (1989,1993) and in Subrahmanyam and Titman (1999). In those models the number of firms listed in a market serves as a proxy for investors' diversification opportunities. IPOs spur liquidity when markets are caught in a low-liquidity trap. To capture the possible non-linear effect of privatization IPOs on market liquidity, we refine our measure by interacting PRIVANUM with a dummy taking the value 1 if the number of listed firms in a given country in the initial year was below 336 - the median value of the number of firms listed across countries - and zero otherwise. The resulting variable is PRIVATRAP.

A test of H2 requires a proxy for the involvement of retail investors in SIPs. The variable PRIVAFLOAT is defined as the product of market capitalization of the privatized company and the *cumulative* percentage of capital floated in the domestic market (taking into account seasoned equity issues), scaled by total market capitalization. This variable measures the free float of privatized companies, which is a suitable proxy for uninformed liquidity trading as in Kyle (1985). The previously defined variables, PRIVANUM and PRIVATRAP, account for the changes in privatization resulting from IPOs only. In contrast, PRIVAFLOAT also allows us to capture the variation in privatization due to secondary offerings. Table 1 reports the (end of period) value of PRIVAFLOAT for each country. The float of French privatized companies represents more than half of the capitalization (59 percent) of the entire market. In this respect, France is followed by Spain and Portugal, where the free float amounted to roughly 30 percent of total market capitalization.

Our database reports accurate information about the international profile of SIPs including the target markets where privatization shares were issued. This information allows us to distinguish between companies floated only domestically (PRIVADOM), and companies listed also in one or more foreign exchanges (PRIVABROAD). This distinction is crucial for a proper test of H3 and H4. PRIVADOM is the sum of the capitalization of privatized companies listed *only* in the domestic market, while PRIVABROAD is equal to the sum of the capitalization of privatized companies listed both in the domestic *and* in one or more foreign exchanges. Both variables are scaled by total market capitalization. Using the variable PRIVABROAD, we are able to test the specific effect of increased foreign market participation on domestic liquidity.

International exchanges vary greatly in terms of listings requirements, transparency and legal protection of minority investors. In order to test whether the exposure of privatized companies to higher standards of corporate governance has a positive effect on the liquidity of their shares (H5), we isolate the companies listed at NYSE both directly and indirectly through

a level III American Depositary Receipt (ADR) (see Karolyi, 1998). We then define PRIVANYSE as the capitalization of privatized companies listed in the New York Stock Exchange (and thus subject to full compliance with SEC regulations) scaled by total market capitalization. US listings in upstairs markets such as the PORTAL, where Qualified Buyers trade shares registered under SEC Rule 144, are therefore excluded from PRIVANYSE, but included in PRIVABROAD.

3.3 Measuring liquidity

We obtain stock market data from Datastream. We first measure trading intensity with the turnover ratio, a standard indicator of market development in the macro-finance literature. For a given country, the (daily) turnover for day *d* in month *t* is equal to the total value of shares traded (TVOLUME) scaled by total daily market capitalization (MVALUE):[9]

$$TURNOVER_{dt} = TVOLUME_{dt}/MVALUE_{dt},$$

Monthly turnover is constructed by dividing the total trading volume over a month by the average market value during that month.

However, theories of stock market development highlighted in the theoretical section bear implications for the price impact rather than the volume of trading activity. We therefore focus on a measure of the price impact suggested by Amihud (2002), ILLIQ. The variable for month *t* is defined as follows:

$$ILLIQ_t = D^{-1} \sum_d \{|R_{dt}|/TURNOVER_{dt}\},$$

where $|R_{dt}|$ is the absolute daily return and D is the number of trading days in month *t*.

This measure of (il)liquidity is intuitive: the price impact of a unit trade is small in a liquid market since in the absence of private information a buy (or sell) order causes a small price increase (decrease). Importantly, this measure has been shown to be strongly positively correlated with the price impact - which coincides with the bid-ask spread in standard-size

transactions - in a cross section of individual stocks (Amihud, 2002). Using daily data, Hasbrouk (2003) also shows that it performs better than other measures of market liquidity, including the innovative one employed in Pastor et al. (2003), especially for portfolios.

We use the monthly *median* of the price impact, instead of the average, in order to mitigate the impact of outliers. So, our definition of the price impact is

$$ILLIQ_t = \text{median}\{|R_{dt}|/TURNOVER_{dt}\},$$

where returns for each market are calculated from the Datastream Market Index.[10]

Figure 1 graphs the time series of ILLIQ. Table 2 provides summary statistics of the variable. A value of 3 of ILLIQ indicates that the absolute return is 3% on a day when 1% of the market value is traded. In early years of the sample period, until 1994 approximately, the ILLIQ measures in certain countries are unusually high. In later years the ILLIQ measure is more stable in time and more similar across countries, although countries with higher capitalization to GDP ratio (Germany, Netherlands, UK and USA) seem to have higher liquidity. In all markets, the ILLIQ measure is declining over time, indicating an improvement in liquidity, accompanied by a remarkable increase in turnover.

3.4 Stationarity Issues

A potential problem in the empirical work is the non-stationarity of the data. To test for stationarity of the dependent variables and the primary explanatory variables in the regression model, we employed a panel unit root test developed by Im, Pesaran and Shin (1997). We found that we can reject non-stationarity for all our dependent variables, i.e. the liquidity measures, and also for volatility.[11] Some of the explanatory variables like market capitalization and the variables measuring privatization are, however, non-stationary. The non-stationarity of the privatization variables is not surprising at all since privatization exhibits an upward trend

[10] For notational convenience the country subscript has been suppressed.

[10] This index does not include all the companies in a market. It selects the most important companies by market value and changes them to reflect current market conditions. The approximate number of stocks ranges from 50 (Austria, Greece, Portugal, Denmark and Finland) to 1000 (US, Japan).

during the sample period. In spite of this, in the regressions we did not encounter problems of non-stationarity of the residuals.

4. Empirical model

We investigate the average impact of SIP on market liquidity by estimating the following specification:

$$y_{it} = \alpha_i + \alpha_t + \beta' x_{it} + \gamma' PRIVA_{it} + \varepsilon_{it} \quad (1)$$

where y_{it} is the dependent variable that is the price impact (ILLIQ) or (the log of) the monthly turnover ratio for country i in month t,[12] $PRIVA_{it}$ is a privatization measure, x_{it} is a vector of control variables, α_i is a country fixed effect, and α_t is a year fixed effect. We consider the following control variables suggested by the literature on privatization and stock market development.

