Available online at www.sciencedirect.com
SCIENCE DIRECT®
Journal of Banking & Finance 30 (2006) 157–177
Journal of BANKING & FINANCE
www.elsevier.com/locate/jbf

Issue costs in the Eurobond market: The effects of market integration

Arie Melnik [a], Doron Nissim [b,*]

[a] *Department of Economics, University of Haifa, Haifa 31905, Israel*
[b] *Graduate School of Business, Columbia University, New York, NY 10027, USA*

Received 16 February 2004; accepted 26 January 2005
Available online 18 March 2005

Abstract

This study compares the issuance costs of Eurobonds before and after the completion of the Economic and Monetary Union (EMU) in 2002. We find that the introduction of the Euro has significantly reduced the issue cost of Euro-denominated bonds compared to bonds denominated in the legacy currencies. The reduction in issue cost is not due to a decrease in underwriter compensation, but rather to the elimination of underpricing (the difference between the market price after trading commences and the offering price). Underwriter fee has declined substantially after the completion of the EMU, but this decline has been offset by an increase in underwriter spread (the difference between the offering price and the guaranteed price to the issuer), leaving total underwriter compensation unchanged. The EMU is also associated with significant reductions in bond maturity and syndicate size, consistent with its expected effects on liquidity and issue costs in the Eurobond market.

JEL classification: G15; G24; G30

Keywords: Eurobonds; Issue costs; Underwriter compensation; Underpricing; EMU

* Corresponding author. Tel.: +1 212 854 4249.
E-mail addresses: amelnik@econ.haifa.ac.il (A. Melnik), dn75@columbia.edu (D. Nissim).

0378-4266/$ - see front matter © 2005 Elsevier B.V. All rights reserved.
doi:10.1016/j.jbankfin.2005.01.005

1. Introduction

For over 40 years the US dollar has been the currency of choice for international debt contracts. On January 1, 1999, a new currency, the Euro, was created with the aim of replacing the currencies of 12 European countries. Since January 2002, the Euro is used for both retail and capital market transactions in the European Union. Although major European currencies such as the German Mark and French Franc have been used internationally in the past, neither currency approached the international use of the US dollar. With the creation of the Euro, the dollar has a potential rival for the role of the leading international currency. Extant research has examined the role of the Euro in real trade and concluded that the Euro is likely to become a major international currency and favorably impact real trade flows between European countries.[1] The implications of the new currency for debt markets, however, have not been fully explored.

The Economic and Monetary Union (EMU) in Europe is expected to reduce the issue costs of Euro-denominated bonds compared to bonds denominated in the legacy currencies for the following reasons. The creation of a uniform currency has eliminated currency risk and expanded investor base, thereby improving liquidity and lowering transaction costs. The EMU has also reduced the reliance of bond underwriters on local expertise and introduced opportunities for economies of scale in bond issuance. As a result of these changes, the effort and uncertainty associated with pricing and selling Euro/legacy-denominated bonds have declined, which is expected to lead to a reduction in bond flotation costs.

In this study, we compare the issue costs of Eurobonds before and after the completion of the EMU in 2002. We examine three components of issue costs: underwriter fee, underwriter spread (the difference between the offering price and the guaranteed price to the issuer), and underpricing (the difference between the market price after trading commences and the offering price). For the pre-EMU period, we analyze the issue costs of bonds denominated in the US dollar (USD) and in three of the major currencies that were replaced by the Euro: French Franc, Dutch Guilder and German Mark. For the EMU period, we examine the issuance costs of Euro- and USD-denominated bonds.

We find that during the pre-EMU period the issue costs of bonds denominated in the legacy currencies were larger than the issue costs of USD-denominated bonds, primarily due to differences in the extent of underpricing. USD bonds were issued in the primary market at prices close to their market values, while legacy currency bonds were issued at a discount. Total underwriter compensation was only slightly larger for the legacy currency bonds compared to USD bonds, although the average values of the two components of underwriter compensation (fee and spread) were very different for the two groups. The mean underwriter fee was almost twice as large for the legacy currency bonds compared to USD bonds, but this difference was

[1] See, for example, Portes and Rey (1998), Rose and van Wincoop (2001), Frankel and Rose (2002), and Glick and Rose (2002).

almost fully offset by an opposite difference in mean underwriter spread. That is, underwriters charged larger fees for legacy currency issues but guaranteed a considerably higher price relative to similar USD issues. Consequently, the differences in total underwriter compensation between bonds denominated in the USD and those denominated in the legacy currencies were small.

Our analysis of the EMU period reveals that the differences in issue costs between the USD bonds and European currency bonds have largely disappeared. Specifically, like USD bonds, Euro-denominated bonds are not underpriced. In addition, the differences in the components of underwriter compensation (fee and spread) between the two groups are much smaller compared to the pre-EMU period. Finally, the issue characteristics of Euro-denominated bonds (e.g., maturity, syndicate size) are similar to those of USD bonds. All these changes are consistent with the expected effects of the EMU.

Interestingly, we find little differences in total underwriter compensation across currency denomination and over time. Underwriter fees vary substantially over our sample period and across currency denomination, but this variation is generally offset by opposite differences in underwriter spread. Focusing on underwriter fee, Santos and Tsatsaronis (2003) conclude that the EMU resulted in a substantial reduction in underwriter compensation. We demonstrate that the reduction in underwriter fee was offset by a similar increase in underwriter spread, leaving total underwriter compensation unchanged. The EMU did cause a reduction in bond issue cost, but this reduction was due to the elimination of underpricing rather than to a decrease in underwriter compensation.

The paper proceeds as follows. In the next section, we describe the institutional features of the Eurobond market and briefly survey some recent developments. In Section 3, we discuss potential implications of the EMU for the issue costs of Eurobonds. Section 4 describes the data and defines the main variables of the analysis, and Section 5 provides descriptive statistics for the pre-EMU and EMU samples. In Section 6 we present the results of multivariate analyses, and we conclude in Section 7.

2. The Eurobond market

A Eurobond is a debt instrument issued simultaneously to investors in a number of countries, outside the jurisdiction of any single country. Originally, the main borrowers in the Eurobond market were international agencies, sovereign governments of developed countries and major banks. After the mid-1980s, high quality corporate borrowers also entered the market. In the mid-1990s, corporate borrowers became dominant. Most corporate Eurobonds are issued by firms from the financial services sector. Other important corporate participants, on the supply side, are industrial conglomerates, utilities, and firms from diverse sectors such as food, chemicals and communication equipments. Most of the bonds are issued by entities from highly developed countries such as the US, UK and Netherlands, and about 10% are issued by international agencies such as the European Investment Bank and

the International Bank for Reconstruction and Development.[2] The Eurobond market grew rapidly during the 1990s. For example, Claes et al. (2002) report that 3716 issues with total face value of 857.3 billion USD were sold in the primary market during 1999, compared to 1206 issues totaling 169.7 billion USD nine years earlier.

