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Multiple Avenues of Intermediation, Corporate Finance and Financial Stability

E. Philip Davis

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International Capital Markets Department

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Prepared by E. Philip Davis¹

Authorized for distribution by Garry J. Schinasi

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Abstract

<p>The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate.</p>
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Using data from the US, UK, Japan and Canada, this paper provides evidence on the benefits to an economy from “multiple avenues of intermediation”. The overall conclusion is that the existence of active securities markets alongside banks is indeed beneficial to the stability of corporate financing, both during cyclical downturns and during banking and securities market crises. The benefit from multiple avenues are greater, the more comparable the size of securities market and intermediated financing, as well as the larger the proportion of companies able to access both loan and securities markets. The analysis raises a number of policy issues and research topics for further investigation.

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Author's E-Mail Address: e_philip_davis@msn.com

¹ The author is Professor of Economics and Finance, Brunel University, Uxbridge, Middlesex UB3 4PH, United Kingdom). He is also a Visiting Fellow at the National Institute of Economic and Social Research, an Associate Member of the Financial Markets Group at LSE, Associate Fellow of the Royal Institute of International Affairs and Research Fellow of the Pensions Institute at Birkbeck College, London. Work on this topic was undertaken while a Visiting Scholar in the Capital Markets and Financial Studies Division of the Research Department at the IMF. The author thanks Sean Craig, Robert Heath, Glenn Hoggarth, Charles Kramer, Lucie Laliberte, Sandeep Sarangi, Garry Schinasi, Mark Stone and participants in seminars at Loughborough and City Universities for helpful comments and suggestions. Views expressed are those of the author and not necessarily those of the institutions to which he is affiliated, nor those of the IMF.

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I. INTRODUCTION

Greenspan (1999, 2000) highlighted the benefits that arise from “multiple avenues of financial intermediation” which had helped to protect the US economy during periods when either banks or debt-securities markets suffered from financial problems. In 1990-1 and 1998, for example, the unaffected market moved to counteract a decline in credit granted by the market in crisis, and hence the effects of financial turbulence on the macro economy were diminished. The issue has wider international relevance. Following the Asian crisis, securities market development has been widely recommended to the countries involved for the protection it offers to the economy against a banking crisis (see for example Knight (1998), Stone (2000)). Furthermore, the development of securities markets in the euro area is likely to gather pace, shifting the financial system closer to the “Anglo Saxon” structure with a diminished role for banks in corporate financing (Davis 1999a).

In this context, this paper seeks to investigate patterns of external credit-market borrowing by the corporate sector in four major industrial countries with active securities markets, in order to assess the benefits of smoothing of flows arising from “multiple avenues”. In order to provide a satisfactory overall assessment, the analysis has to look at a number of aspects:

- substitution between credit markets. On the one hand firms may substitute between domestic debt securities markets and intermediated borrowing, and on the other between domestic and international markets.
- differing types of shocks needing to be smoothed via multiple avenues. Besides those outlined by Greenspan, i.e. systemic problems affecting credit supply either in the banking market or the securities market, there is a need to take into account the broader range of cyclical effects on the market which affect the supply and demand for credit.
- varying access of borrowers to markets. This will affect benefits arising from multiple avenues. Notably, some borrowers, such as small firms, can only access domestic banking markets.

The paper is structured as follows: Section II examines longer term patterns, correlations and volatilities of the different financial flows in the US, UK, Canada and Japan, to assess cyclical trends in the different financial flows and the extent of smoothing. The focus then narrows to changes in flows during periods of financial turbulence. Financing patterns in the international capital markets from the countries concerned are also examined, to assess whether they provided a further buffer against domestic credit rationing, for firms of sufficient credit-standing.

A complete account of securities/loan substitution and the benefits of “multiple avenues” requires an assessment of what “equilibrium behavior” would be expected in response to cyclical shocks. Accordingly, Section III considers supply and demand factors underlying corporate financing behavior. Particular focus is put on theories of corporate financing based on agency costs and asymmetric information, as well as some of the complementary theories of

financial intermediation. The theories motivate an econometric modeling exercise on determinants of the flows, set out in Section IV. This permits an illustration of the differences between the determinants of securities and banking flows (thus further demonstrating their complementarity). It also provides a counter-factual estimate of what changes in flows could be expected on the basis of normal cyclical behavior, in order to judge the “abnormality” of market behavior in the wake of systemic crises. Section V examines selected analytical and policy issues arising from the topic of multiple avenues, while Section VI concludes.

II. PATTERNS OF DEBT-SECURITIES ISSUANCE AND LENDING –LONG-TERM PATTERNS AND SHIFTS DURING TURBULENCE

A. Long Term Patterns of Intermediated and Market Based Debt Finance

Charts 1-4 show overall patterns of corporate credit-market financing, drawn from quarterly flow data on funds raised in the credit market by non-financial corporations for the US, UK, Japan and Canada over 1970-1999. The data are respectively from the US Flow of Funds (produced by the Federal Reserve Board), UK Financial Statistics (Office of National Statistics), Canadian National Income and Expenditure data (Statistics Canada) and Japanese flow of funds data (Bank of Japan). “Real debt securities” in the charts comprises corporate bond issuance plus commercial paper (CP), where available², deflated by the CPI, while “real loans” is bank lending, mortgages and other loans to companies, similarly deflated. Real borrowing is the sum of these two sub-components. Note that financings are grouped by intermediation status and not by maturity.

Overall external financing in the US (Chart 1) follows a broadly cyclical pattern, reaching peaks in the early and late 1970s, late 1980s and mid-to-late 1990s; there is no single quarter throughout the period when total credit market borrowing is negative. Securities-market financing tends to be larger than lending, notably in the 1990s. Whereas net intermediated lending is often negative, notably in 1973-5 and 1990-3, net securities issuance is positive in each quarter. A broad negative correlation can be seen between bank lending and securities issuance, such that overall intermediation is more stable. Securities markets appear to smooth aggregate flows, while intermediated financing is more volatile.

Chart 2 shows a cyclical pattern for the UK similar to the US. Total credit-market financing has at times been negative. For much of the period shown, securities issuance was a trivial share of credit market borrowing by corporations. Only since 1991 has it become a significant share of the total, although slight increases were already apparent in the mid 1980s. Looking at flows in Japan (Chart 3), both cyclical and seasonal patterns are apparent in the credit market borrowing data. The scope of debt-securities issuance was minimal until the mid-1980s³, and it declined

² CP data were not available consistently for the UK and Japan.

³ For a discussion of the liberalization of bond market financing and its effect on large companies see Hoshi et al (1993).

again in the 1990s, being frequently negative. Lending has also been periodically negative, and more structurally during the late 1990s.

In Canada (Chart 4) a sharp increase in borrowing is apparent in the late 1970s and early 1980s (accompanying an energy boom). This was followed by a corporate debt crisis in the following recession. In the early 1990s, net repayments of debt securities took place. Canada is shown to be similar to the United States in terms of the importance of securities market financing, which is commonly as or more important than bank lending.

Table 1 shows descriptive statistics for the size and volatility of the different financing flows as a percentage of GDP since 1970. On average, credit market financing was a similar percentage of GDP in all four countries, varying from 3.2 percent in the United States to 4.9 percent in Japan. As indicated by the charts, the proportion accounted for by debt-securities varies strongly across countries, with two clear groups of countries emerging. In both the US and Canada, debt-securities flows account for around half of credit market financing, while in the UK and Japan the share is much lower (around 10-20 percent). The proportion of debt securities issuance is higher in all four countries since 1985.

The right hand side of Table 1 shows the volatilities of the different forms of financing relative to GDP. The very high standard deviation of Japanese credit market financing and its main component, bank lending is partly an artifact of the lack of seasonal adjustment (US and Canadian data are seasonally adjusted, while the UK and Japanese are not) but also links to the banking problems in Japan, which led to large and sustained falls in credit market borrowing (see Chart 2). The cyclical volatility of debt-securities market financing is considerably lower than that of lending in all countries. This is particularly relevant in the US and Canada where the series means are comparable. Volatilities relative to GDP tend to be higher since 1985, except for Canada.

Table 2 shows in more detail the volatility and correlation of the different financing flows, deflated by the CPI rather than as a ratio to GDP. The volatility measure shown is the coefficient of variation⁴, which in all cases is lower than that of the subset intermediated lending, suggesting that there are benefits in terms of “multiple avenues” relative to a system dependent on intermediated lending alone. It is also lower than the volatility of debt-securities financing, except in the US where the figure is comparable.