Market size. We use the (log of the) total number of listed firms to control for market size. The number of listed firms is a proxy for diversification opportunities which affect liquidity in Pagano (1989) and Subrahmanyam and Titman (1999). Other control variables, like market capitalization, may not fully capture these diversification effects as a large market could arise due to the participation of a few large firms. Including the number of firms as an explanatory variable may cause simultaneity problems in the regressions because market size may be endogenous to liquidity. To avoid this problem, for an observation at month t we take into account the number of listed firms at month (*t-12)*. This provides only a partial solution to the problem making the lagged variable predetermined but not strictly exogenous. However, since the longitudinal size of our panel is relatively large (16 years of monthly data), we believe the resulting bias is of second-order relevance (see Baltagi, 1995).

Country risk. In emerging economies country risk is often of a primary concern. It is an a priori less serious concern in advanced economies with established democracies and a sound rule of law. In spite of this expectation, we employ a number of control variables in all

[12] The results of these non-stationarity tests are available on request from the authors.
[13] We take the logarithm of turnover in order to reduce both cross-country heteroskedasticity and the impact of outliers.

the regressions, to capture changes in the institutional environment and the countries' policy risk assessments.

These variables are motivated by the analyses in Perotti (1995), Perotti and Laeven (2002), Perotti and Van Oijen (2001), and Lombardo and Pagano (2000). Perotti and Van Oijen argue that the effect of privatization on market development may be indirect: privatization leads to a gradual improvement in political risk, attracting foreign investors and thereby stimulating market development. Lombardo and Pagano (2000) point out that the legal and institutional environment has a significant impact on expected returns: the more stable the institutional environment, the lower the cost of capital. Our proxies for the institutional environment are a set of time varying indicators collected by the International Country Risk Guide (ICRG), namely political risk, risk of expropriation and contract repudiation, the quality of bureaucracy, the rule of law, corruption, and ethnic tensions. These indicators are contained in the IRIS Dataset and are available for the 1985-1997 period only.

Capital market integration. We include a dummy EU92 that is equal to one for 1992 and later years for the European Union countries. This dummy is expected to capture the effect of European capital market integration that picked up substantially after the conclusion of the Maastricht treaty. Due to increased competition in the financial services industry, in the last decade EU countries began to modernize their financial institutions and regulatory practices. In several countries, the trading system in the stock exchange has been drastically reformed,[13] a development that is likely to affect liquidity. This phenomenon is at the core of the theoretical analysis in Biais (1993), where competition among stock exchange intermediaries improves liquidity. As the number of dealers increases, the premium charged to liquidity traders falls because dealers attempt to undercut each other's prices. We also construct a dummy variable for 1996 and subsequent years, to capture the possible acceleration in European stock market integration triggered by the implementation of the first Investment Services Directive. Under the new rules, financial intermediaries in a certain member country could directly conclude transactions in another member country, without opening a local brokerage branch.

We also control for the impact of financial liberalization through a measure of openness to trade, given by the sum of export and imports relative to GDP of the particular country. The correlation between trade and capital flows induced by liberalization has been widely documented in the literature (see Bekaert, Harvey, and Lundblad, 2001).

[13] For a good overview of these developments see Demarchi and Foucault (1998).

Last but not least, the official launch of the Euro may have reduced the currency premium, thus increasing the liquidity of EMU stock markets. Even if the currency risk of the original constituent currencies were priced properly, as argued by Dumas and Solnik (1995) and Allayannis and Ihrig (2001), the elimination of such risks in 1999 through a single currency may have reduced the risk premium component of the price impact. We thus include a dummy variable (EURO) which equals 1 from 1999 on, in order to test whether there is an independent effect associated with the introduction of a single European currency.

Insider trading. Illiquidity increases with the likelihood of information trading (Glosten and Milgrom, 1985; Kyle, 1985) initiated both by analysts and insiders. Enforcement of insider trading regulation may reduce the adverse selection premium and thus increase liquidity provided that the information produced by analysts is not a substitute of the insiders' foreknowledge. This hypothesis is supported by Bhattacharya and Daouk (2002), showing that turnover significantly increases after the first prosecution for insider trading in a large panel of countries. We use the indicator for the enforcement of insider trading regulations in Bhattacharya and Daouk (2002) as a control variable (INSIDER). The dummy takes the value one starting from the year of the first prosecution for insider trading.

4.1 Endogeneity

Consistent estimates for equation (1) can be obtained under the assumption that the explanatory variables $PRIVA_{it}$ and x_{it} are uncorrelated with the error terms, $\boldsymbol{u}_{it}$. The condition implies that $E[PRIVA_{it}\boldsymbol{u}_{it}]=0$. In our basic model however this condition may not hold: the privatization variables are likely to be endogenous. Governments may attempt to privatize at times when stock prices are high. To the extent that "hot markets" are accompanied with high trading intensity, privatization may be simultaneously determined with liquidity. In this case, consistent estimates are obtained through two stage least squares estimation (2SLS). To perform the analysis, we use a vector of exogenous instruments z_{it} for which the condition $E[z_{it}\boldsymbol{u}_{it}]=0$ holds.

The empirical literature has identified a set of valid instruments that suit our endogeneity problem. These variables are strongly correlated with SIP but are uncorrelated with market liquidity (Bortolotti et al, 2003; Bortolotti and Pinotti, 2003). They include the partisan orientation of governments, political-institutional indexes, and public finance variables. The proxy for political orientation ranges from 0 (extreme left) to 10 (extreme right

of the political spectrum). It is given by the weighted average of scores attributed in expert surveys to the parties supporting the government, as in Huber and Inglehart (1995). The weights are the number of seats obtained by each party as a percentage of the total number of seats of the ruling coalition. The political-institutional index has been developed in comparative political science and it positions countries in the majoritarian/consensual dimensions of the political spectrum (see Lijphart 1999).[14] These political indexes are based on electoral data and display variability both in time and longitudinal dimension. The public finance variables include the fiscal deficit and the debt-to-GDP ratio.

To follow the conventional 2SLS routine, we take all variables in deviation from their means to remove the fixed effects. Then we run 19 regressions (one for each country) of the endogenous privatization variables on all the instruments z_{it} and exogenous variables x_{it}, including the country and year dummies

$$PRIVA_{it} = \boldsymbol{d}_i'(z_{it}, x_{it}) + u_{it},$$

and calculate the fitted values $\hat{PRIVA}_{it}$, *i=1,…19*. Then, we run regression (1) on the fitted privatization variables,

$$y_{it} = \boldsymbol{a}_i + \boldsymbol{a}_t + \boldsymbol{b}' x_{it} + \boldsymbol{g}\hat{PRIVA}_{it} + \boldsymbol{u}_{it}. \qquad (2)$$

Finally, we adjust the standard errors of regression (2) to the two-step nature of the estimation procedure (Baltagi, 2001).