In general, the credit quality of Eurobonds is very high, as most Eurobonds are rated in the AAA to A range. Only about 5% of the issues receive BBB ratings at the time of issue, and few issues are ranked BB or below. During the 1980s, bonds with initial maturity between 5 and 10 years accounted for more than 50% of the total face value, while issues with maturities between one to five years (over 10 years) constituted about 15% (35%). In the 1990s, the 5–10-year category has declined to about 40%, and the 1–5-year category has increased to 30%. Eurobonds are primarily fixed coupon bonds (71%). The remaining bonds are floating rate notes (20%), zero coupon bonds (5%), or equity-linked bonds (4%).

Fixed coupon Eurobonds are purchased from the issuer by syndicates of investment banks that are formed specially for underwriting purposes on a case-by-case basis. The syndicate structure is typically "flat," consisting of one arranging (lead) bank and several regular members.[3] Banks may operate in some syndicates as leaders and in others as regular members. Since the mid-1990s, the number of syndicate members who participate on a regular basis is about two hundred, although this number has slightly declined in recent years. The lead bank negotiates conditions with the borrower and prepares the necessary documentation.[4] It usually underwrites a significant amount of the issue, while other members of the syndicate receive the residual allocation. The members purchase the issue according to an agreed sharing formula at the underwritten (guaranteed) price, and resell their share of the issue either to "book registered" customers or to the market. Thus, syndicate members carry a standard underwriting risk; if they cannot sell the entire issue, they have to carry parts of it in their own books until the entire allocation is sold, possibly at lower prices.[5] In exchange for taking this risk and for the effort associated with selling the bonds, underwriters receive a fee and possibly a positive spread between the guaranteed and offering prices.

[2] The statistics in this section were extracted primarily from Claes et al. (2002), who provide a detailed analysis of the primary market for Eurobonds based on information about 33,024 publicly issued Eurobonds during the period 1980–2000.

[3] According to Claes et al. (2002), 17% of all Eurobonds are placed by a single bank and the rest are taken up by syndicates. Over 90% of syndicated issues are coordinated by a single leading bank. For particularly large issues (often exceeding one billion USD), two or three banks may share the book-running duties.

[4] The primary document is the "term sheet" or "information memorandum" that is circulated to potential syndicate participants. The term sheet contains a short description of the borrower and an outline of the issue (coupon, maturity, suggested yield, fees, etc.). It also contains summaries of relevant financial information, plans for the use of proceeds, and agreements to be signed.

[5] According to Melnik and Plaut (1996), riskier bond issues are dealt with by increasing the number of underwriters (each receives a smaller allocation).

3. Research issue

This study investigates the effects of the Economic and Monetary Union (EMU) in Europe on issue costs in the Eurobond market. The EMU is expected to reduce the issue costs of European currency bonds for the following reasons.[6] First, if the currency risk of the original constituent currencies was priced in the market (as argued by Dumas and Solnik, 1995; Allayannis and Ihirg, 2001; De Santis and Gerard, 1998), then the elimination of this risk by the creation of a uniform currency should lead to a lower cost of capital. The EMU also improves risk-sharing opportunities, which may further reduce the cost of capital (Bekaert and Harvey, 1995).[7] Indeed, using a multiperiod APT model, Sentana (2002) finds that the European integration of the 1990s reduced the cost of capital for European firms. The reduction in the cost of capital is expected to lower the issue cost of Eurobonds, because both underpricing and underwriter compensation typically increase with the bonds' risk.[8]

Second, the adoption of the Euro may have reduced the degree of "home bias," which influenced European investors before the integration. Home bias, or the preference of investors for financial assets with familiar characteristics, is an important factor influencing investment decisions (see Lewis, 1999, for a review). In the context of the pre-EMU European financial markets, home bias was augmented by restrictive regulations. Before the EMU, most European pension funds were constrained by regulators to invest no more than 20% of their funds in foreign currency denominated assets. With the introduction of the Euro, such restrictions were practically abolished. The reduction in the degree of home bias has expanded investor base for European currency bonds, and is therefore expected to reduce underwriter compensation and underpricing.[9]

Third, the integration of financial markets in Europe is likely to attract non-European investors to the new Euro-denominated assets. As the Euro substituted the legacy currencies, European financial markets have become more liquid and offer lower transaction costs for investors. These changes have made Euro-denominated bonds

[6] Santillan et al. (2000) discuss the expected impact of the introduction of the Euro on money and bond markets.

[7] Investment bankers often cite the reduction in price variability in the secondary market as a reason for preferring global issues over domestic offers. Price variability is driven by systematic as well as unsystematic risk. Selling debt securities to foreign investors could make them less sensitive to domestic systematic risk. On the other hand, it may increase the issuer's exposure to foreign market shocks (e.g. large changes in foreign interest rates).

[8] The uncertainty associated with the market value of bonds increases with their risk. High uncertainty implies greater effort in estimating the value of the bonds and higher underwriting risk, both leading to larger underwriter compensation. High uncertainty also implies a greater probability of insufficient demand, which could induce underwriters to underprice the issue.

[9] According to Hartmann et al. (2003), the introduction of the Euro has created a more homogeneous market and as a result expanded the demand for Euro denominated bonds.

more attractive for non-European investors who would like to diversify their portfolios.[10] Consequently, the effort and risk associated with selling Euro-denominated bonds (compared to bonds denominated in legacy currencies) have declined, which is expected to lead to lower underwriter compensation and smaller underpricing.

Fourth, before the introduction of the Euro, issuers of bonds denominated in a legacy currency had to select a syndicate with sales expertise in that currency. Thus, underwriting syndicates frequently included local banks to enhance the marketability of the bonds, which may have increased the issuance costs. The introduction of the Euro reduced the reliance on local expertise and therefore may have reduced the issue cost of Euro-denominated bonds.

Fifth, by creating a uniform currency, the EMU allows issuers to consolidate issues that otherwise would have been denominated in different currencies. To the extent that economies of scale exist in the underwriting industry (Altinkilic and Hansen, 2000), this effect should also lead to lower issue costs.

Consistent with these hypothesized effects, Santos and Tsatsaronis (2003) find that the introduction of the Euro caused a significant reduction in bond underwriting fees. We examine two additional components of issue costs: underwriter spread (the difference between the offering price and the guaranteed price to the issuer), and underpricing (the difference between the market price and the offering price) and, as discussed below, find interesting interactions among the three cost components. We next discuss the measurement of cost components.

4. Data

4.1. Components of issue costs

In the process of issuing fixed-coupon Eurobonds, there are three prices that merit attention: First, the syndicate guarantees a given price to the issuer. This guaranteed price (P_G) represents the gross proceeds to the issuer (i.e., before deducting the fee). The second price, which is determined by the syndicate several days later, is the offering price (P_O). At this price the underwriters are usually able to sell the entire issue. The third price is the market price after trading commences (P_M), which is measured here as the median price of the first five transactions executed after trading commences. Using these three prices and the underwriter fee (FEE), we calculate the total issue cost and its components as follows.[11]

Measured relative to the market value of the bonds, the total cost to the issuer (i.e., the percentage of the bonds' value that the issuer loses) is

[10] The importance of broad and liquid secondary market is discussed in Johnson (1994) and Kool (2000). According to McCauley (1997) and Hartmann (1998), the preference of issuers for USD denominated bonds in the pre-EMU era was due to the lower transaction cost and greater liquidity of these instruments. Bekaert et al. (2002) provide evidence on the economic effects of integration on emerging equity markets.