Table 2 also shows correlations between the two sub-series and their correlations with total credit market financing. In all four countries, credit market financing in aggregate tends to be more closely correlated with loans than securities issuance, perhaps reflecting greater cyclicality of the latter, while the correlation between securities and loans is low – around 0.3 for all the countries except Canada, where it is actually negative.

⁴ This is the standard deviation divided by the mean. This allows series of different magnitudes to be more readily compared than for the standard deviation alone.

Consistent with the charts, these correlations show in a preliminary way that lending and securities will move to balance each other out on average over time, although the effectiveness of this will depend on the size of the markets. The greater stability of securities flows than intermediated flows suggests that the former helps to smooth overall credit flows over the cycle. But these long run average data alone do not answer the question whether smoothing – either by securities or intermediated lending - also applies during periods of crisis in one market. There could be a high positive correlation in such periods, indicating that both channels are closed, owing to pervasive high risk and uncertainty. This could be balanced out in the average correlations by stronger diversification in normal times.

B. Corporate Financing in Crisis Periods

This section focuses on financial flows at the time of systemic shocks, which originated in and affected the financial system, completely or largely independent from the behavior of the corporate sector. These would be expected to impose a supply-side constraint on the cost and availability of finance to corporations, separate from normal supply and demand conditions in the credit market. Some of the crises affected international as well as domestic markets. Periods of systemic risk are selected on a judgmental basis, with no definite benchmark to define a crisis event. Judgment is inevitable, especially if one wishes to include securities market liquidity crises as well as crises affecting intermediated lending. Some types of financial instability are unsuitable for inclusion. For example, some countries had long-lasting problems in the financial sector (such as the US thrifts crisis) which had no clear crisis point, but which could have affected the efficiency of intermediation. There have also been regional crises (such as the Texas and New England banking crises), which did not impact on national credit flows but may have affected regional flows⁵. Even among the shocks considered to have national or international impact, the severity of the impact on the financial system varies strongly, with for example the UK small banks affected by the crisis of the early 1990s accounting for only a small part of lending (Logan 2000). Also, the date of onset of the crises cannot always be precisely defined.

The shocks selected⁶ are as follows: for the United States, Franklin National/Herstatt (Q2 1974); the onset of the LDC debt crisis (Q3 1982); the Stock Market Crash (Q4 1987); the bank capital/credit crunch (Q1 1991); the bond market reversal (Q1 1994) and the Russia/LTCM crisis (Q3 1998). For the UK, there has been the Secondary Banking Crisis (Q4 1973) and the

⁵ Even regional crises could benefit from multiple avenues, however. Research into the causes and consequences of the Texan crisis (Gunther et al 1995) suggest that the regional economic downturn was a key feature underlying the bank failures, but local restrictions on credit supply did not have further repercussions on the macroeconomy. Possible reasons for this were that banks and financial intermediaries from outside the area may have provided necessary lending, *while businesses were able to make use of commercial paper and other types of securities market financing in national markets.*

⁶ Descriptions are provided in Davis (1995a), (1995b) and (1999b).

Small Banks crisis (Q1 1991), both of which were accompanied by more general financial fragility for the financial and non-financial sectors. For Japan there is the initial monetary tightening (Q3 1990) which precipitated the fall in asset prices, as well as the initial peak of the banking crisis when the Jusen housing institutions were in difficulty (Q4 1993). Note however that the whole of the 1990s have seen banking problems, with another peak occurring when Yamaichi (Q4 1997) and later LTCB failed (see also Hutchinson and McDill (1999)). For Canada, periods of systemic risk have been rather rare (partly due to the centralized and diversified banking system), although one instance was the Northlands banking failures (Q2 1985). With the exception of the 1987 stock market crash, 1994 bond market reversal and Russia/LTCM in 1998, all of these events had a principal effect on banks. The US crises of 1974, 1982, 1987, 1994 and 1998 affected international as well as domestic markets, while the other crises were more domestic in scope.

In the US (Table 3), there is a broad pattern of equilibration by the market less severely affected by the turbulence, although overall financing tended to be most severely affected in banking crises (suggesting that banks may be better able to offset securities market crises than vice versa).

Focusing initially on such banking problems, in the year following the Franklin National failure (which also coincided with the Herstatt crisis in the international markets), lending fell by around 75 percent, while securities issuance doubled. Accordingly, total credit market borrowing fell by 2 percent of GDP as opposed to 3 percent for lending. In the bank capital crunch (dated here Q1 1991) a sharp fall in loans outstanding was accompanied by flat securities financing. The onset of the LDC debt crisis is an exception, with a pattern of declining net issuance of securities and falls in loans outstanding, although the fall in loans was more marked (1.6 percent of GDP as compared to 0.5 percent for securities).

The three securities-market related events tended to show at most a minor or short term fall in issuance, while loans increased; credit market financing was hence not adversely affected. Both for the stock market crash and Russia/LTCM, the fall in issuance was most apparent in the quarter of the crisis. Averaged out over the year following, issuance was virtually unchanged from the year prior to it. Whereas a more sustained fall in securities issuance took place in 1994, this was compensated by a strong turnaround in lending (from markedly negative to strongly positive), so that credit market financing actually increased.

Complementing the tables of corporate credit market financing, Table 4 shows flow data for US equity issuance, trade credit and total external finance. The patterns shown do not suggest that the alternative sources of external finance strongly offset the flows generated in the credit markets. Comparing the years before and after the crisis, trade credit was flat or declining for all of these episodes, except for the 1994 bond market reversal, when it rose strongly. Equity issuance was generally low or negative, as has been the case in most recent years owing to equity retirements and take-overs. In most cases equity issuance was lower in the year following the crisis than in the year prior. The exception was the onset of the LDC debt crisis in 1982, when equity issues were somewhat higher in the year after the crisis. As noted above, bank

lending and securities issuance both fell, suggesting in this case a degree of equilibration from the equities side.

In contrast to the US, the equilibrating effect from debt securities in the UK was minor in the episodes shown (Table 5). 1973-4 saw a fall in securities issuance as loans rose slightly, despite the systemic concerns raised by the secondary banking crisis. Following the small banks crisis of 1991, and in the accompanying “financial fragility”, there was a sharp fall in the flow of loans to companies, giving a decline in credit market financing equivalent to 4.5 percent of GDP. For other components of the UK’s sources of funds table (Table 6), the largest positive contribution was by equity issuance in 1991-2, with other flows being unchanged.

In Japan (Table 7), in all three periods shown, flows of loans and securities both declined, taking the year beginning the crisis as compared to the year before it. Trade credit (Table 8) fell in the aftermath of the monetary tightening and after the Yamaichi failure but became less negative after Q4 1993. Finally, as regards the patterns for Canada in Q2 1995, the Northlands crisis only entailed a pause in overall corporate financing, with both loans and securities picking up strongly after falling in the quarter of the crisis.

C. International Capital Market Financing during Turbulence

Particularly where the crises were largely domestic, the international capital markets could offer a substitute source of finance (albeit only for firms of sufficient credit standing and reputation). International capital markets are also relevant because there are offshore transactions, e.g. by foreign subsidiaries of multinationals based in the home country, that may be omitted by domestic flow of funds data. This section utilizes data for international bonds, syndicated credit and euro note facilities for private non-financial corporations over 1980-2000, supplied by Capital Data Loanware and Bondware. The data are gross (i.e. repayments are not netted off), and hence they are not strictly comparable with the flow of funds. Syndicated credits in the euromarkets are recorded at their full amount when signed, even if the drawdown is later, and note facilities are recorded at their full potential size rather than at the amount of drawdown at a given time. This means they are both distorted indicators of actual flows, although they are accurate in showing the amount of “credit insurance” provided.

Table 11 shows descriptive statistics for euromarket financing by private companies from the four countries studied. As is the case for domestic borrowing, total euromarket financing is less volatile than its components, given they are themselves imperfectly correlated. Credit facilities (including both syndicated credits and euro notes) and eurobond issues are more strongly correlated with each other than are domestic securities and loans (compare Table 2), at least for the US and UK. The relatively-low correlations of the various forms of euromarket financing with total domestic credit market finance suggest that international markets can contribute to stabilization on average over time.