All the 19 models are estimated by the Pooled Least Squares method with equal country weights. We also include country and year fixed effects. The latter control for variations that are common across countries, such as business cycles, stock market bubbles, and the reduction in trading costs due to technological developments. Standard errors are computed by the Newey-West procedure for panel data that takes into account eteroskedasticity and serial correlation.[15] In reporting the results, we use the 1% significance level, unless otherwise indicated.

[14] It is an average of three (standardized) variables measuring the disproportionality of the electoral rule, the effective number of parties, and government stability. For an more accurate description of the variables and sources see Bortolotti and Pinotti (2003).

[15] Heteroskedasticity and autocorrelation consistent standard errors are calculated using the Newey-West procedure with a window of 13 months. For an exact description of the procedure in a fixed effects panel data model, we refer to Greene (2000, p.580).

5. Empirical results

In this section, we describe our results. After presenting evidence on SIP as a determinant of aggregate market liquidity, we test for the existence of a spillover effect of privatization on the liquidity of private companies, as well.

5.1 Privatization and aggregate market liquidity

Table 3 reports our results of the second stage of the 2SLS procedure. Panel A presents regressions of illiquidity (ILLIQ) and Panel B of turnover, as the dependent variable. Each column shows one regression. To account for the possibility of multicollinearity among our privatization measures, we first assess the relevance of the different channels between privatization and liquidity in stand-alone specifications. In both Panels, each of the first six regressions includes one privatization indicator in isolation together with a number of control variables. In order to gain insights concerning the most important transmission channels, we estimate the combined effects of significant privatization variables (see regressions (7)-(10) in Panel A and in regression (7) in Panel B). These estimations confirm the existence of multicollinearity and thus the adequacy of stand-alone specifications.

The PRIVA variables estimate the *direct* incremental effect of privatization on market liquidity above the indirect effect of the increase in the number of listed firms, which is captured by the variable NUMFIRMS. Our most important finding is that SIPs have a statistically significant direct impact on market liquidity besides the indirect effect associated with an increase in the number of listed firms. In particular, the coefficients of PRIVAFLOAT, PRIVABROAD, and PRIVANYSE are statistically significant in the estimations of ILLIQ. SIPs associated with cross-listings display the strongest effect: PRIVABROAD and PRIVANYSE remain highly significant also in the turnover regressions.

The negative (positive) sign of the coefficient of PRIVABROAD in the ILLIQ (turnover) regression supports H3: foreign investor participation in the market decreases the risk borne by domestic investors and thereby increases liquidity. The effect of listings at the New York Stock Exchange also seems to be very strong. Recall that PRIVANYSE involves a subset of the privatized companies included in PRIVABROAD, with shares cross-listed at NYSE, and it allows to isolate the effect of enhanced protection of minority shareholders, stricter listing standards, and improved disclosure rules. The negative (positive) sign of its

coefficient in the ILLIQ (turnover) regression is consistent with H5: improved standards for corporate governance increase market liquidity.

The effect of cross-listings may be due either to the international profile of SIP programs or to the fact that these programs simply increase the number of firms listed in the domestic market. In order to identify the real transmission channel, we run a regression with PRIVADOM that refers to privatization shares listed only in domestic markets. Regression (4) (in both Panel A and B) confirms the relevance of international listings for domestic liquidity.

The ILLIQ measure turns out to be significantly negatively correlated with the free float of privatized companies (PRIVAFLOAT). This indicates that a privatization program aimed at the participation of retail investors – through both IPOs and seasoned offerings - appears to be a successful policy in boosting stock market liquidity. However, Panel B shows that retail investors' participation does not enhance trading intensity: the coefficient of PRIVAFLOAT in the turnover regression is not statistically different from zero.

The number of privatized firms (PRIVANUM) captures the effect of privatization IPOs. Changes in the number of IPOs affect neither turnover nor illiquidity.[16] This holds also for markets that had only a small number of listings (less than 336) in 1985 as shown by the insignificance of the coefficient estimate of PRIVATRAP.

Overall, the results in Table 3 do not reject H2, H3, and H5. In order to identify the dominating transmission channel between SIP and liquidity, we first compare t-statistics, goodness-of-fit measures, and the effects of changes in the standard deviation of the privatization variables on liquidity. These criteria suggest that the effect of cross-listings dominates the effect arising from increased participation of retail investors. We then consider combinations of the statistically significant privatization indicators in regressions (7), (8), (9) in Panel A and in regression (7) in Panel B.[17] The instability of the estimates and the negligible gain in the goodness of fit indicate the presence of multi-collinearity. With this caveat, the results confirm that SIP programs with cross-listings have the strongest effect on market liquidity and turnover.

Our results indicate that privatization leads to economically significant improvements in market liquidity. To assess the size of this effect, we analyse the impact of a one standard deviation change in the variables PRIVAFLOAT, PRIVABROAD, and PRIVANYSE on

[16] A similar result obtains when the number of listed companies is replaced by market capitalization as a proxy for market size in the regressions.
[17] Other combinations do not carry further information and are therefore not reported.

liquidity. The standard deviation change that we use for this exercise is the time series standard deviation of each variable, averaged across the 19 countries in the sample. When multiplied by the estimated coefficients of these variables, a one standard deviation increase in privatisation implies a decrease in the ILLIQ measure of 1.26, 1.90 and 2.16, respectively. Considering that the value of ILLIQ ranges from a high (averaged over all countries) of around 15 in the early years to a low of around 2 in the last years, one can draw the conclusion that the effect of an increase in SIP is economically very significant. The effect of privatization on turnover is also remarkable: a one standard deviation shock in PRIVABROAD and PRIVANYSE raises log(TURNOVER) by 15% and 23%, respectively.

Several control variables turn out to have significant impact on liquidity. The size of the equity market is an important determinant of both the ILLIQ and turnover indices (with reverse signs) when measured by the (log of the lagged) number of listed companies (NUMFIRMS). Regressions using proxies for total market capitalization give similar results. The coefficient of NUMFIRMS captures a within-country time series effect: it measures the average improvement in liquidity due to the increase in the number of listings in domestic markets. Thus, it shows the indirect impact that past privatizations have on liquidity via raising the number of listed companies.