[11] The issuer has to bear some additional indirect costs such as accounting, legal and printing, which we do not consider due to data unavailability.

$$\begin{aligned}\text{COST} &= \frac{\text{FEE} + P_M - P_G}{P_M} = \frac{\text{FEE}}{P_M} + \frac{P_M - P_O}{P_M} + \frac{P_O - P_G}{P_M} \\ &= \text{RFEE} + \text{UNDERPR} + \text{SPREAD}.\end{aligned}$$

RFEE denotes the relative fee. UNDERPR represents the implicit cost associated with underpricing, that is, the loss to the underwriter (and indirectly to the issuer) that results when the underwriter sells the bonds below their market value. SPREAD reflects the difference between the offer price to the public and the amount the underwriter passes on to the issuer, and therefore represents an indirect payment to the underwriter. Unlike the fee, however, the spread may be negative. Total underwriter compensation (COMP) is

$$\text{COMP} = \frac{\text{FEE}}{P_M} + \frac{P_O - P_G}{P_M} = \text{RFEE} + \text{SPREAD}.$$

We examine the effects of the EMU on each of these cost components.

4.2. Sample

In the years preceding the completion of the EMU, the world economy and international financial markets were influenced by several important trends and episodes besides the introduction of the Euro (e.g., globalization of product and financial markets, financial crises in credit and stock markets of several developing economies), which may have affected bond issue costs. Since we are interested in identifying the effects of the EMU, it is important to control for such global effects. Thus, in addition to comparing the issue costs of Euro-denominated bonds with bonds denominated in legacy currencies, we benchmark both types of bonds against contemporaneous USD-denominated bonds. To the extent that global trends in the financial markets affected the issue cost of USD-denominated bonds similarly to legacy/Euro-denominated issues, changes in the relative magnitudes of issue costs of legacy/Euro bonds compared to contemporaneous USD bonds should be due to the EMU.

We accordingly construct two samples: pre-EMU and EMU. The pre-EMU sample includes bonds denominated in the USD and in three of the main legacy currencies that became part of the Euro: German Mark (GM), French Franc (FF) and Dutch Guilder (DG). These currencies are the three most important constituents of the European Currency Union by weight.[12] The EMU sample includes USD- and Euro-denominated bonds. The pre-EMU sample covers the period from September 1996 to October 1997, which preceded the market integration process mandated by the Maastricht Treaty, while the EMU sample covers the 10 months immediately after the completion of the EMU (January–October 2002).

[12] The designated weights of the European Currency Union basket were 31.9% for the German Mark, 20.3% for the French Franc, 12.5% for the British Pound, and 9.9% for the Dutch Guilder. However, the British Pound was not merged into the new currency.

As discussed in Section 2, most Eurobonds are straight fixed-coupon bonds (approximately 70%), some are floating rate notes (FRNs, about 20%), and the rest are either zero-coupon or equity-linked bonds. We focus in this study on straight fixed-coupon bonds primarily because these bonds are purchased by the underwriters while most FRNs are sold on a best-effort basis. That is, underwriters do not incur the traditional underwriting risk when selling FRNs, and accordingly the compensation structure for these issues is different from that of fixed-coupon bonds. In particular, underwriter spread (a primary variable in our analysis, defined in Section 4.1) does not exist for most FRNs. Further, since they do not bear underwriting risk when selling FRNs, underwriters may be less likely to underprice these issues.

For the pre-EMU period, we sample 316 issues, which represent approximately 20% of all fixed-coupon issues during the sample period. The currency denominations of these bonds are 201 USD, 68 GM, 23 FF, and 24 DG. For the EMU period, we sampled 83 USD-denominated bonds and 115 Euro-denominated bonds, representing approximately 15% of all relevant issues. All issues were internationally underwritten and placed by syndicates whose members are primarily large international financial institutions.[13]

For each issue, we collect the price and fee information described above as well as the following data: the issue amount (AMOUNT, measured as the total nominal face value and expressed in millions of USD), years to maturity (MATUR), credit rating, and number of syndicate members (UNDERWR). Using the credit rating information, we construct a credit quality indicator (DQ), which takes values between one (lowest quality) and five (highest quality).[14] None of the results reported below are sensitive to measuring AMOUNT, MATUR and UNDERWR in logarithm form, or to the use of individual dummy variables for the different credit ratings instead of the multinomial DQ variable.

[13] The data set was provided by a major investment bank out of a list of "participation offers."

[14] The corporate bonds rating are by S&P and Moody's (in the few cases where the ratings were not identical, we follow Jewell and Livingston (1998) and average them). The top rank is assigned to AAA or Aaa (DQ = 5). The second group includes the group of AA+ and AA or Aa1 and Aa2 (DQ = 4). The third group includes the rating AA− and A+ or Aa3 and A1 (DQ = 3). The fourth rank includes the group of A and A− or A2 and A3 (DQ = 2). The final group covers the BBB range or the corresponding Baa (DQ = 1). In a similar vein, we rank sovereign debt, most of which is issued by governments of stable western countries. Government of countries such as France, Germany, UK, USA and a handful of others routinely receive the highest rank by all rating firms. In our sample, the sovereign debt of such countries receives the top rank (DQ = 5). Debt issues of other countries are assigned rankings of 4, 3, and 2 depending on the relevant group. The ranking is based on the average score assigned by three rating organizations, which generally view "country risk" as being composed of three primary components: political risk, economic risk and financial risk. A lucid explanation of how sovereign risk ranking is constructed is contained in Erb et al. (1996).

5. Descriptive statistics

5.1. Before the EMU

We start by examining the pre-EMU period. Table 1 presents summary statistics by currency denomination for the issue costs variables (total cost, underpricing, total underwriter compensation, underwriter fee, and underwriter spread) and issue characteristics (maturity, amount, number of underwriters, and debt quality). For each variable, we report the mean, median and standard deviation. For the DG, GM and FF bonds, we also report for each variable the t-statistic associated with the difference between the mean value of the variable for that currency and the value for the USD bonds ($t(\Delta)$).

The average issue costs of USD bonds are only about 0.32% of the bonds' market value. For the GM and FF bonds, the costs are 0.56% on average, significantly larger than for USD bonds. For the DG bonds, the issue costs are 0.42%, slightly and insignificantly larger than for USD bonds.[15] The average issue costs across all the legacy currency bonds is 0.53%, which is about two-third larger than the average issue costs for USD bonds (t-statistic for the difference is 2.92). Thus, issue costs of bonds denominated in the legacy currencies are both economically and statistically larger than the issue cost of USD bonds.