Examining flows during financial turbulence, one can distinguish the crises that actually affected international capital markets to some degree (LDC debt; stock market crash; bond market reversal; Russia/LTCM) from the others. Note that the data for international credit

facilities in Japan are highly volatile owing to the sporadic nature of such financings for Japanese firms. Comparing financings in the year before with the year beginning the crisis (Table 12), the most consistent pattern observable is the decline in credits for companies in the US, UK and Canada after the LDC debt crisis, which severely affected international banking markets. This weakness was not reproduced in the eurobond market, except for Canada – for the UK and US there was a marked increase in issuance after the onset of the LDC debt crisis, thus offering equilibration (although note that the levels in that year were quite low). The stock market crash, although it caused some initial disruption in euromarket activity (see Davis (1995a)) evidently did not have a long lasting effect, since virtually all the data show an increase in financings. A decline in eurobond issuance is apparent for all countries except the US after the bond market reversal, while credit facilities increased, hence offering equilibration. Finally, Russia/LTCM, like the stock market crash, had only a short-term effect on eurobond issues, while credits fell in the following year. Amongst all these cases, the net overall change in euromarket financings was negative only for the US, Canada and Japan after the debt crisis, for Japan in 1994 and for the US and Canada after Russia/LTCM. On balance, the international capital markets show themselves to be resilient and adaptable in the wake of turbulence affecting them directly.

As shown in Table 13, the overall pattern following the “domestic” crises is one where eurobond issuance consistently increased, apart from in Japan in 1993 and 1997. On the other hand, the volume of international credit facilities generally declined following domestic turbulence. The Canadian Northlands crisis was the only case where both intermediated and disintermediated euromarket activity increased in volume after the crisis. In most cases the total volume of euromarket financing fell, again with the exception of Canada in 1985 and Japan in 1990. This evidence is less favorable for an equilibrating role of international capital markets.

III. IMPLICATIONS OF THE THEORY OF CORPORATE FINANCE FOR FINANCING PATTERNS

The main focus of the previous section was on empirical patterns of financial flows during periods of turbulence, where patterns appear broadly favorable to the benefits of multiple avenues of intermediation. But in order to address multiple intermediation channels more deeply, it is essential to address some key theoretical and empirical insights in corporate finance and financial intermediation and utilize them econometrically.

A. Credit Demand, Agency Costs and Credit Rationing

Concerning the *demand for credit* by firms, both macro and finance theory suggest that fixed investment and other financing vary cyclically, while interest rates also affect the demand for credit. As regards the sources of funds, the traditional “pecking order” view of corporate finance (Myers 1984) suggests that external debt finance, either in the form of securities or lending, ranks fairly highly for borrowing firms as a source of funds. Internal funds are cheaper, but are generally limited by the scale of expenditures (including dividends) that tend to outstrip such internal funds increasingly during a cyclical upturn – while cash-flows shrink in a downturn. Whereas in principle equity issuance is also a feasible alternative, firms tend to see it as costly

and less desirable than debt, while investors often see equity issuance as an adverse signal about the firm. A further alternative, the run-down of liquidity, is limited by the need for precautionary levels of such liquidity to be maintained to avoid liquidity crises.

The *supply of external debt finance*, from banks or markets, is affected by asymmetric information between borrowers and lenders and the inability of lenders to write complete contracts covering borrowers' behavior in every eventuality. These give rise to agency problems of the debt contract, linked to adverse selection in advance of lending and moral hazard after the financing has taken place. These effects may vary over time, giving rise to cyclical changes in credit supply in equilibrium. Mishkin (1991), for example, suggests that variations in agency costs affecting credit supply may occur via a number of channels. First, if *interest rates rise* due to monetary tightening or merely to balance the credit market, adverse selection may increase, giving rise to a decline in credit availability. Second, *heightened uncertainty*, such that lenders find it harder to screen borrowers, increases adverse-selection problems, potentially reducing credit supply. Collateral is a means whereby asymmetric information problems may be reduced (as the lender is then confident of recovering his loan even if the borrower proves to be of low quality). But this means that a *decrease in the valuation of assets* (e.g. a stock market decline provoked by a change in future profit expectations), by lowering collateral values, sharply increases adverse selection for lenders. A parallel mechanism operates via the link of net worth to moral hazard. Besides resulting from stock-market declines, net worth could decline due an unanticipated disinflation or deflation that redistributes wealth from debtors to creditors.

Such patterns are said to give rise to a "financial accelerator" (Bernanke, Gertler and Gilchrist 1996) as changes in cash flow or asset prices over the cycle give rise to pro-cyclical feedback effects of agency costs on the cost of external finance and hence on real corporate expenditures. This will operate particularly via borrowers whose net worth is most heavily affected during a recession, and for borrowers whose activities are riskier or harder to monitor⁷.

Effects of changes in credit on the real economy are not the subject of this paper. Such theories and related empirical verification are nevertheless important in the present context since they imply that borrowing may have an inherent cyclical pattern, as firms are credit-rationed in equilibrium during downturns, while their demand for credit may also fall. These patterns are common to any financial system, however smoothly running and well-diversified. If financial crises occur in periods of recession, some fall in lending may be normal in the light of lower

⁷ Important empirical tests of the hypothesis include Bernanke et al (1996) who show that after a monetary tightening, the relationship between internal funds and investment becomes stronger for smaller firms than for larger firms, and small firms experience much more procyclical variation in economic activity. Using flow of funds data, Christiano et al (1996) show that following a monetary policy shock, borrowing of large firms rises for some time before falling off in the subsequent recession (perhaps because cash flows fall before expenditures can be adjusted), while borrowing of small firms (whose net worth may be hit by the monetary policy action) is much weaker.

demand and increased agency costs, rather than all being a consequence of abnormal supply constraints in the credit market.

B. Theories of Intermediation

The theories of corporate finance, agency costs and the financial accelerator outlined above apply to debt finance in general rather than distinguishing intermediated and non-intermediated finance. Hence they need to be supplemented in order to understand the forces underlying the choice of borrowers between banks and securities as a source of such external finance, as well as possible asymmetries in credit rationing. There are a number of “theories of intermediation” (Davis and Mayer 1991) that cast light on this issue, highlighting in general the advantages of banks. As a corollary they suggest that the determinants of intermediated and market financing may differ significantly, benefiting those firms able to access both types of finance. Such theories include those focusing on *economies of scale* (small borrowers do not access debt-securities markets due to fixed costs of doing so) and *commitment* (that banks can offer long term relationships to borrowers not available in the debtor-securities markets, which reduce information asymmetry and moral hazard). However, the most relevant for this exercise are those linked to asymmetric information and control.

Following the discussion above, the existence of *asymmetries of information* between borrowers and lenders gives rise to difficulties in screening the quality of entrepreneurs and firms to avoid adverse selection (Leland and Pyle 1977) and monitoring their performance to minimize moral hazard (Diamond 1984). Leland and Pyle suggested that intermediaries can communicate proprietary information at lower cost than borrowers, and then sell claims to diversified portfolios of these assets to investors. Diamond suggests that financial intermediaries act as delegated monitors to overcome asymmetric information, whereby diversification reduces monitoring costs. A corollary is that market finance is only available to borrowers with a reputation (Diamond 1991). Hence small firms with low levels of public information will be served by banks, while larger firms with a higher degree of public information will have the option to be served by securities markets. Whereas these theories as set out in the literature do not have a cyclical element, they do imply that bank financing will rise relative to securities following developments that increase asymmetric information and moral hazard. Technological changes which impact on information provision and thereby reduce information asymmetry, and the related development of markets for lower rated bond issuance, will increase the scope for securities market financing, and hence raise the proportion of firms able to substitute between lending and securities.

Theories of intermediation based on *control* also highlight the incompleteness of loan contracts and suggest that intermediaries are better able than markets to influence the behavior of borrowers while a loan is outstanding, and seize assets or restructure in the case of default (Bolton 1990). The corollary of control theory is that a higher degree of risk in a transaction will tend to be accompanied by bank financing, as banks are better able to influence the behavior of borrowers while a loan is outstanding and seize assets or restructure in the case of default. Such patterns may potentially be cyclical (as default risk rises in downturns), with firms switching to

banks as credit quality declines. Note however that this assumes firms of lower credit quality can access securities in the first place - as is feasible only if there are high-yield bond markets.