The dummy variable for capital market integration in EU countries (EU92) and the measure of openness of the countries (TRADE) are also significantly correlated with ILLIQ and turnover suggesting that enhanced competition among financial intermediaries leads to improvements in liquidity and trading intensity. These findings are in line with Bekaert and Harvey (2000) and Henry (2000) who argue that financial liberalization leads to a lower cost of capital and may thus improve liquidity. Other measures of liberalization, such as dummy variables associated with the introduction of either the EURO (in 1999) or the First Investment Services Directive (in 1996), have no explanatory power and are not reported.

The effect of privatization on liquidity is robust to including the ICRG political risk measure in the estimation. Political risk seems to have no impact on ILLIQ. At the same time, it turns out to have a significant negative effect on turnover. Higher political risk (i.e. a lower value of the ICRG indicator) is associated with higher trading intensity, a puzzling result we leave unexplained.[18]

[18] There may be an indirect effect of privatization on liquidity via an associated reduction in political risk, as in Perotti and Laeven (2002). Thus, we compute a measure of political risk orthogonal to privatization, which is

Among the other institutional variables mentioned in Section 4, only the enforcement of insider trading rules (INSIDER) has a coefficient that significantly differs from zero. This suggests that, in line with the results in Bhattacharya and Daouk (2002), the enforcement of insider trading rules seems to foster stock market development. Other control variables – such as indicators of expropriation and repudiation risk, the quality of the bureaucracy, the rule of law, corruption, and ethnic tensions – neither affect liquidity, nor change the significance of the impact of privatization. Due to space constraints, we do not include these results in our tables.

5.2 The spillover effect of SIP programs

So far, we focused on aggregate liquidity, that is the liquidity of the market as a whole. One may argue, however, that the increase in liquidity due to privatization is simply a direct consequence of the higher liquidity of the privatized firms' shares. This may indeed be the case since large privatized firms represent attractive investment opportunities for financial institutions. But does privatization contribute to the liquidity of non-privatized firms? In other words, does a significant spillover effect of privatization on the liquidity of private companies exist - as implied by several of the theories we referred to in section 2?

We measure the liquidity of non-privatized companies using the following method. We obtain daily market value (trading volume) of non-privatized firms by subtracting the market value (trading volume) of the privatized firms from the total market value (total trading volume). This procedure is slightly inaccurate, because in our data set total market value and turnover refer to the constituents of the Datastream index, which does not always include all companies listed in the domestic market. On the other hand, privatized firms – often the largest ones with the most actively traded shares – are typically included in the index.[19] Our approach will thus 'correct too much' the total market value and may result in an underestimated value of non-privatized firms. This bias will however distort our empirical results against the hypothesis of a positive spillover effect. Taken these arguments into account, we believe that our data set is suitable for the empirical inquiry on the effect of privatization on the liquidity of non-privatized firms.

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given by the residuals of a regression of POLRISK on two privatization variables (PRIVANUM and PRIVAFLOAT). When we include this measure as an explanatory variable, we obtain very similar results.

[19] We have checked the coverage of privatized companies in the Datastream Index for a random sample of countries using the Data Appendix. On average, 98% of privatized companies are included in the market index.

Using the newly created data, we construct daily return[20] and turnover series, and calculate the average ILLIQ and turnover measures using the definitions described in Section 3. The resulting variables NONPRIV_ILLIQ and NONPRIV_TURNOVER refer to the illiquidity and turnover of non-privatized firms. In Table 4, we present estimations, based on the same explanatory variables as regressions in Table 3, of NONPRIV_ILLIQ (Panel A) and NONPRIV_TURNOVER (Panel B), as dependent variables.

The results in Table 4 show that privatization does generate cross-asset externalities. Strong significance of the variables PRIVABROAD and PRIVANYSE in Panel A refers to the existence of a positive spillover effect of privatization issues with international cross-listings on the liquidity of non-privatized shares. This positive impact on liquidity can be attributed to improved risk sharing and investor recognition, as envisaged in H3. It is therefore not consistent with H4 and thus with the claim that purely domestic stocks are negatively affected by the cross-listing of privatization shares, as a result of a portfolio reallocation of institutional investors towards more liquid cross-listed securities.

In theory, stricter listing standards at the New York Stock Exchange and the consequent improvements in the protection of minority shareholders will benefit only the cross-listed companies themselves (H5). At first sight, in Panel A, we detect a possible spillover effect of NYSE listings, on top of that associated with other foreign listings. This effect is however not robust to alternative specifications.

Results in Panel B show that the turnover of non-privatized companies is stimulated by both the country's openness to trade (TRADE) and the enforcement of insider trading rules (INSIDER), while it is unaffected by the cross-listings of privatization stocks.[21] If we take into account the evidence in Table 3 concerning the positive effect on overall turnover, we can conclude that trading by active foreign investors is concentrated in cross-listed privatized companies. This is also consistent with H3: even if foreign investors trade only cross-listed securities, a positive liquidity spillover will arise because of improved risk sharing.

The spillover effect of privatization on liquidity is economically significant. A one standard deviation change in the variables PRIVAFLOAT, PRIVABROAD, and PRIVANYSE

[20] Daily return is set equal to the relative change in market value of the non-privatized firms. This excludes dividends, and includes increases in market cap due to new issues of non privatized firms. Unfortunately, we don't have a proper price index of non-privatized firms only.

[21] The unchanged turnover of domestic companies is peculiar to our sample of OECD economies. Karolyi (2004) shows that home market turnover falls in developing countries as a consequence of cross-listing at American exchanges, which is consistent with H4.

results in a decrease in the NONPRIV_ILLIQ measure of 1.12, 1.36 and 1.07, respectively. These effects are only slightly smaller that for the market as a whole, indicating that SIP accounts for an economically significant part of the change in the liquidity of private company shares. Looking at stand-alone specifications (regressions (1)-(6) in Panel A), PRIVABROAD seems to be the most significant variable in both the statistical and the economic sense. As far as turnover is considered, only PRIVANYSE has a positive spillover effect (an increase of 9% for a one standard deviation shock), although the estimated coefficient is not statistically significant.

Regressions (1) and (2) in Panel A suggest that privatization IPOs have a positive spillover effect in markets characterized by a liquidity trap (PRIVATRAP), as implied by H1. Regressions (7)-(13) reflect however that the explanatory power of the estimate fades away when the variable is considered together with other privatization measures. Equation (3) indicates that SIP targeted to retail investors (PRIVAFLOAT) is also positively correlated with the liquidity of private companies in a stand-alone specification. When other privatization measures are included in the estimation, however, PRIVAFLOAT also looses its explanatory power.