The differences in total issue costs between the legacy currency bonds and USD bonds are not due to differences in total underwriter compensation, as indicated by the insignificant $t(\Delta)$ values of COMP for the DG, GM and FF bonds. Rather, they are due to differences in underpricing: During the pre-EMU period, USD bonds were sold in the primary market at prices close to their market values (the mean value of UNDERPR for USD bonds is an insignificant −0.02%), while the legacy currency bonds were sold at statistically significant discounts, ranging from 0.11% (GM bonds) to 0.16% (DG bonds).

Interestingly, the average values of the components of total underwriter compensation for the legacy currency bonds and USD bonds are very different. The mean fees for the legacy currency bonds are considerably larger than for USD issues, while the spreads are smaller by a similar magnitude. Consequently, the differences in total underwriter compensation between the legacy currency bonds and USD bonds are substantially smaller than the corresponding differences in underwriter fee. For both groups of bonds, however, the mean fee is large while the spread is negative (that is, the price guaranteed to the issuer is set above the offering price). We return to this issue in Section 6.

The mean size of USD-denominated issues is 345 million, which is larger than the mean size of GM (316 million) and DG bonds (244 million), but is similar to the size

[15] These figures may be compared with domestic costs of large debt floatation. For example, Lee et al. (1996) report that the cost of selling large issues of straight bonds is 0.64%. The larger scale and high credit quality in the international bond market may explain the smaller issue costs for our sample. Evidence on the effects of scale and credit rating on issue costs is provided by many studies, including Livingston and Miller (2000), Altinkilic and Hansen (2000), Cantor and Packer (1995) and Livingston et al. (1995).

Table 1
Descriptive statistics for the pre-EMU sample

	US dollar ($N = 201$)			Dutch Guilder ($N = 24$)				German Mark ($N = 68$)				French Franc ($N = 23$)			
	Mean	Median	StD	Mean	Median	StD	$t(\Delta)$	Mean	Median	StD	$t(\Delta)$	Mean	Median	StD	$t(\Delta)$
COST	0.32	0.29	0.57	0.42	0.41	0.59	0.79	0.56	0.36	0.71	2.53	0.56	0.57	0.48	2.23
UNDERPR	−0.02	0.01	0.34	0.16	0.19	0.39	2.16	0.11	−0.02	0.58	1.75	0.15	0.12	0.43	1.83
COMP	0.34	0.25	0.44	0.26	0.25	0.51	−0.74	0.44	0.33	0.50	1.47	0.41	0.35	0.29	1.03
RFEE	1.03	1.00	0.50	1.67	1.88	0.47	6.26	1.98	2.07	0.66	10.86	1.67	1.88	0.65	4.57
SPREAD	−0.69	−0.62	0.62	−1.41	−1.58	0.51	−6.38	−1.54	−1.75	0.70	−8.90	−1.26	−1.55	0.72	−3.65
MATUR	4.83	4.00	3.51	7.88	8.00	3.18	4.39	7.31	6.00	4.20	4.38	9.22	10.00	3.01	6.51
AMOUNT	345	250	306	244	168	166	−2.51	316	199	284	−0.71	344	291	178	−0.02
UNDERWR[a]	25.1	22.0	11.7	26.1	22.5	12.9	0.32	27.8	28.0	11.6	1.54	32.5	34.0	11.3	2.56
DQ	3.58	4.00	0.89	3.71	4.00	0.69	0.84	3.57	4.00	1.03	−0.07	3.61	4.00	0.84	0.16

StD is the standard deviation. $t(\Delta)$ is the t-statistic associated with the difference in the mean value of each variable between the European currency bonds and the USD bonds. The issue cost variables are measured relative to the market value of the issue after trading commences and are expressed in percentage points. COST is total issue costs. RFEE is the underwriter fee. SPREAD is the indirect component of underwriter compensation, that is, the difference between the offering price and the price guaranteed to the issuer. COMP is the sum of RFEE and SPREAD. UNDERPR is underpricing, that is, the difference between the market price and the offering price. MATUR is the number of years to maturity on the issue date. AMOUNT is the amount issued expressed in millions of US dollars. UNDERWR is the number of underwriters. DQ is a debt quality measure that receives values between 1 and 5, where 5 is the highest grade and 1 is the lowest grade.

[a] The number of observations for UNDERWR is 168, 18, 60 and 17, respectively.

of FF bonds (344 million). When considering all legacy currency bonds as one group, the difference in issue size relative to USD bonds is insignificant (t-statistic of −1.23). USD bonds have average maturity of less than five years, while the legacy currency bonds have average maturities ranging between 7 and 10 years. The differences in maturity between the legacy currency bonds and USD bonds are all highly significant. In addition, for the overall sample of legacy currency bonds, the average number of underwriters per issue is larger than for USD bonds (t-statistic of 2.11). The statistically significant differences in maturity and number of underwriters between the legacy currency bonds and USD bonds suggest that the former were more difficult to sell: Legacy currency bonds required a larger number of underwriters to place and had longer maturity, reducing the need to access the market frequently.

5.2. After the completion of the EMU

Table 2 provides descriptive statistics for the EMU period. Total issue costs of both USD- and Euro-denominated bonds are 0.43% on average. For the USD bonds, this figure represents an increase relative to the pre-EMU period, while for the European currency bonds it represents a decline. Unlike the legacy currency bonds in the pre-EMU period, the Euro-denominated bonds are not underpriced, which is the primary reason for the decline in the issue costs of these bonds. Total underwriter compensation for the European currency bonds has not changed substantially; it was 0.40% prior to the EMU (average across all legacy currency bonds), and it is 0.38% after the completion of the EMU. For the USD bonds, total underwriter compensation has increased by 6 basis points to 0.40% (this increase is

Table 2
Descriptive statistics for the EMU sample

	US dollar ($N = 83$)			Euro ($N = 115$)			
	Mean	Median	StD	Mean	Median	StD	$t(\Delta)$
COST	0.43	0.26	0.54	0.43	0.33	0.48	0.00
UNDERPR	0.03	−0.01	0.20	0.04	0.00	0.34	0.26
COMP	0.40	0.26	0.45	0.38	0.32	0.35	−0.34
RFEE	0.67	0.35	0.68	0.43	0.33	0.41	−2.86
SPREAD	−0.27	−0.01	0.61	−0.05	0.00	0.51	2.68
MATUR	6.00	5.00	2.54	6.37	5.00	3.65	0.84
AMOUNT	687	500	750	600	440	655	−0.85
UNDERWR	13.4	12.0	6.9	12.1	11.0	5.7	−1.48
DQ	3.52	4.00	1.16	3.40	3.00	0.93	−0.78

StD is the standard deviation. $t(\Delta)$ is the t-statistic associated with the difference in the mean value of each variable between the Euro- and USD-denominated bonds. The issue cost variables are measured relative to the market value of the issue after trading commences and are expressed in percentage points. COST is total issue costs. RFEE is the underwriter fee. SPREAD is the indirect component of underwriter compensation, that is, the difference between the offering price and the price guaranteed to the issuer. COMP is the sum of RFEE and SPREAD. UNDERPR is underpricing, that is, the difference between the market price and the offering price. MATUR is the number of years to maturity on the issue date. AMOUNT is the amount issued expressed in millions of US dollars. UNDERWR is the number of underwriters. DQ is a debt quality measure that receives values between 1 and 5, where 5 is the highest grade and 1 is the lowest grade.

statistically insignificant). Thus, both underwriter compensation and underpricing (and therefore total issue costs) are similar for Euro- and USD-denominated bonds. This evidence suggests that the EMU has reduced the issue costs of European currency bonds by reducing the extent of underpricing.