Theories of intermediation suggest that banks should provide a larger proportion of credit when there is heightened risk. Intuitively this could be taken to imply provision of credit in downturns, whereas it has been shown that in practice it is securities market financing that falls less in recessions. The empirical work below casts light on the possible resolution of this point, suggesting that banks come to the fore when agency costs rise, which may not be perfectly correlated with recession. Meanwhile the description of the theories of intermediation points to an additional form of insurance offered by multiple channels, namely that they offer a diversified set of contracts to the economy, which offer different forms of risk sharing.

IV. ECONOMETRIC ESTIMATES OF LOAN/DEBT SECURITIES SUBSTITUTION BY CORPORATE BORROWERS

Following the above theoretical outline, this section outlines econometric estimates of the determinants of total credit market lending, securities issuance and loans, with the aim of, first, probing further the long term nature of credit market activity and the benefits of multiple avenues of intermediation, and, second, providing a benchmark “counterfactual” change in equilibrium flows that would be expected to occur in crisis periods. Against this, one can evaluate the actual changes in issuance and borrowing after crises for “disequilibria” supply side effects.

A. Specification

Drawing on the theory in Section III.A, the “reduced-form” specification seeks to combine demand and cost elements, with a similar basic specification being estimated for total credit market financing and the two sub-components, securities and lending, in each of the four countries. In focusing on external debt financing, the analysis abstracts throughout from possible changes in internal financing of corporate expenditures, equity financing and shifts on the assets side of the corporate balance sheet, which could in principle balance out the effect of shocks on the liabilities side on real corporate activity. However, both the results here and earlier work by Christiano et al (1996) support this abstraction, as they show credit market financing is the most flexible aspect.

Corporate demand for external finance is considered to be related most strongly to investment spending, with a proviso that demand for external finance increases as the upturn proceeds and internal funds are exhausted, as proxied by the investment/GDP ratio. The demand for finance is also dependent on monetary policy and its effect on the cost of external funds (i.e. the overall level of interest rates). Agency costs and consequent restrictions on the supply of funds, as outlined in the theory in Section III.A.above, will depend on factors such as trends in share prices (proxying firms’ net worth), the corporate credit-quality spread for bonds (showing markets’ view of risk) and again the change in the short term interest rate (which increases adverse selection). For the securities and lending equations the term spread is added as

indicating the relative cost of fixed and floating rate finance. Seasonal dummies are added where their effects are significant.

The importance of the above-mentioned demand and cost variables may be expected to vary between securities and lending markets, given the associated structural elements outlined by the theory of intermediation in Section III.B. (which suggests that agency problems and risks may be more readily handled by banks, for example). Note that the assumption underlying the inclusion of the term spread is that firms may substitute between bank and debt-securities financing. This may be the case for many firms which are structurally confined to banking e.g. due to small size, high risk, lack of reputation, desire for credit insurance from relationships, or which lose access to securities markets during downturns.

The dependent variables are the difference of the real financing flow in question (respectively, total credit market financing and its components, debt securities and lending). Because these variables are often negative, the equations are specified in linear rather than log linear form. All the cost variables are included as levels and differences to allow for differences between short and long run effects to be captured. Share prices, which are inherently trended, are included as first and second differences. On the demand side, we include the difference of real investment⁸ to capture short term cyclical demand effects, and the lagged levels of the borrowing/investment ratio and the investment/GDP ratio to capture potential long term equilibrium effects. As shown in Table 14, all of the differenced terms are stationary, while some of the levels terms are $I(1)$, notably the short rate and yield curve in several countries. These variables are entered as levels as well as differences (also following economic logic that these variables cannot be trended in the long term), while noting that this may lead to some difficulties in interpretation of the results in respect of short and long run effects.

Much more detailed estimation work would be needed for a complete characterization of the determinants of these flows, which would be usable for example in forecasting. (The flow of funds itself is one of the more difficult areas to forecast.) For example, a fairly simple Hendry-style specification is adopted, so as to ensure it can be employed and compared readily for all the countries studied. We do not at this stage utilize the Granger-Engel two step procedure to estimate a cointegrating vector before estimating the short run. Further work would also be needed to identify demand and “equilibrium” supply effects – although some suggestions are made about smoothing of shocks to demand and supply in the light of differing results for the types of finance. The reason for simplicity is that the aim here is a limited one, to test whether multiple channels of intermediation are of benefit because they are uncorrelated and respond to

⁸ It might be thought that simultaneity could enter via this contemporaneous term, as a result of supply side constraints on finance affecting investment. We would suggest that the gestation lag in investment is such as to limit this problem. In practice we also tried running the equations while instrumenting this variable with a constant and three lags of itself, and the results were little changed.

different variables over the cycle⁹ (Section IV.B) and to use dummies to interpret patterns of issuance and lending in the wake of systemic crises (Section IV.C).

B. Results of Estimation

The results of the parsimonious specifications are shown in Tables 15-18. There are major differences between the determinants of securities issuance and lending, suggesting that there is indeed a form of diversification for the economy - which benefits those borrowers able to access both markets. The error-correction term relating the flow in question to investment is always significant, suggesting an equilibrium relationship of investment to flows.

There appears to be a stronger cyclical component to bank lending than securities, with typically a significant effect of the change of real investment and the investment/GDP ratio. On the other hand, price and agency cost variables tend to emerge more frequently and with correct signs for the securities markets. These results imply that bank lending may smooth when securities market conditions are unfavorable. Examples include a positive effect of share prices on securities issuance in the US and UK, and a negative effect of the short rate in the US, Canada and the UK. (The share price is positive for both equations in Japan.) The term structure relation proxying the relative cost of fixed rate funds is also correctly signed in the US and UK (demand for securities finance is lower when the long rate rises relative to prime).

Looking at the price and agency cost variables in the lending equations, the credit quality spread enters with an expected negative sign for the US and Canada (lending falls when risk increases). There are also some apparently-perverse effects, with share price changes affecting lending negatively for the US, UK and Canada. This may link on the one hand to “distress borrowing” which firms unable to access securities undertake in a downturn when share prices fall. It may also reflect scope for firms to access cheaper financing in the securities markets when net worth rises with share prices. The term spread enters negatively in the UK and Canada, which may link to cyclical patterns, possibly affecting firms unable to access the debt-securities markets. The short rate effect is positive in Japan, which may link to the overall pattern of the 1990s, with the authorities cutting rates as lending (and share prices) fell.

The interim conclusions from this analysis are that there are indeed major differences between the economic and financial determinants of flows of lending and securities. Bank lending is more sensitive to the cycle (and thus markets help to smooth demand shocks¹⁰) while debt-securities markets are more sensitive to financial variables, reflecting costs of funds to the borrowing firm (so banks may help to smooth the supply of finance in such cases). While the

⁹ There is an underlying assumption that effects arising from systemic crises are sufficiently rare – and random – not to seriously affect the coefficients of the estimates.

¹⁰ The pattern may also reflect segmentation, with firms limited to bank finance switching over the cycle between bank lending and internal funds as investment rises, whereas firms accessing bond markets may do so more evenly over the cycle.

cyclicality of lending may seem contrary to the theory of intermediation, the fact securities issuance is more sensitive to financial market conditions indicative of heightened risk enables the observation to be partly reconciled. These results suggest that multiple avenues of intermediation offer benefits of diversification. If the economies concerned were dependent on bank lending there would be more cyclically volatile funding of corporates than is shown to be possible with securities markets.¹¹

For the United States, data were also obtained for high-yield bond issuance from 1982:3 to 2000:3¹², as shown in Chart 5. Such issuance opens up the possibility of substitution of securities financing for a wider range of companies, thus increasing the smoothing benefits to the economy as a whole. While disaggregated data to test directly whether there is increased substitution were not available, we do address some related hypotheses. For example, opening of the high yield market would be expected to increase securities issuance and lower bank lending. Conversely, the periodic closure of the high-yield bond market (as in 1990, 1994 and 1998) could lead to a fall in overall financing if companies that have been accessing high yield bonds are unable to access banking markets. We would expect that high yield bond issues would have a separate effect on total, securities and loan financing if this were the case. We incorporated an instrumented difference of real high-yield bond issues and a lagged ratio to investment in each equation. The results are shown in Table 19. For the full data period (i.e. assuming high-yield bond issuance was zero before 1982) there is indeed a positive contemporaneous effect in the real borrowing equation, suggesting high-yield bond boosted overall financing in upturns, while a fall in issuance of such securities affected overall financing in recessions. However, for the sub period since 1982, the high yield issues are not significant except in the debt-securities issue equation themselves. There is no indication of substitution between high-yield bonds and loans in either period.