PRIVABROAD is the only measure that survives the robustness check of taking into account different combinations of the privatization variables. Its coefficients remain both statistically and economically significant in all regressions. This result allows us to draw the primary conclusion of our empirical analysis: privatization with international cross-listings of shares boosts stock market liquidity.

6. Conclusion

The analysis in this paper shows that privatization enhances the liquidity of the stock market as a whole, and also the liquidity of private firms' shares. In other words, besides the obvious impact of SIP on the liquidity of privatized stocks, privatization has a positive spillover effect on the price impact of other (non-privatized) stocks. Privatization-related improvements in market liquidity are therefore not simply driven by the increased liquidity of privatized stocks, but also by the positive externality that SIP imposes on the domestic market.

Our analysis shows that the externality effect of SIP is associated to the cross-listing of privatization shares in international markets. Through privatization, governments allow for the trading of company related risk which was not tradable before. Through cross-listings, governments enhance foreign investors' recognition and participation in domestic assets, which is reflected in higher overall liquidity and turnover in domestic markets. Increased participation of international investors lowers the overall risk borne by domestic investors: it reduces the risk premium required for holding purely domestic securities thereby increasing their liquidity.

Retail investors' participation in privatization also turns out to be an important element in boosting market liquidity: retail investors increase uninformed trading, thereby reducing the adverse selection component of the price impact. The effect of cross listings however seems to be both economically and statistically more significant.

Although consistent with the theory, the positive effect of cross-listings on the liquidity of private companies is new in the empirical literature. Indeed, the listings of shares issued in developing countries at American exchanges have a significant *negative* spillover effect on several indicators of domestic market development (Karolyi, 2004). Our focus - on developed rather than developing countries - is likely to be the source of this difference. But we leave the investigation of this issue for further work.

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Table 1. End of Period Values of Privatization Measures

This table includes the end of period (31/12/2000) number of share issue privatizations (SIP), the number of privatized firms as a percentage of the total number of firms quoted on the market, the market capitalization of privatized companies as a percentage of total market capitalization, and the value of floated privatized shares as a percentage of market capitalization.

Countries	SIPs	Number of privatized firms (%)	Capitalization of privatized firms (%)	Value of float of privatized firms (%)
AUS	20	2	23	15
AUT	26	23	42	17
BEL	3	1	10	9
CAN	26	2	5	3
DEN	6	3	10	5
FIN	22	14	8	1
FRA	54	6	83	59
GER	20	2	19	7
IRE	4	4	12	7
ITA	45	15	41	21
JAP	16	1	6	3
NET	11	3	-	2
NEW	7	4	30	12
NOR	13	6	1	0
POR	39	35	45	30
SPA	24	2	54	29
SWE	10	3	10	3
SWI	3	1	2	1
UK	54	2	15	12
USA	7	0	0	0

Table 2. Descriptive Statistics of Liquidity Measures

This table reports the average values of the monthly turnover ratio, given by the ratio of the value of trades to total market value, and of the variable ILLIQ, given by the monthly average of the absolute price change to the trading value.

Countries	TURNOVER 1985-1993	TURNOVER 1994-2000	ILLIQ 1985-1993	ILLIQ 1994-2000	First date used in estimation
AUS	3.51	4.16	4.03	3.04	01-01-85
AUT	3.81	4.87	3.93	2.34	01-08-86
BEL	1.25	1.80	10.26	6.30	01-01-86
CAN	3.01	4.45	3.62	2.56	01-01-85
DEN	2.00	3.04	4.70	4.07	01-10-91
FIN	1.83	3.06	12.69	9.02	01-10-93
FRA	3.61	5.15	7.51	3.04	01-07-91
GER	14.98	17.39	0.97	0.93	01-06-88
ITA	3.43	6.29	13.76	3.42	01-07-93
JAP	2.64	3.07	6.07	5.57	01-12-90
NET	6.70	9.01	1.93	1.60	01-02-86
NEW	2.35	2.60	7.45	5.41	01-01-90
NOR	3.95	5.26	7.51	2.98	01-04-88
POR	2.36	3.55	3.60	3.56	01-11-93
SPA	4.66	5.76	3.98	2.97	01-02-90
SWE	3.58	5.67	6.97	3.33	01-01-85
SWI	4.31	5.59	3.77	2.37	01-01-89
UK	4.87	5.48	2.57	2.23	01-10-86
USA	7.15	9.26	1.64	1.31	01-01-85

Table 3. Privatization and Market Liquidity: Regression Analysis (2SLS Estimates)

This table shows results of 2SLS fixed effect panel data regressions of the dependent variable (ILLIQ or turnover) on a number of explanatory variables. PRIVANUM is the ratio of the number of privatized firms to the total number of listed firms. PRIVATRAP is PRIVANUM interacted with a dummy taking the value one if the country reported in 1985 was lower than the median value, and zero otherwise. PRIVAFLOAT is the value of the free float of privatized firms scaled by total market capitalization. PRIVADOM is the sum of the capitalization of privatized companies listed only in the home market, scaled by total market capitalization. PRIVABROAD is the sum of the capitalization of privatized companies listed at home and in one or more than one foreign exchange, scaled by total market capitalization. PRIVANYSE is the sum of the capitalization of privatized companies listed at home and fully listed at New York Stock Exchange (ADR level III are also considered). NUMFIRMS is the (log) of the total number of listed companies, lagged one year. TRADE is the sum of export and imports, scaled by GDP. EU92 is a dummy variable taking the value 1 from 1-1-1992 onwards, and zero otherwise, for EU countries. POLRISK is the International Country Risk Guide political risk measure. INSIDER is a dummy taking the value one starting from the date of one country's first prosecution of insider trading. Instrumental variables are the debt ratio, the deficit to GDP, the political orientation of privatizing government (PARTISAN), and a political-institutional index locating countries in the majoritarian-consensual dimension, POLINST. Year dummies are always included in the regressions without reporting estimated coefficients. Significant estimates are typed **bold**, t-statistics are in brackets.