While total underwriter compensation is similar for Euro- and USD-denominated bonds, the composition of compensation is different: Underwriter fee (spread) is on average smaller (larger) for Euro-denominated bonds compared to USD bonds. This stands in sharp contrast to the pre-EMU period, when the average underwriter fee (spread) of legacy currency bonds was larger (smaller) than that of USD bonds. Thus, consistent with the evidence in Santos and Tsatsaronis (2003), we find that the introduction of the Euro resulted in a considerable decline in underwriter fees for Euro-denominated bonds. However, this decline was offset by a corresponding increase in underwriter spread, leaving total underwriting compensation unchanged. In contrast to Santos and Tsatsaronis (2003), therefore, our results do not indicate that the EMU has led to a sizeable decline in total underwriter compensation. Issue costs have indeed declined, but this was due to the elimination of underpricing rather than to a reduction in underwriter compensation. Evidently, the Euro-denominated bond market is more efficient than the market for bonds denominated in the legacy currencies, and underwriters offer newly issued bonds at prices close to market prices.

Turning to the issue characteristics, we find that the differences in characteristics between the USD- and Euro-denominated bonds in the EMU period are insignificant. In particular, the average issue size, maturity, credit quality and number of underwriters are all similar for the two groups of bonds. In the pre-EMU period, the European currency bonds had substantially longer maturity and larger number of underwriters than USD bonds. Thus, the EMU appears to have mitigated the factors causing differences in the preferred characteristics of European currency issues relative to USD bonds. The changes in the characteristics of European currency bonds (shorter maturity, smaller number of underwriters) are consistent with the hypothesis that the EMU has reduced the risk and effort associated with issuing these bonds.

6. Regression analysis

6.1. Primary results

The differences in issue costs between the European currency bonds and USD bonds documented in the previous section could be due to differences in issue characteristics. To address this possibility, we next conduct a regression analysis that allows us to control for differences in characteristics. Specifically, we regress each of the issue costs components on a qualitative variable that indicates whether the issue is denominated in a European currency (NON$ = 1) or not (NON$ = 0), controlling for three issue characteristics: time to maturity (MATUR), amount (AMOUNT), and credit quality (DQ). That is, the regression model is

$$Y = \beta_0 + \beta_1 \text{NON\$} + \beta_2 \text{MATUR} + \beta_3 \text{AMOUNT} + \beta_4 \text{DQ} + \varepsilon, \quad (1)$$

where the dependent variable Y is either total issue cost (COST), underpricing (UNDERPR), total underwriter compensation (COMP), underwriter fee (RFEE) or underwriter spread (SPREAD). Panel A of Table 3 presents the results for the pre-EMU period while Panel B gives the estimates for the EMU period. As discussed in more detail below, the regression results are generally consistent with the findings from the univariate analysis (in Section 5), indicating that the differences in issue costs between the European currency bonds and USD bonds can not be attributed to differences in issue characteristics.

Table 3
Regressions examining the determinants of issue costs by sub-periods

Dep. Var.	Intercept	NON$	MATUR	AMOUNT	DQ	R^2	N
Panel A: Pre-EMU							
COST	0.545	0.168	0.017	0.160	−0.101	0.071	316
	3.811	2.067	1.367	1.339	−2.829		
UNDERPR	−0.059	0.139	0.005	0.086	−0.005	0.039	316
	−0.540	2.470	0.547	0.786	−0.185		
COMP	0.604	0.029	0.012	0.074	−0.096	0.054	316
	5.413	0.479	1.387	1.033	−3.417		
RFEE	1.964	0.822	0.003	−0.109	−0.254	0.459	316
	13.766	12.457	0.309	−0.839	−6.939		
SPREAD	−1.361	−0.794	0.009	0.183	0.158	0.302	316
	−8.122	−9.479	0.771	1.245	3.736		
Panel B: EMU							
COST	0.912	−0.022	0.002	−0.054	−0.130	0.089	198
	3.609	−0.311	0.164	−1.958	−2.581		
UNDERPR	−0.013	0.014	0.004	−0.020	0.007	0.005	198
	−0.166	0.374	0.537	−1.292	0.428		
COMP	0.924	−0.036	−0.002	−0.034	−0.138	0.147	198
	4.622	−0.662	−0.338	−1.516	−3.409		
RFEE	1.086	−0.253	−0.014	−0.118	−0.070	0.102	198
	5.188	−3.103	−1.622	−2.736	−1.517		
SPREAD	−0.162	0.217	0.012	0.084	−0.068	0.062	198
	−1.250	2.704	1.422	2.137	−2.018		

The table reports estimates from the following regression model:

$$Y = \beta_0 + \beta_1 \text{NON\$} + \beta_2 \text{MATUR} + \beta_3 \text{AMOUNT} + \beta_4 \text{DQ} + \varepsilon,$$

where Y represents the various issue costs variables. Heteroscedasticity consistent (White, 1980) t-statistics are reported below the coefficient estimates. The issue cost variables are measured relative to the market value of the issue after trading commences and are expressed in percentage points. COST is total issue costs. RFEE is the underwriter fee. SPREAD is the indirect component of underwriter compensation, that is, the difference between the offering price and the price guaranteed to the issuer. COMP is the sum of RFEE and SPREAD. UNDERPR is underpricing, that is, the difference between the market price and the offering price. NON$ is a qualitative variable that equals one for issues denominated in a European currency (that is, a legacy currency for the pre-EMU period, or the Euro for the EMU period). MATUR is the number of years to maturity on the issue date. AMOUNT is the amount issued expressed in billions of US dollars. DQ is a debt quality measure that receives values between 1 and 5, where 5 is the highest grade and 1 is the lowest grade.

For the pre-EMU period (Panel A), total issue cost of bonds denominated in legacy currencies are 0.168% larger than for USD-denominated bonds with similar characteristics, as measured by the coefficient of NON$. Given that the mean issue costs of USD bonds for the pre-EMU period is 0.32%, the incremental cost associated with issuing bonds denominated in a legacy currency was clearly substantial. The results of the underpricing regression indicate that this issue cost differential is due primarily to underpricing: The coefficient of NON$ in the underpricing regression is positive and significant, and its magnitude is only slightly smaller than in the total cost regression. The third regression indicates that total underwriter compensation (COMP) is insignificantly related to currency denomination. In contrast, the two compensation components are strongly related to currency denominations; compared with USD bonds, the fee for legacy currency bonds is considerably larger and the spread is smaller, even after controlling for issue characteristics.