C. Are Errors in the Equations Consistent with Offsetting “Supply Effects” on Credit Granted?

The equations in Tables 15-18 were used to cast further light on the changes in financing during and after the periods of turbulence, which were discussed in Section II.B. The equations' *fitted values* during periods of turbulence were used to provide a benchmark for changes in issuance and borrowing. They indicate whether a fall in lending would have been expected on a normal cyclical basis. In contrast, the equation *errors* may be attributable to extraneous factors, including systemic problems affecting credit supply. Technically, the test is for the significance of dummy variables for the period of the shock and the quarter afterwards. A negative (positive) error suggests a priori that there is a greater fall (rise) in issuance or lending than would be

¹¹ As noted, some firms may not benefit from the multiple avenues, but these effects are not readily captured with macroeconomic aggregate data for the corporate sector. For some estimates of lending patterns for the US using disaggregated data, see Gertler and Gilchrist (1992) and (1994).

¹² Thanks are due to Sandeep Sarangi of the Federal Reserve Board for providing these data.

anticipated by looking at general economic conditions, averaged out over the sample period. This suggests that there could have been a separate supply side effect operating on the market, be it a direct effect of systemic risk (if negative) or an offset by the market that was unaffected, and is hence facing unexpected demands for funds from creditworthy borrowers (if positive). Since the equations are in first differences, a single decline that is not offset in the next quarter implies a sustained fall in actual flows. The accuracy of this method is limited by shortcomings in the data, estimation and specification, but they should nonetheless give an indication of the direction and size of the shock. The results are shown in Table 20. Many of the dummies are consistent in sign and magnitude with the a priori suggestions made about offsetting shifts in financing made in Section II.B. On the other hand, the implied shocks are also generally within the bounds of two standard errors of the estimates. This may reflect the imperfection of the equations rather than a strong conclusion that no independent supply side effect was operating. It may also link to the relative importance of the various shocks at a macroeconomic level, which as noted is highly variable.

Looking first at the US, the pattern of signs in 1974 is consistent with offsetting rises in securities relative to their long run determinants and falls in bank lending. A statistically significant rise in bank lending, offsetting weak securities issuance, is found after Russia/LTCM, consistent with contemporary accounts (IMF (1998) and Greenspan (2000)). In 1991 bank lending fell significantly below its long term determinants (the so-called "capital crunch") while the securities market effect is estimated to be zero; in 1994 a securities market decline is only initially offset by a rise in bank lending relative to the predicted level. In 1982, where as shown in Table 3 both lending and issuance fell, it is the securities market decline that is shown to be significantly unusual relative to the average. The 1987 crash's effect on debt markets is put in perspective by positive dummies in the equations (i.e. financing was higher than anticipated).

In the UK and Japan, the much greater size of the negative dummies in bank lending relative to the positive one in the securities market shows the weakness of the securities markets in those countries as a means of stabilizing corporate financing. Falls in lending relative to historical trends are significant in 1991 in the UK and in 1998 in Japan. Finally in Canada in 1985 the most significant effect is a recovery in securities issuance relative to the equation prediction, in the quarter after the crisis.

On balance, the tentative econometric work presented tends to support the suggestion made by examining the data in Section II, namely that multiple avenues of intermediation provide stabilization to corporate financing, both on average over time and (more tentatively) in periods of crisis. Of particular interest is the cyclical nature of bank financing, while securities fluctuate largely in response to market conditions. The analysis provided in this section strengthens the conclusion of smoothing during crises to the extent that it allows for the economic determinants of corporate financing which would be expected to operate in normal times, when there is no systemic problem affecting the banks or markets. The fact that many of the dummies are insignificant offers some counter evidence. The work is subject to standard caveats of any econometric work, such as the risk that structural change may render future patterns different, as well as imperfections in the specification and estimation methods used.

V. ANALYTICAL AND POLICY ISSUES ARISING

This section considers certain financial, policy and conceptual issues that arise from “multiple avenues”. In combination with the statistical work, they help also to provide a suggested agenda for future work.

Is there true independence between banking and debt-securities markets such that one may truly be unaffected if the other is in crisis? Banks often provide backups for commercial paper programs, meaning that CP may not be readily issuable when banks are in crisis. Moreover, bank financing is typically needed in order for primary bond markets to operate, e.g. via underwriting, as well as providing finance for the operation of market-making in securities and derivatives. Banks in effect provide “insurance” to the markets. This is particularly the case where there is universal banking, where commercial banks provide market financing directly. Markets in the US and Japan have in the past been partly insulated from banking difficulties by the separation of commercial and investment banking - although commercial bank financing of investment banks was still important even when such separation was effective, as experience in the 1987 crash showed. Furthermore, US experience shows that bond markets generally find rescheduling after financial distress difficult, and banks generally play a major role in restructuring, acting in many ways like German or Japanese relationship banks (Gilson et al 1990). Meanwhile, banks may rely to some extent on bond and short term paper issuance to finance lending, so that a liquidity problem in the securities markets could have feedback effects on lending.

Will some sectors of the economy still be vulnerable even if there are effective multiple avenues of intermediation? Besides smoothing, the fact that bond issuance is less cyclical than bank lending may partly reflect credit rationing for loans, with the largest firms being unaffected by the cycle¹³ and the small firms confined to the banks being badly affected. The latter are also unable to access securities markets if there is a banking crisis. On the other hand, the distinctions between types of borrowers may be diminishing, as witness the rise of the high yield bond market and the growth of securitization even for small-firm loans. A supply-side contraction of bank lending could at a certain stage in financial development, perhaps not yet

¹³ A corollary may be that if the large firms were confined to banks, that bank lending would be less cyclical, because the credit quality of large firms is inherently more stable than that of small firms, with their operations being more diversified, and more transparent. On the other hand, large firms in bank-dominated economies would remain vulnerable to supply side effects arising from banking failures independent of their own credit quality, to the extent that they could not access the international capital markets. This was of course the difficulty faced by solvent companies in affected countries during the Asian crisis.

reached even in the US, be followed by a switch to securitized lending even for borrowers which were historically confined to banks¹⁴.

What are the relative costs of a crisis in the securities markets compared to banking? The data show that there has been quite rapid recovery in debt-securities financing following crises in the securities markets, while declines in bank lending were protracted. This may link to the contrasting nature of systemic risks in the two markets. As has been argued elsewhere (Davis 1994, 1999b) both banking and securities markets may be subject to liquidity crises. For banking, as set out by Diamond and Dybvig (1983), these arise from maturity transformation, imperfect information regarding the bank's assets, inability of the bank to sell or cash illiquid assets (i.e. loans) at par, and the "sequential servicing" process whereby claims are distributed. There is thus an incentive for panic runs by depositors even if banks are solvent. Meanwhile if doubt arises over the future liquidity of a debt securities market for whatever reason (it could be heightened credit risk or market risk), it may be rational to sell first before the disequilibrium between buyers and sellers becomes too great, and market failure occurs (i.e. yields are driven up sharply, and selling in quantity becomes extremely difficult). Sellers may either seek cash or more reliably liquid instruments. Moreover, if it is not always be easy for market participants to distinguish liquidity and credit shocks, then disruption to markets may be aggravated. Such crises may be more common when market making is of low profitability and market makers are poorly capitalized. Liquidity crises in both banking and debt-securities markets can have adverse effects on corporate borrowers which cannot readily switch sources of finance, as well as on investors dependent on the liquidity of their claims.

There are several reasons why securities market crises may be less damaging and protracted than banking crises. First, the parallels made above between crises in banks and securities markets are not exact, since securities investors who are not constrained to sell need not incur a loss – the underlying value of their assets arising from income streams does not change purely in the case of temporary liquidity failure (although marking to market means that their balance sheets will be affected). In contrast, banks can clearly become insolvent following liquidity failure, owing to inability to sell assets at their underlying value generating losses to depositors. Moreover, as shown by Gorton (1988), although bank liquidity crises can be “sunspots”, they are typically triggered by solvency concerns. In this context, approaching bank insolvency can be obscured by the lack of continuous pricing of intermediated claims. In contrast, since risk is priced continuously in the securities markets, concerns about solvency of borrowers are likely to emerge at a much earlier stage than for loans held on banks’ books. This gives an independent reason why banks are more vulnerable to solvency problems than markets.