Panel A: the Amihud illiquidity index

Dependent Variable: ILLIQ									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
PRIVATRAP	13.72								
	(-0.62)								
PRIVANUM		13.31							
		(0.81)							
PRIVAFLOAT			**-36.51**				**151.66**	14.41	
			(-3.63)				**(4.97)**	(0.91)	
PRIVADOM				1.03					
				(-0.10)					
PRIVABROAD					**-34.71**		**-127.55**		-14.26
					(-5.66)		**(-5.91)**		(-1.01)
PRIVANYSE						**-58.85**		**-69.91**	-37.4
						(-4.66)		**(-3.78)**	(-1.59)
NUMFIRMS	**-2.32**	**-2.19**	**-1.86**	**-2.18**	**-3.57**	**-2.41**	**-8.64**	**-2.57**	**-2.88**
	(-3.88)	**(-4.21)**	**(-1.99)**	**(-3.14)**	**(-5.87)**	**(-2.66)**	**(-6.46)**	**(-2.72)**	**(-3.12)**
TRADE	-0.09	-0.09	-0.03	-0.04	-0.04	**-0.10**	**-0.11**	**-0.13**	**-0.08**
	(-2.11)	(-2.55)	(-1.11)	(-1.56)	(-1.51)	**(-4.27)**	**(-4.37)**	**(-4.54)**	**(-2.48)**
EU92	-1.48	**-1.46**	-0.01	0.72	-0.31	0.71	**-2.42**	0.62	0.31
	(-1.93)	**(-2.35)**	(-0.02)	(-1.45)	(-0.64)	(-0.93)	**(-4.19)**	(0.82)	(0.41)
POLRISK	-0.03	-0.03	-0.01	-0.01	**0.09**	**0.12**	**0.34**	**0.14**	**0.12**
	(-1.13)	(-1.18)	(-0.33)	(-0.42)	**(2.67)**	**(-2.48)**	**(4.74)**	**(2.42)**	**(2.50)**
INSIDER	**-0.99**	**-0.95**	**-1.37**	-0.85	**-1.99**	**-1.09**	**-2.47**	**-0.93**	**-1.56**
	(-2.43)	**(-2.55)**	**(-3.69)**	(-2.12)	**(-5.52)**	**(-2.99)**	**(-6.40)**	**(-2.47)**	**(-3.50)**
Nobs	2321	2321	2321	1939	2290	2321	2290	2321	2290
Adj R^2	0.570	0.570	0.574	0.524	0.578	0.58	0.585	0.58	0.579

Table 3 (continued)

Panel B: the turnover ratio

Dependent Variable: Log(TURNOVER)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PRIVATRAP	-1.09						
	(-0.33)						
PRIVANUM		-1.02					
		(-0.42)					
PRIVAFLOAT			1.50				
			(1.00)				
PRIVADOM				-2.06			
				(-1.60)			
PRIVABROAD					**2.76**		-2.53
					(3.00)		(-1.08)
PRIVANYSE						**6.33**	9.69
						(3.03)	(2.32)
NUMFIRMS	**0.34**	**0.33**	**0.32**	**0.23**	**0.44**	**0.36**	0.26
	(4.11)	**(5.05)**	**(2.95)**	**(3.08)**	**(5.05)**	**(3.35)**	(1.62)
TRADE	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.02**	**0.02**
	(2.84)	**(3.53)**	**(3.49)**	**(4.38)**	**(3.61)**	**(6.00)**	**(5.13)**
EU92	**0.27**	**0.27**	**0.20**	**0.14**	**0.19**	0.05	0.02
	(2.57)	**(3.19)**	**(2.52)**	**(2.50)**	**(2.85)**	(0.38)	(0.18)
POLRISK	-0.00	-0.00	-0.00	**-0.01**	**-0.01**	**-0.02**	**-0.02**
	(-1.58)	(-1.59)	(-1.57)	**(-2.52)**	**(-3.05)**	**(-2.76)**	**(-2.83)**
INSIDER	**0.14**	**0.13**	**0.15**	**0.21**	**0.23**	**0.15**	0.11
	(2.533)	**(2.83)**	**(3.02)**	**(4.30)**	**(4.62)**	**(3.06)**	(1.75)
Nobs	2321	2321	2321	1939	2290	2321	2290
Adj R^2	0.869	0.869	0.869	0.855	0.866	0.871	0.868

Table 4. Spillover Effects of Privatization: Regression Analysis (2SLS Estimates)

This table shows results of IV fixed effect panel data regressions of the dependent variable (NONPRIV_ILLIQ or NONPRIV_Log(TURNOVER) on a number of explanatory variables. PRIVANUM is the ratio of the number of privatized firms to the total number of listed firms. PRIVATRAP is PRIVANUM interacted with a dummy taking the value one if the country reported in 1985 was lower than the median value, and zero otherwise. PRIVAFLOAT is the value of the free float of privatized firms scaled by total market capitalization. PRIVADOM is the sum of the capitalization of privatized companies listed only in the home market, scaled by total market capitalization. PRIVABROAD is the sum of the capitalization of privatized companies listed at home and in one or more than one foreign exchange, scaled by total market capitalization. PRIVANYSE is the sum of the capitalization of privatized companies listed at home and fully listed at New York Stock Exchange (ADR level III are also considered). NUMFIRMS is the (log) of the total number of listed companies, lagged one year. TRADE is the sum of export and imports, scaled by GDP. EU92 is a dummy variable taking the value 1 from 1-1-1992 onwards, and zero otherwise, for EU countries. POLRISK is the International Country Risk Guide political risk measure. INSIDER is a dummy taking the value one starting from the date of one country's first prosecution of insider trading. Instrumental variables are the debt ratio, the deficit to GDP, the political orientation of privatizing government (PARTISAN), and a political-institutional index locating countries in the majoritarian-consensual dimension, POLINST. Year dummies are always included in the regressions without reporting estimated coefficients. Significant estimates are typed **bold**, t-statistics are in brackets.