The results for the EMU period (Panel B) indicate that the issue costs of USD- and Euro-denominated bonds are generally similar, as the NON$ indicator variable is insignificant in the total issue cost, underpricing, and total compensation regressions. The compensation component regressions, however, reveal that underwriter fee (spread) is smaller (larger) for Euro-denominated issues compared to USD-denominated bonds. This result stands in sharp contrast to the pre-EMU period, when the fee for legacy currency bonds was substantially larger than for USD bonds and the spread was smaller.

6.2. Trade-off between components of underwriter compensation

Melnik and Nissim (2003) document a strong trade-off between the fee and spread components of underwriter compensation for USD-denominated Eurobonds. They further show that this fee-spread structure is due to income tax minimization by issuers and strategic behavior by underwriters.[16] To examine whether this trade-off also holds for European currency bonds, we re-run the spread regression including underwriter fee as an additional explanatory variable:

$$\mathrm{SPREAD} = \beta_0 + \beta_1 \mathrm{NON\$} + \beta_2 \mathrm{MATUR} + \beta_3 \mathrm{AMOUNT} + \beta_4 \mathrm{DQ} + \beta_5 \mathrm{RFEE} + \varepsilon. \quad (2)$$

To the extent that underwrites or issuers prefer a particular form of underwriter compensation, the fee, which is determined before the spread, may help to predict the spread.

[16] Borrowers may postpone tax payments by minimizing spreads and increasing fees. They may therefore offer to pay higher up-front fees (which are tax-deductible faster than the spread) in return for a significant reduction in spreads. Underwriters may agree to this structure because their tax obligations are not sensitive to the fee/spread combination. In addition to the tax benefits for issuers, the trade-off between the fee and spread may be due to a two tier-pricing mechanism that underwriters use to separate borrowers based on the expected total amount of borrowing. Melnik and Nissim (2003) provide evidence consistent with both hypotheses.

Table 4
Regressions examining the trade-off between underwriter fee and spread

Sample	Intercept	NON$	MATUR	AMOUNT	DQ	RFEE	R^2	N
Panel A: Pre-EMU								
USD	0.094		0.039	−0.043	−0.012	−0.886	0.555	201
	0.608		5.808	−0.608	−0.374	−12.054		
Legacy	0.765		−0.016	0.023	−0.130	−0.880	0.589	115
	2.717		−1.386	0.183	−2.433	−11.690		
Pooled	0.359	−0.074	0.011	0.088	−0.064	−0.875	0.656	316
	2.777	−0.944	1.347	1.199	−2.192	−16.804		
Panel B: EMU								
USD	0.828		−0.002	0.026	−0.174	−0.737	0.684	83
	4.299		−0.139	0.759	−3.652	−6.636		
Euro	0.602		0.003	−0.033	−0.069	−0.951	0.566	115
	5.014		0.388	−0.924	−2.277	−12.196		
Pooled	0.717	0.012	0.000	−0.011	−0.124	−0.809	0.620	198
	5.985	0.285	0.049	−0.510	−3.975	−8.971		

The table reports estimates from the following regression model:

$$\text{SPREAD} = \beta_0 + \beta_1 \text{NON\$} + \beta_2 \text{MATUR} + \beta_3 \text{AMOUNT} + \beta_4 \text{DQ} + \beta_5 \text{RFEE} + \varepsilon.$$

Heteroscedasticity consistent (White, 1980) t-statistics are reported below the coefficient estimates. The issue cost variables are measured relative to the market value of the issue after trading commences and are expressed in percentage points. SPREAD (the dependent variable) is the indirect component of the underwriter compensation, that is, the difference between the offering price and the price guaranteed to the issuer. RFEE is the underwriter fee. NON$ is a qualitative variable that equals one for issues denominated in a European currency (that is, a legacy currency for the pre-EMU period, or the Euro for the EMU period). MATUR is the number of years to maturity on the issue date. AMOUNT is the amount issued expressed in billions of US dollars. DQ is a debt quality measure that receives values between 1 and 5, where 5 is the highest grade and 1 is the lowest grade.

Table 4 presents the estimation results for the pre-EMU (Panel A) and EMU (Panel B) periods, for three regressions each period: USD-denominated bonds, Legacy/Euro-denominated bonds, and all issues (including the NON$ indicator to capture the average difference between the two groups). In each of the six regressions, the coefficient on RFEE is negative and highly significant, suggesting that underwriters set the fee and the guaranteed price (which determines the spread) strategically, so that one component offsets the other. The magnitude of the fee coefficient is similar across all regressions, and the coefficient on NON$ is insignificant in both periods. These results suggest that the cross-sectional trade-off between the fee and spread is not affected by currency denomination and has not changed over time.

6.3. Pooled regressions

Next we re-run the regressions of Tables 3 and 4 using all observations (from both periods) and including qualitative variables to capture the average effects of (1) the time period (EMU, equal to one for the EMU period and zero for the pre-EMU period), (2) denomination in a legacy currency (LEGACY, one for denomination in a

legacy currency and zero for USD and Euro denominations), and (3) denomination in Euro (EURO, one for denomination in Euro and zero for all other denominations). The regressions are nested in the following model:

$$Y = \beta_0 + \beta_1 \mathrm{EMU} + \beta_2 \mathrm{LEGACY} + \beta_3 \mathrm{EURO} + \beta_4 \mathrm{MATUR} + \beta_5 \mathrm{AMOUNT} + \beta_6 \mathrm{DQ} + \beta_7 \mathrm{RFEE} + \varepsilon, \quad (3)$$

where Y represents the different issue costs variables, and RFEE is included as explanatory variable only in the SPREAD regression.

In model (3), the coefficient of LEGACY captures the incremental issue costs associated with denomination in a legacy currency compared to contemporaneous USD denomination; the EMU coefficient reflects the change in the issue costs of USD denominated bonds in the EMU period compared to the pre-EMU period; and the EURO coefficient reflects the incremental issue cost of Euro-denominated bonds compared to concurrent USD bonds. As discussed below, all the results of this analysis are consistent with those of the previous analyses, demonstrating the robustness of the findings with respect to alternative test specifications.

The regression results are reported in Table 5. As shown, total issue costs (COST) is larger for bonds denominated in a legacy currency (the coefficient of LEGACY is positive and significant), increases with maturity, declines with credit quality, and is insignificantly related to the time period (EMU), Euro versus USD denomination (EURO), and issue amount. Thus, the results of this regression confirm the findings of the previous analyses that the issue costs of bonds denominated in legacy currencies were larger than those of USD bonds, while the issue costs of Euro-denominated bonds are similar to those of USD bonds. To test whether the issue costs of bonds denominated in European currencies have declined with the adoption of the Euro, we examine the statistical significance of the difference between the coefficients of LEGACY and EURO, and find that the p-value associated with this test (one-tail) is 4.0%.[17]

The next two regressions (UNDERPR and COMP) confirm that the incremental issue costs associated with denomination in a legacy currency is due to underpricing rather than underwriter compensation, as LEGACY is significant in the UNDERPR regression but not in the COMP regression. In fact, total underwriter compensation is insignificantly related to each of the three qualitative variables (EMU, LEGACY and EURO), suggesting that there is little variation over time or across currency denomination in total underwriter compensation. In contrast, the fee regression reveals a substantial reduction in the average fee between the two periods, which is offset by a similar increase in the spread (the coefficient of EMU is negative in

[17] An alternative approach to test this hypothesis is to examine the significance of the difference between the coefficient of LEGACY and the sum of the coefficients of EMU and EURO. This test examines the overall change in the issue costs of legacy/Euro-denominated bonds, while the test of the difference between the coefficients of LEGACY and EURO focuses on the change in the issue costs of legacy/Euro-denominated bonds that is not due to global factors as reflected in the issue costs of USD-denominated bonds (as discussed above, the coefficient of EMU captures the change in the issue costs of USD-denominated bonds). The p-value associated with this test (one-tail) is 4.7%.