Second, difficulties arise for issuers when market have a liquidity crisis only when an existing securities issue is maturing and needs rolling over – or there is a pressing need for a further issue - when the liquidity problem arises. CP programs usually have a backup line of credit from

¹⁴ See recent papers on theory of intermediation by Allen and Santomero (1998) and Scholtens and Wensveen (1999), who question the relevance of the traditional theories of intermediation set out in Section III.B. for contemporary banking activity.

banks. Loans generally have a shorter maturity and/or no backup, and banks in difficulty may be forced to call loans. These suggest there will be less of an impact on the economy when there is market liquidity crisis than for a banking crisis.

Third, given that bank lending involves private information, banking failures are more likely to generate deadweight loss of information to the economy in the manner pinpointed by Bernanke (1983) as occurring during the Great Depression. This in turn makes it more difficult for securities markets to offset banking crises than vice versa. Since information in the securities markets is public, it is more readily utilized by other providers of credit (e.g. bank lending or international markets) when securities markets suffer liquidity failure. Since information is not destroyed by securities market failure, markets can operate freely as soon as the liquidity blockage is removed, as was the case in the events pinpointed in this paper, while banking crises may involve prolonged falls in bank lending. Moreover, securities issuers are of higher average credit quality than borrowers from banks. Hence securities borrowers can access banks in a crisis more readily than average borrowers from banks can securities. This may help explain why banks tended to fully offset securities market crises while securities markets could not always offer substitute financing when there are banking problems (e.g. In Table 3). Finally, banks may also be more vulnerable to “herding” and concentrating their risks in sectors such as real estate than are markets.

There are clear implications from these arguments for the need for risk to be priced into financial instruments, as is the case for securities markets as opposed to banks. Transparency is indicated to be better for financial stability.

What was the role of the authorities in the various episodes? Generally, they have sought to defuse what is considered to be systemic risk by liquidity and interest rate policies, as in the US interest rate cuts in 1982, 1987 and 1998. But there is arguably also much more implicit and explicit protection for banking via the “safety net” than for securities markets, although the latter is seen to be stabilizing corporate financing. Conceptually, the authorities could be seen, following the argument above, to be protecting the private information that banks accumulate (as well as protecting depositors and the deposit insurance system). But transparency and further market development may improve stability without a need for such a broad safety net.

Are there any benefits to bank domination, given the thrust of this paper is the benefit of securities markets and consequent “multiple channels”? Allen and Gale (1997) suggest that Anglo-American capital markets dominated by institutional investors may have a disadvantage in terms of risk sharing, despite their “multiple intermediation buffers”. Competition and opportunities for arbitrage are said to constrain intermediaries - including banks - to only carry out cross-sectional risk sharing, i.e. exchanges of risk among individuals at a given point in time. This, it is argued, leaves non-financial firms more vulnerable to undiversifiable risks arising over time, e.g. owing to macroeconomic shocks¹⁵. In contrast, financial systems where

¹⁵ In Anglo-American countries, the focus on cross-sectional risk sharing may help explain the intense focus on risk management via derivatives (Allen and Santomero 1999).

banks have some monopoly power over savers facilitate elimination of such intertemporal risks by accumulation of reserves and smoothing of returns over time. One counter argument is that bank failures in bank dominated systems are likely to be much more damaging. Even abstracting from this, as argued by Greenspan (1999), the benefits of intertemporal risk sharing as practiced in Continental Europe may require less efficient allocation and utilization of capital, given the apparent need for intensive involvement of the public sector in the banking system (including direct ownership) in order to provide “insurance”. Increased competition may make “relationship” banking harder to sustain and render crises more likely¹⁶. Furthermore, the distinction may be less clear cut than Allen and Gale suggest, since Anglo-Saxon systems have intertemporal smoothing via “market-priced” forms of insurance such as backup credit lines, commitments etc.

What behavior in terms of smoothing could be expected of a system in transition towards a greater role for capital markets – as is the case for the EMU countries? Following the above discussion of intertemporal smoothing via relationship banking, financial integration, openness to global markets and institutional-investor growth are likely to transform European systems to securitisation¹⁷. This means the behavior of “Anglo Saxon” financial systems as illustrated in this paper is of considerable relevance as a model for the future. There may also be a period of transition in EMU before multiple intermediation becomes effective, when the system could be especially vulnerable to systemic risks in the banking system. Davis (2000) argues that fully functioning securities markets cannot develop overnight but need infrastructure such as alternative means of corporate control (hostile take-overs and direct influence by institutional investors) as well as means of reducing asymmetric information and aiding control by debt holders (rating agencies, changes in credit structure and possibly a lower debt/equity ratio). This risk of an unstable transition was arguably realized to some extent in Japan, and EMU countries may need to study closely the transition that the Japanese financial system is passing through at present (see also Hoshi et al (1999), Nakaso (1999)).

Further research and analysis in the area of “multiple avenues” could include the following:

- Assessment of the funding of unincorporated/small firms in diversified financial systems
- Investigation of patterns of bank financing in Germany and France, as well as in Sweden, where the contribution of securities issuance to corporate financing is small.

¹⁶ Historically many Continental European systems have been stabler than Anglo Saxon ones, but Japan (as well as the Scandinavian countries and Switzerland) shows the dangers once a relationship banking system is subject to competition and/or securitization.

¹⁷ This will reduce the benefits of intertemporal smoothing as per Allen and Gale, since savers will not accept lower yields on their deposits than obtainable via securities markets, while borrowers may also seek cheaper financing outside their traditional relationships (see Petersen and Rajan 1993).

- Focus on bank capital in the loans equations as a possible source of constraint on bank lending (as in the US “capital crunch” of the early 1990s).
- Different estimation techniques for the econometrics, including VARs which incorporate both debt-securities issuance and lending, which could enable some of the effects of cyclical and financial variables to be distinguished via impulse response functions¹⁸, as well as simultaneous estimation of securities and loan equations and estimation of the volatility of financing.
- Further consideration of policy issues, in particular those policies which enhance transparency, help to develop securities markets or render securities markets less vulnerable to liquidity failure. Note that although property rights, accounting standards, transparency etc. may be necessary conditions, it is not clear they are sufficient, as witness the UK experience of weak domestic securities markets. Arguably a strong institutional investor sector focused on debt securities is also needed.
- Further consideration of the buffer role of international capital markets. Do the favorable indications shown in the data apply only to advanced economies (which are less likely than emerging markets to face sudden constraints on international borrowing)?
- Use of micro data for the international capital markets to assess changing maturity of financings and credit quality of issuers during periods of turbulence. Following Davis and Mayer (1991) such an examination would also cast light on the nature of financial intermediation more generally. Note in this context that international markets may offer a “cleaner” dataset for examining the substitution between securities and lending, given all firms in the international market are of a certain size and credit quality, while domestic markets feature many firms that could not access securities markets.

VI. CONCLUSIONS

This paper has provided evidence on the benefits to an economy from “multiple avenues of intermediation”. The overall conclusion is that the existence of active securities markets alongside banks is beneficial to the stability of corporate financing, both during cyclical downturns and during banking and securities market crises. The benefits are to limit volatility arising from the normal patterns of credit demand and supply that obtain over the cycle, and changes in agency costs as companies’ net worth varies. While bank lending is largely cyclical, securities financing is more highly responsive to indicators of agency costs, implying a degree of complementarity in response to shocks. Multiple avenues also restrict the impact of undue limits on credit availability arising solely from weakness on the supply side, be it from liquidity crises in the securities markets or from liquidity or solvency problems among financial intermediaries (although it has been suggested that banks may be more capable of balancing securities market crises than vice versa – not least for smaller firms). The benefit from multiple

¹⁸ Using a VAR, besides obviously examining the effects of shocks in securities and loans on the “other form of financing”, one could assess the effects of liquidity shocks (rise in short rates) and solvency shocks (rise in credit quality spread) on financing. Any reverse effect of financing constraints on investment would also be indicated.

avenues will be greater, the more comparable the size of securities market and intermediated financing, as well as the larger the proportion of companies able to access both loan and securities markets. The analysis raises a number of policy issues and research topics for further investigation.