Panel A: the Amihud illiquidity index

Dependent Variable: NONPRIV_ILLIQ															
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
PRIVATRAP	**-32.18**						39.25	19.68	20.06	39.54	28.70	-7.69			
	(-2.53)						(1.57)	(0.81)	(0.84)	(1.56)	(1.72)	(-0.47)			
PRIVANUM		-22.75													
		(-2.40)													
PRIVAFLOAT			**-32.44**				**-46.16**	20.98	**53.17**	**-46.80**			33.72	**-29.71**	
			(-4.79)				**(-3.70)**	(1.03)	**(2.32)**	**(-3.01)**			(1.88)	**(-2.97)**	
PRIVADOM				-2.17											
				(-0.26)											
PRIVABROAD					**-24.85**			**-42.18**	**-88.04**		**-30.69**		**-46.27**		**-39.75**
					(-6.71)			**(-3.62)**	**(-4.31)**		**(-5.78)**		**(-3.93)**		**(-4.43)**
PRIVANYSE						**-29.26**			**48.46**	0.77		**-27.35**		-3.94	28.53
						(-3.85)			**(2.94)**	(0.07)		**(-3.11)**		(-0.36)	(1.95)
NUMFIRMS	-0.82	**-1.14**	-0.86	-1.13	**-2.18**	-1.24	-1.15	**-3.29**	**-5.34**	-1.14	**-2.72**	-1.15	**-3.36**	-0.89	**-2.71**
	(-1.96)	**(-3.04)**	(-1.32)	(-2.14)	**(-5.88)**	(-1.95)	(-2.03)	**(-4.09)**	**(-5.71)**	(-1.99)	**(-5.44)**	(-1.85)	**(-4.01)**	(-1.36)	**(-5.09)**
TRADE	0.00	-0.01	-0.01	-0.04	-0.02	**-0.06**	-0.05	-0.05	-0.01	-0.05	-0.06	-0.05	-0.03	-0.01	0.01
	(0.03)	(-0.81)	(-0.69)	(-2.28)	(-1.46)	**(-3.89)**	(-1.74)	(-1.75)	(-0.59)	(-1.73)	(-2.28)	(-1.74)	(-2.03)	(-0.89)	(0.47)
EU92	**1.26**	**0.98**	**1.32**	0.31	**0.94**	**1.22**	0.61	0.23	-0.93	0.60	0.28	**1.38**	0.51	**1.36**	0.50
	(2.87)	**(2.71)**	**(2.93)**	(0.79)	**(3.03)**	**(2.65)**	(1.43)	(0.52)	(-1.44)	(1.29)	(0.69)	**(2.88)**	(1.13)	**(2.91)**	(1.16)
POLRISK	**-0.05**	-0.04	-0.02	-0.04	0.05	0.03	-0.01	**0.10**	**0.12**	-0.01	**0.07**	0.03	**0.11**	-0.01	0.02
	(-2.36)	(-2.21)	(-1.31)	(-1.49)	(2.16)	(1.26)	(-0.57)	**(2.65)**	**(2.69)**	(-0.42)	**(2.58)**	(0.92)	**(2.92)**	(-0.47)	(0.83)
INSIDER	0.21	0.05	**-0.57**	-0.19	**-1.00**	-0.26	**-1.12**	**-1.40**	**-2.05**	**-1.13**	**-1.43**	-0.18	**-1.16**	**-0.55**	**-1.29**
	(0.81)	(0.23)	**(-2.67)**	(-0.68)	**(-4.32)**	(-1.15)	**(-2.97)**	**(-3.60)**	**(-4.30)**	**(-2.91)**	**(-4.20)**	(-0.67)	**(-4.74)**	**(-2.66)**	**(-5.51)**
Nobs	1891	1891	1891	1860	1860	1891	1891	1860	1860	1891	1860	1891	1860	1891	1860
Adj R^2	0.551	0.551	0.556	0.545	0.552	0.554	0.556	0.553	0.555	0.556	0.553	0.554	0.553	0.556	0.553

Table 4 (continued)

Panel B: the turnover ratio

Dependent Variable: Log(NONPRIV_TURNOVER)						
	(1)	(2)	(3)	(4)	(5)	(6)
PRIVATRAP	-3.29					
	(-1.51)					
PRIVANUM		-2.47				
		(-1.52)				
PRIVAFLOAT			-1.76			
			(-1.79)			
PRIVADOM				-2.05		
				(-1.82)		
PRIVABROAD					-0.10	
					(-0.16)	
PRIVANYSE						2.42
						(1.77)
NUMFIRMS	0.03	0.00	0.01	0.03	-0.00	0.00
	(0.70)	(0.12)	(0.25)	(0.50)	(-0.11)	(0.11)
TRADE	**0.02**	**0.02**	**0.01**	**0,01**	**0,01**	**0.01**
	(5.61)	**(6.56)**	**(8.50)**	**(7.19)**	**(8.43)**	**(8.23)**
EU92	0.08	0.06	0.04	0.05	0.00	-0.07
	(1.23)	(1.11)	(1.00)	(1.23)	(0.13)	(-1.12)
POLRISK	-0,00	-0,00	-0.00	-0,00	-0.00	-0.00
	(-0.84)	(-0.72)	(-0.31)	(-1.71)	(-0.52)	(-1.99)
INSIDER	**0.17**	**0.16**	**0.11**	**0.16**	**0.15**	**0.16**
	(4.54)	**(4.75)**	**(3.56)**	**(4.23)**	**(4.28)**	**(4.74)**
Nobs	1895	1895	1895	1864	1864	1895
R^2	0,837	0,837	0,837	0,821	0,820	0,837