Table 5
Regressions comparing issue costs before and after the completion of the EMU

Dep. Var.	Intercept	EMU	LEGACY	EURO	MATUR	AMOUNT	DQ	RFEE	R^2	N
COST	0.656	0.086	0.163	−0.022	0.016	−0.012	−0.115		0.068	514
	5.167	1.219	2.208	−0.306	2.102	−0.402	−3.792			
UNDERPR	−0.054	0.039	0.131	0.014	0.007	0.003	−0.001		0.028	514
	−0.711	1.079	2.484	0.369	1.128	0.142	−0.046			
COMP	0.709	0.047	0.032	−0.036	0.010	−0.015	−0.114		0.076	514
	7.236	0.846	0.571	−0.658	1.609	−0.609	−4.751			
RFEE	1.704	−0.336	0.846	−0.264	−0.005	−0.071	−0.174		0.517	514
	15.202	−4.006	13.632	−3.187	−0.937	−1.805	−6.035			
SPREAD	−0.994	0.383	−0.814	0.228	0.015	0.055	0.060		0.418	514
	−8.663	4.575	−10.728	2.744	2.200	1.411	2.084			
SPREAD	0.465	0.095	−0.089	0.002	0.010	−0.005	−0.089	−0.857	0.735	514
	5.506	1.598	−1.268	0.036	1.818	−0.223	−4.364	−18.342		

The table reports estimates from the following regression model:

$$Y = \beta_0 + \beta_1 \mathrm{EMU} + \beta_2 \mathrm{LEGACY} + \beta_3 \mathrm{EURO} + \beta_4 \mathrm{MATUR} + \beta_5 \mathrm{AMOUNT} + \beta_6 \mathrm{DQ} + \beta_7 \mathrm{RFEE} + \varepsilon,$$

where Y represents the various issue costs variables. Heteroscedasticity consistent (White, 1980) t-statistics are reported below the coefficient estimates. The issue cost variables are measured relative to the market value of the issue after trading commences and are expressed in percentage points. COST is total issue costs. UNDERPR is underpricing, that is, the difference between the market price and the offering price. RFEE is the underwriter fee. SPREAD is the indirect component of the underwriter compensation, that is, the difference between the offering price and the price guaranteed to the issuer. COMP is the sum of RFEE and SPREAD. EMU is a qualitative variable that equals one for issues from the EMU period. LEGACY is a qualitative variable that equals one for issues denominated in a legacy currency. EURO is a qualitative variable that equals one for Euro-denominated issues. MATUR is the number of years to maturity on the issue date. AMOUNT is the amount issued expressed in billions of US dollars. DQ is a debt quality measure that receives values between 1 and 5, where 5 is the highest grade and 1 is the lowest grade.

the RFEE regression and positive in the SPREAD regression). Indeed, the statistics in Tables 1 and 2 indicate that the average spread is substantially less negative in the EMU period compared to the pre-EMU period, and the average fee is smaller.

Thus, the *average* trade-off between the fee and spread, which was documented by Melnik and Nissim (2003) for the pre-EMU period, has declined substantially in recent years. This trend cannot be fully attributed to the EMU since it holds for both USD- and legacy/Euro-denominated bonds, although it is substantially stronger for the latter. In contrast, as discussed in the previous section, the estimates of Table 4 suggest that the *cross-sectional* trade-off between the fee and spread, as captured by the coefficient of RFEE, has not changed appreciably between the two periods.

The final regression of Table 5 demonstrates that, after controlling for RFEE, none of the qualitative variables are significant in explaining SPREAD. Thus, consistent with the findings of the previous analyses, this evidence suggests that differences in the spread across currency denomination and over time are due to differences in the fee/spread mix rather than to differences in total underwriter compensation.

6.4. Syndicate size

To the extent that the market for European currency bonds in the pre-EMU period was smaller and less liquid than the market for USD bonds, underwriters were likely to form larger syndicates when selling legacy currency bonds compared to USD bonds. If the arrival of the Euro increased the liquidity of European currency bonds and broadened their investment base, the difference in the number of underwriters per issue between European currency bonds and USD bonds is likely to be smaller in the EMU period. To examine this hypothesis, we regress the number of underwriters (UNDERWR) on the qualitative variables described above (EMU, LEGACY, and EURO), controlling for issue characteristics:

$$\text{UNDERWR} = \beta_0 + \beta_1\text{EMU} + \beta_2\text{LEGACY} + \beta_3\text{EURO} + \beta_4\text{MATUR} + \beta_5\text{AMOUNT} + \beta_6\text{DQ} + \varepsilon. \quad (4)$$

Table 6 presents the results. As expected, the number of underwriters is positively related to the issue amount and maturity (a proxy for interest rate risk), and negatively related to credit quality. The coefficient on EMU is negative and highly significant, indicating that the number of underwriters per issue has declined after the completion of the EMU. This decline applies to all currency denomination, but is particularly large for European currency bonds (the difference between the coefficients on LEGACY and EURO in the pooled regression is positive and significant). The overall decline in the number of underwriters is consistent with the strong consolidation trend in this industry during the late 1990s and the beginning of the mil-

Table 6
Regressions examining the determinants of syndicate size

Sample	Intercept	EMU	LEGACY	EURO	MATUR	AMOUNT	DQ	R^2	N
Pre-EMU	18.015		4.095		0.145	22.674	−0.544	0.372	259
	8.538		2.917		0.705	6.320	−0.906		
EMU	9.443			−0.930	0.224	6.629	−0.549	0.538	198
	7.222			−1.511	2.226	7.914	−1.707		
Pooled	21.850	−15.247	2.436	−0.801	0.485	9.479	−0.744	0.530	457
	14.356	−15.749	1.703	−1.178	3.269	7.070	−2.098		

The table reports estimates from the following regression model:

$$\text{UNDERWR} = \beta_0 + \beta_1\text{EMU} + \beta_2\text{LEGACY} + \beta_3\text{EURO} + \beta_4\text{MATUR} + \beta_5\text{AMOUNT} + \beta_6\text{DQ} + \varepsilon.$$

Heteroscedasticity consistent (White, 1980) t-statistics are reported below the coefficient estimates. UNDERWR is the number of underwriters. EMU is a qualitative variable that equals one for issues from the EMU period. LEGACY is a qualitative variable that equals one for issues denominated in a legacy currency. EURO is a qualitative variable that equals one for Euro-denominated issues. MATUR is the number of years to maturity on the issue date. AMOUNT is the amount issued expressed in billions of US dollars. DQ is a debt quality measure that receives values between 1 and 5, where 5 is the highest grade and 1 is the lowest grade.

lennium.[18] The incremental reduction in the number of underwriters for Euro-denominated bonds is consistent with the positive effect of the EMU on the marketability of Euro-denominated bonds.