Table 1. Corporate External Financing/GDP

	Percent of GDP	Percent of GDP Since 1985	S.D. Percent of GDP	S.D. Percent GDP Since 1985
United States				
Credit market	3.15	2.92	1.65	1.89
Securities	1.65	1.81	0.72	0.84
Loans	1.50	1.11	1.48	1.44
United Kingdom				
Credit market	3.57	4.15	3.20	3.83
Securities	0.67	1.20	1.04	1.25
Loans	2.90	2.96	2.92	3.41
Japan				
Credit market	4.94	3.63	4.46	4.94
Securities	0.54	0.77	0.93	1.26
Loans	4.40	2.86	4.07	4.09
Canada				
Credit market	4.31	3.30	2.66	1.96
Securities	2.01	1.65	1.49	1.70
Loans	2.30	1.64	2.37	1.77

Table 2. Volatility and Correlation of Real Corporate Debt Financing Flows

	Coefficient of Variation	Correlations		
		Credit Market	Securities	Loans
United States				
Credit market	0.59	1.00		
Securities	0.56	0.64	1.00	
Loans	1.01	0.86	0.16	1.00
United Kingdom				
Credit market	1.03	1.00		
Securities	1.72	0.60	1.00	
Loans	1.10	0.94	0.28	1.00
Japan				
Credit market	1.03	1.00		
Securities	2.04	0.64	1.00	
Loans	1.01	0.97	0.45	1.00
Canada				
Credit market	0.61	1.00		
Securities	0.77	0.45	1.00	
Loans	1.04	0.81	-0.15	1.00

Table 3. Corporate Debt Financing Amid Financial Turbulence—United States 1970-99
(In billions of U.S. dollars, 1995 prices/percent of GDP, annual rates)

	Year Before	Quarter of Crisis	Year After	Year Before	Quarter of Crisis	Year After
US Franklin National (Q2 1974)						
Credit market	249	208	149	5.3	4.5	3.2
Securities	55	83	95	1.2	1.8	2.1
Loans	194	125	54	4.1	2.7	1.2
US Mexican default (Q3 1982)						
Credit market	211	178	100	4.1	3.5	1.9
Securities	83	59	55	1.6	1.2	1.1
Loans	129	119	45	2.5	2.3	0.9
US stock market crash (Q4 1987))						
Credit market	234	269	289	3.7	4.2	4.4
Securities	106	76	126	1.7	1.2	1.9
Loans	128	193	163	2.0	3.0	2.5
US bank capital crunch (Q1 1991)						
Credit market	149	-50	-51	2.2	-0.8	-0.8
Securities	66	59	66	1.0	0.9	1.0
Loans	83	-109	-117	1.2	-1.6	-1.8
US bond market reversal (Q1 1994)						
Credit market	50	138	141	0.7	1.9	1.9
Securities	97	60	53	1.4	0.8	0.7
Loans	-47	78	88	-0.7	1.1	1.2
US Russia/LTCM (Q3 1998)						
Credit market	367	334	406	4.6	4.1	4.9
Securities	240	186	227	3.0	2.3	2.7
Loans	127	149	180	1.6	1.8	2.2

Table 4. Equity Issuance, Trade Credit and Total Liabilities—US 1970-99
(In billions of U.S. dollars; 1995 prices/percent of GDP, annual rates)

	Year Before	Quarter of Crisis	Year After	Year Before	Quarter of Crisis	Year After
US Franklin National (Q2 1974)						
Trade credit	121	124	46	2.6	2.7	1.0
Equity issuance	26	16	13	0.5	0.3	0.3
Total liabilities	419	376	236	8.8	8.1	5.1
US Mexican default (Q3 1982)						
Trade credit	-12	42	5	-0.2	0.8	0.1
Equity issuance	-23	-12	28	-0.4	-0.2	0.5
Total liabilities	309	339	216	5.9	6.6	4.1
US stock market crash (Q4 1987)						
Trade credit	48	88	60	0.8	1.4	0.9
Equity issuance	-101	-148	-142	-1.6	-2.3	-2.2
Total liabilities	316	520	427	5.0	8.0	6.5
US bank capital crunch (Q1 1991)						
Trade credit	34	-53	26	0.5	-0.8	0.4
Equity issuance	-73	-7	20	-1.1	-0.1	0.3
Total liabilities	214	94	75	3.2	1.4	1.1
US bond market reversal (Q1 1994)						
Trade credit	38	53	79	0.5	0.7	1.1
Equity issuance	22	-10	-46	0.3	-0.1	-0.6
Total liabilities	230	144	248	3.3	2.0	3.4
US Russia/LTCM (Q3 1998)						
Trade credit	45	0	38	0.6	0.0	0.4
Equity issuance	-126	-288	-276	-1.6	-3.5	-3.3
Total liabilities	384	476	531	4.8	5.8	6.4

Table 5. Corporate Debt Financing Amid Financial Turbulence—
United Kingdom 1970-99

(In billions of GBP, 1995 prices/percent of GDP, annual rates)

	Year Before	Quarter of Crisis	Year After	Year Before	Quarter of Crisis	Year After
UK Secondary banking crisis (Q4 1973)						
Credit market	27.3	50.5	32.9	5.9	10.9	7.3
Securities	0.7	0.3	-0.1	0.2	0.1	0.0
Loans	26.5	50.2	33.0	5.7	10.9	7.3
UK Small banks crisis (Q1 1991)						
Credit market	37.7	7.3	9.0	5.7	4.4	1.4
Securities	4.3	0.9	6.2	0.7	0.5	0.9
Loans	33.4	6.4	2.8	5.1	3.9	0.4

Table 6. Equity Issuance, Foreign Financing and Total Liabilities—
United Kingdom 1970-2000

(In billions of GBP, 1995 prices/percent of GDP, annual rates)

	Year Before	Quarter of Crisis	Year After	Year Before	Quarter of Crisis	Year After
UK Secondary banking crisis (Q4 1973)						
Overseas finance	9.3	6.6	11.4	2.0	1.4	2.5
Equity issuance	0.9	0.3	0.2	0.2	0.1	0.1
Total liabilities	34.9	60.2	44.5	7.5	13.0	9.8
UK Small banks crisis (Q1 1991)						
Overseas finance	22.8	5.1	18.2	3.5	0.8	2.8
Equity issuance	3.4	1.0	13.1	0.5	0.1	2.0
Total liabilities	63.9	13.3	40.3	9.7	2.0	6.2

Table 7. Corporate Debt Financing Amid Financial Turbulence—Japan 1970-99
(In trillions of Japanese yens, 1995 prices/percent of GDP, annual rates)

	Year Before	Quarter of Crisis	Year After	Year Before	Quarter of Crisis	Year After
Japanese monetary tightening credit restrictions (Q3 1990)						
Credit market	73.9	71.6	49.2	10.3	9.6	6.6
Securities	12.0	8.2	5.2	1.7	1.1	0.7
Loans	61.8	63.4	44.0	8.6	8.5	5.9
Japanese banking crisis (Q4 1993)						
Credit market	18.9	31.5	4.8	2.5	4.1	0.6
Securities	2.5	6.2	1.0	0.3	0.8	0.1
Loans	16.5	25.3	3.8	2.2	3.3	0.5
Japan Yamaichi/LTCB failures (Q4 1997)						
Credit market	1.8	56.0	-6.3	0.3	7.1	-0.8
Securities	2.3	3.8	1.5	0.3	0.5	0.2
Loans	-0.5	52.2	-7.9	0.0	6.6	-1.0

Table 8. Trade Credit—Japan 1970-2000
(In trillions of Japanese yen, 1995 prices/percent of GDP, annual rates)

	Year Before	Quarter of Crisis	Year After	Year Before	Quarter of Crisis	Year After
Japanese monetary tightening/credit restrictions (Q3 1990)						
Trade credit	27.7	23.0	14.6	3.9	3.1	1.9
Japanese banking crisis (Q4 1993)						
Trade credit	-4.5	55.2	-1.4	-0.6	7.2	-0.2
Japan Yamaichi/LTCB failures (Q4 1997)						
Trade credit	7.0	37.3	-19.6	0.8	4.7	-2.5

Table 9. Corporate Debt Financing Amid Financial Turbulence—Canada 1970-2000

(In billions of Canadian dollars, 1995 prices/percent of GDP, annual rates)

	Year Before	Quarter of Crisis	Year After	Year Before	Quarter of Crisis	Year After
Canada Northland Banking Crisis (Q2 1985)						
Credit market	17.7	7.0	20.5	2.7	1.1	3.1
Securities	6.2	-0.2	7.1	0.9	0.0	1.1
Loans	11.6	7.1	13.4	1.8	1.1	2.0

Table 10. Corporate Debt Financing Amid Financial Turbulence—Canada 1970-2000
(In billions of Canadian dollars), 1995 prices/percent of GDP, annual rates)