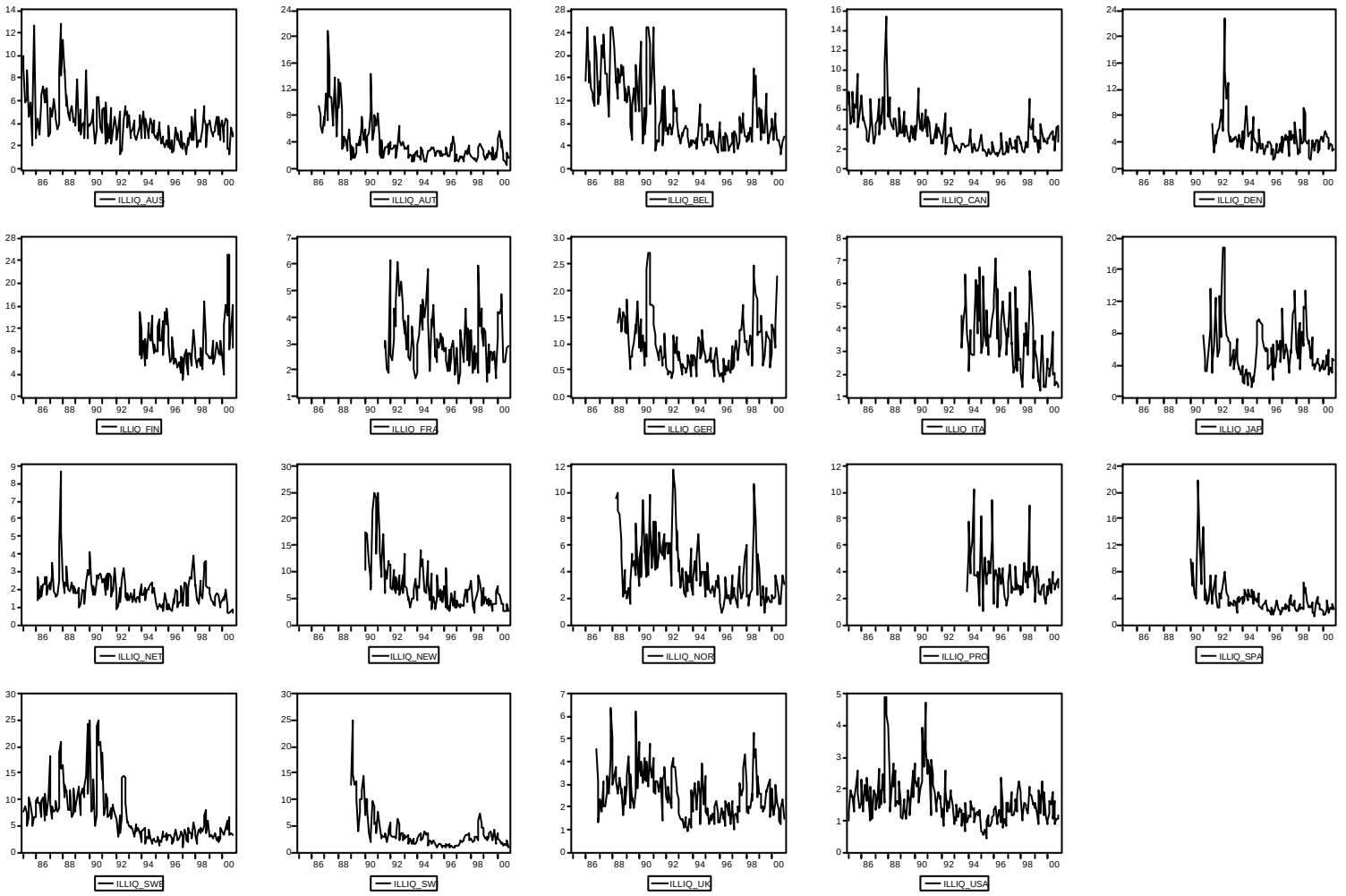


Figure 1: Time Series Graphs of ILLIQ

Figure 2. The Total Number of Privatized Companies in OECD Economies

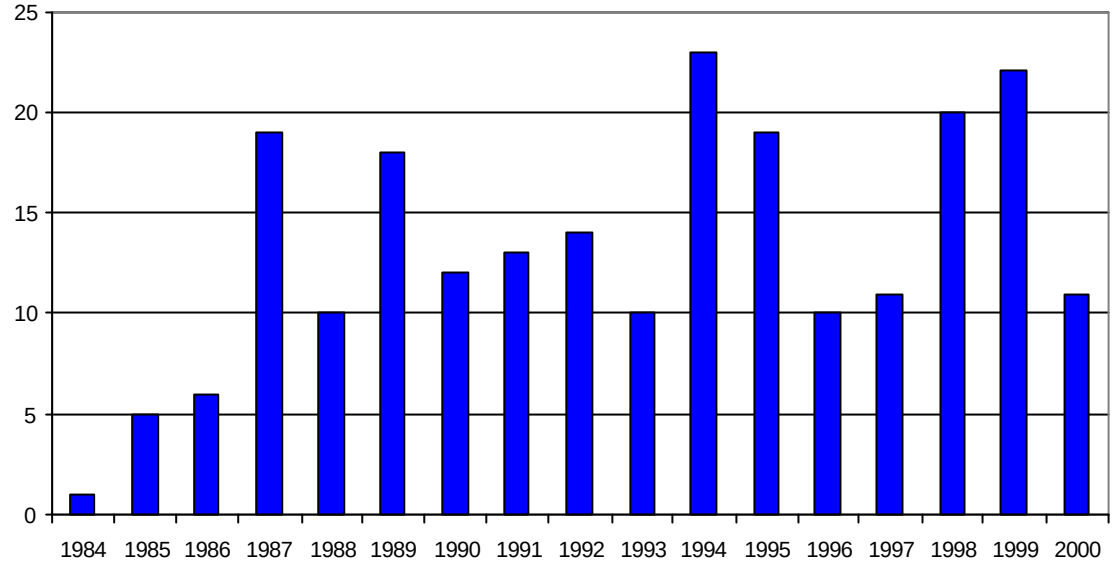
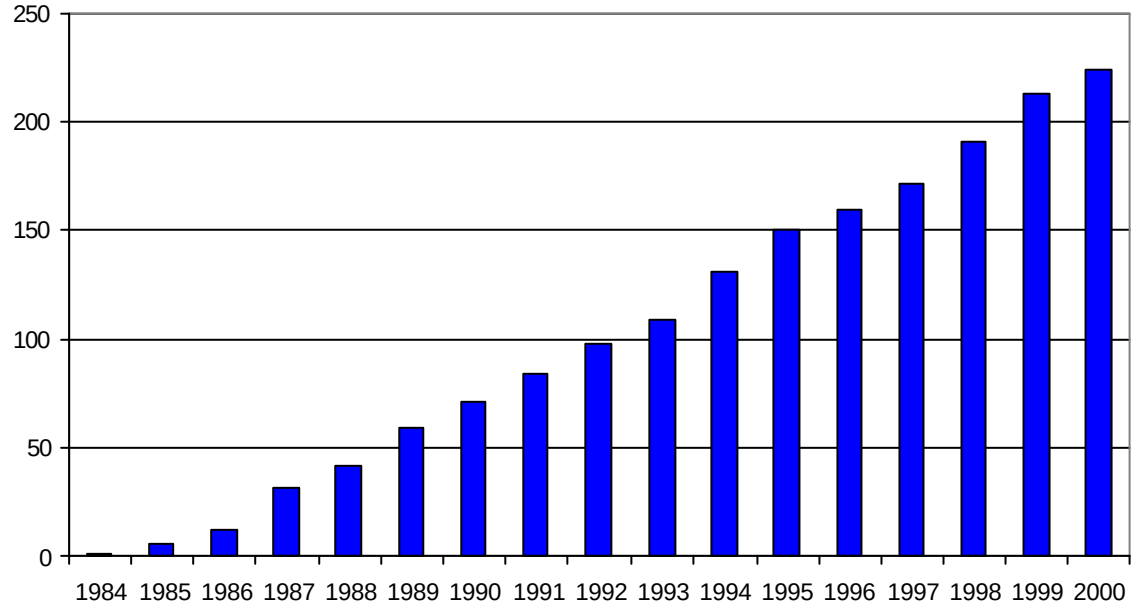


Figure 3. The Cumulative Number of Privatized Companies in OECD Economies



SOURCE: Privatisation International, IFR-Thomson