7. Summary and conclusions

This study compares the issuance costs of Eurobonds denominated in European currencies with those of contemporaneous USD-denominated bonds, before and after the completion of the EMU in 2002. We find that the introduction of the Euro significantly reduced the issue cost of Euro-denominated bonds compared to bonds denominated in the legacy currencies. The reduction in issue cost was not due to a decrease in underwriter compensation, but rather to the elimination of underpricing.

The formation of the EMU is also associated with a substantial reduction in the underwriter fee of legacy/Euro-denominated bonds coupled with a similar increase in the underwriter spread. The net effect on total underwriter compensation is insignificant. The strong trade-off between the fee and the spread, which has been documented for USD-denominated bonds in the pre-EMU period, also existed for bonds denominated in the legacy currencies. Moreover, it continues to exist after the completion of the EMU for both USD- and Euro-denominated bonds, although the average magnitudes of the fee and spread are now smaller (the spread is less negative and the fee is smaller). Finally, the EMU has changed the characteristics of Euro-denominated issues, particularly maturity and syndicate size, consistent with its expected effects on liquidity, investor base and transactions costs.

Acknowledgments

We gratefully acknowledge the helpful comments and suggestions of Alec Crystal, Giovanna Nicodano, Dylan Thomas, two anonymous reviewers, and seminar participants at the Money, Macro and Finance 2004 Conference, the University of New South Wales, and the University of Sydney. We also thank Karen Simhony-Boniel for assistance during the data collection process. Special thanks are due to Mark N. Cutis, Jaakko P. Karki, Fukuyoshi Kikunaga, Amos Rubin, and Constantine Thanassulas for their detailed description of the workings of the primary market for international bonds. A. Melnik thanks the visiting fellow program at ICER in

[18] During the five-year period from 1997 to 2001 there were close to 50 major mergers in the industry. Some of the most visible mergers were Morgan Stanley with Dean Witter, Bankers Trust with Deutsche Bank, SBC Warburg with UBS, PaineWebber with UBS, Robertson Stephens with BankAmerica, Bank of America with NationsBank, BankBoston with Fleet Financial Group, Oppenheimer with CIBC Wood Gundy, Salomon with Smith Barney, Schroders with SSB Holdings, BZW with ABN-AMRO Holding, Donaldson Lufkin and Jenrette with CSFB, and JP Morgan with Chase Manhattan Corp.

Torino for its hospitality while part of this work was conducted. Maela Giofre' provided excellent research assistance.

References

Allayannis, G., Ihirg, J., 2001. Exposure and markups. Review of Financial Studies 14, 805–835.

Altinkilic, O., Hansen, R.S., 2000. Are there economies of scale in underwriting fees? Evidence of rising external financing costs. Review of Financial Studies 13, 191–218.

Bekaert, G., Harvey, C.R., 1995. Time-varying world market integration. Journal of Finance 50, 403–444.

Bekaert, G., Harvey, C., Lumsdaine, R., 2002. Dating the integration of world equity markets. Journal of Financial Economics 65, 203–249.

Cantor, R., Packer, F., 1995. The credit rating industry. Journal of Fixed Income 5, 10–34.

Claes, A., De Ceuster, M.J.K., Polfliet, R., 2002. Anatomy of the Eurobond market: 1980–2000. European Financial Management 8, 373–385.

De Santis, G., Gerard, B., 1998. How big is the premium for currency risk? Journal of Financial Economics 49, 375–412.

Dumas, B., Solnik, B., 1995. The world price of foreign exchange risk. Journal of Finance 50, 445–479.

Erb, C.B., Harvey, C.R., Viskanta, T.E., 1996. Political risk, economic risk, and financial risk. Financial Analysts Journal 52, 29–46.

Frankel, J., Rose, A., 2002. An estimate of the effect of common currencies on trade and income. Quarterly Journal of Economics 117, 437–466.

Glick, R., Rose, A.K., 2002. Does a currency union affect trade? The time-series evidence. European Economic Review 46, 1125–1151.

Hartmann, P., 1998. Currency Competition and Foreign Exchange Markets: The Dollar, the Yen and the Euro. Cambridge University Press, Cambridge.

Hartmann, P., Maddaloni, A., Manganelli, S., 2003. The Euro-area financial system: Structure, integration and policy initiatives. Working Paper, European Central Bank.

Jewell, J., Livingston, M., 1998. Split ratings, bond yields, and underwriter spreads. Journal of Financial Research 21, 185–204.

Johnson, K.H., 1994. International dimension of European monetary union: Implications for the dollar. International Finance Discussion Paper 469, Board of Governors of the Federal Reserve System.

Kool, C.J.M., 2000. International bond markets and the introduction of the Euro. Federal Reserve Bank of St. Louis Review 82, 41–56.

Lee, I., Lochhead, S., Ritter, S., Zhao, Q., 1996. The costs of raising capital. Journal of Financial Research 19, 59–74.

Lewis, K.K., 1999. Trying to explain home bias in equities and consumption. Journal of Economic Literature 37, 571–608.

Livingston, M., Pratt, H., Mann, C., 1995. Drexel, Burnham, Lambert's debt issues. Journal of Fixed Income 4, 58–75.

Livingston, M., Miller, R.E., 2000. Investment bank reputation and the underwriting of nonconvertible debt. Financial Management 29, 21–34.

McCauley, R.N., 1997. The Euro and the dollar. BIS Working paper No. 50.

Melnik, A., Nissim, D., 2003. Debt issue costs and issue characteristics in the market for US dollar denominated international bonds. European Finance Review 7, 277–296.

Melnik, A., Plaut, S.E., 1996. Industrial structure in the Eurocredit underwriting market. Journal of International Money and Finance 15, 623–636.

Portes, R., Rey, H., 1998. The emergence of the Euro as an international currency. Economic Policy 26, 307–343.

Rose, A.K., van Wincoop, E., 2001. National money as a barrier to international trade: The real case for currency union. American Economic Review 91, 386–390.

Santillan, J., Bayle, M., Thygesen, C., 2000. The impact of the Euro on money and bond markets. Occasional Paper Series No. 1, European Central Bank.

Santos, J.A.C., Tsatsaronis, K., 2003. The cost of barriers to entry: Evidence from the market for corporate Euro bond underwriting. Working paper, Federal Reserve Bank of New York.

Sentana, E., 2002. Did the EMS reduce the cost of capital? The Economic Journal 112, 786–809.

White, H., 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. Econometrica 48, 817–838.