	Year Before	Quarter of Crisis	Year After	Year Before	Quarter of Crisis	Year After
Canada Northland Banking Crisis (Q2 1985)						
Trade credit	4.1	-1.2	0.9	0.6	-0.2	0.1
Equity issuance	13.2	21.2	15.0	2.0	3.2	2.3
Total liabilities	37.1	18.9	38.1	5.7	2.9	5.7

Table 11. Volatility and Correlation of Gross Corporate Debt Financing
in International Capital Markets

	Coefficient of Variation	Correlations				
		Eurobonds	Credit Facilities	Total		
United States						
Eurobonds	1.28	1.00				
Credit facilities	1.02	0.75	1.00			
Total euromarket	1.02	0.80	1.00	1.00		
Memo: Total credit market finance	n.a.	0.74	0.63	0.66	1.00	
United Kingdom						
Eurobonds	1.17	1.00				
Credit facilities	1.16	0.70	1.00			
Total euromarket	1.11	0.80	0.99	1.00		
Memo: Total credit market finance	n.a.	0.66	0.61	0.66	1.00	
Japan						
Eurobonds	0.91	1.00				
Credit facilities	3.02	-0.11	1.00			
Total euromarket	0.85	0.86	0.41	1.00		
Memo: Total credit market finance	n.a.	0.36	-0.34	0.15	1.00	
Canada						
Eurobonds	0.99	1.00				
Credit facilities	0.90	0.23	1.00			
Total euromarket	0.82	0.38	0.99	1.00		
Memo: Total credit market finance	n.a.	-0.10	0.22	0.19	1.00	

Table 12. Changes in Corporate Financing in International Capital Markets during Turbulence

(In billions of U.S. dollars equivalent)

(4Q/4Q Percent Change)	Mexican Default Q3 1982	Stock Market Crash Q4 1987	Bond Market Q1 1994	Russia/ LTCM Q4 1998
Eurobonds				
United States	41.85	-29.41	19.09	58.14
United Kingdom,	413.60	12.32	-40.78	60.94
Japan	-61.94	4.62	-45.97	-30.92
Canada	-29.63	11.50	-14.55	37.79
Syndicated Credits and Note Facilities				
United States	-73.58	73.11	52.40	-14.93
United Kingdom	-15.90	99.92	64.97	-9.61
Japan	2,489.15	4,347.70	-12.38	2,989.78
Canada	-9.80	295.58	66.22	-10.90
Syndicated Credits				
United States	-83.50	89.39	56.61	-14.06
United Kingdom	-47.85	394.20	89.27	-14.05
Japan	na	na	0.53	3,162.31
Canada	667.74	441.46	75.36	-14.25
Total				
United States	-64.54	54.51	50.31	-9.72
United Kingdom	21.14	79.61	24.47	4.35
Japan	-45.54	11.85	-45.54	119.43
Canada	-15.26	225.57	41.82	-7.15

Table 13. Changes in Financing of Domestic Companies in International Capital Markets during Domestic Turbulence

(In billions of U.S. dollars equivalents)

4Q/4Q Percent Change	US Bank Capital Crunch	UK Small Banks	Japan Tightening	Japan Crisis	Japan Failures	Canada Northlands
	1991:Q1	1991:Q1	1990:Q3	1993:Q4	1997:Q4	1985:Q2
Eurobonds	23.76	68.07	23.83	-16.08	-47.17	178.32
Credits and Facilities	-16.19	-25.96	-90.36	-12.38	48.09	100.93
Credits	-15.34	-31.05	-89.26	0.53	42.17	114.93
Total	-14.02	-14.79	8.35	-16.03	-43.73	111.34

Table 14. Dickey-Fuller Unit Root tests

	United States	United Kingdom	Japan	Canada
D1 real securities	-4.9**	-1.1	-3.8**	-4.3**
D1 real loans	-6.2**	-4.9**	-3.6**	-8.1**
D1 real borrowing	-5.5**	-5.0**	-3.2*	-7.1**
D1 investment	-3.7**	-4.7**	-3.2*	-3.5**
D1 short rate	-3.9**	-6.0**	-3.8**	-4.1**
D1 corporate risk spread	-4.2**	-5.7**	-5.4**	-4.0**
D1D1 share prices	-6.0**	-5.4**	-6.0**	-5.1**
D1 term structure	-6.2**	-6.6**	-6.0**	-4.1**
Securities/investment ratio	-3.2*	-0.1	-1.8	-4.0**
Loans/investment ratio	-3.2*	-3.1*	-1.8	-4.0**
Borrowing/investment ratio	-2.8	-2.6	-1.7	-3.6**
Investment/GDP ratio	-2.5	-3.0	-2.1	-3.9**
Term structure	-2.9	-2.4	-3.1*	-3.1
Short rate	-2.5	-2.9	-3.5**	-2.6
D1 share prices	-6.4**	-5.6**	-4.1**	-6.1**
Corporate risk premium	-3.9**	-3.0	-3.4**	-3.7**

Notes:

** denotes stationarity accepted at 95%; * at 90 percent

D1 indicates a first-differenced variable

D1D1 indicates a second-differenced variable

Table 15. Econometric Estimates for Changes in Flows of External Finance—United States
(1970Q3-1999Q4); t values in parentheses)

Dependent Variable Independent Variables	D1 Real Credit Market Financing	D1 Real Securities Issuance	D1 Real Intermediated Lending
Constant	-2531 (3.0)	375 (4.2)	434 (4.3)
D1 Real investment	1271 (4.6)	317 (1.8)	792 (2.7)
D1 Short rate		-106 (2.4)	
D1 Credit spread			-571 (2.6)
D1D1 Share price	-2264 (2.2)	1526 (2.7)	-4159 (4.1)
D1 Term spread		-129 (3.0)	
Financing/Investment ratio (-1)	-4.8 (6.3)	-33 (5.5)	-4.0 (5.7)
Investment/GDP ratio (-1)	21840 (3.7)		
Term spread (-1)		-33 (1.5)	
Short rate (-1)			
D1 Share price (-1)	-2920 (2.3)	1159 (1.7)	-4852 (3.6)
Credit spread (-1)			
R ²	0.33	0.27	0.35
DW	2.3	2.3	2.3
SE	649	351	649

Table 16. Econometric Estimates for Changes in Flows of External Finance—United Kingdom

((1970Q2-1999Q4) ; t values in parentheses)

	D1 Real Credit Market Financing	D1 Real Securities Issuance	D1 Real Intermediated Lending
Constant	-45 (1.1)	20 (3.5)	-115 (2.9)
D1 Real investment	1696 (3.6)		1912 (4.5)
D1 Short rate			
D1 Credit spread			
D1D1 Share price		21.9 (1.9)	
D1 Term spread			
Financing/Investment ratio (-1)	-0.15 (6.1)	-0.13 (5.4)	-0.21 (7.8)
Investment/GDP ratio (-1)	393 (1.7)		804 (3.7)
Term spread (-1)		-1.52 (2.9)	-3.4 (2.6)
Short rate (-1)		-1.6 (3.3)	
D1 Share price (-1)			-89 (2.3)
Credit spread (-1)			
R ²	0.31	0.2	0.47
DW	2.2	2.1	2.2
SE	40	13	34

Table 17. Econometric Estimates for Changes in Flows of External Finance—Japan
((1970Q2-1999Q4) ; t values in parentheses)

	D1 Real Credit Market Financing	D1 Real Securities Issuance	D1 Real Intermediated Lending
Constant	-1133 (1.8)	192 (4.9)	-1001 (1.7)
D1 real investment			3.5 (2.1)
D1 short rate			
D1 credit spread			
D1D1 share price	1313 (1.9)		
D1 Term spread			
Financing/Investment ratio (-1)	-684 (6.1)	-1252 (9.5)	-850 (6.8)
Investment/GDP ratio (-1)	6444 (3.0)		5107 (2.4)
Term spread (-1)			
Short rate (-1)		15 (1.8)	52 (2.3)
D1 Share price (-1)	2472 (3.2)	354 (1.8)	1504 (2.7)
Credit spread (-1)			
R ²	0.56	0.59	0.56
DW	506	153	425
SE	2.6	2.1	2.5

Note: Dummy in securities equation for deregulation of the bond market (1 to Q4 1984, 0 thereafter);
coefficient -140 (3.3)

Table 18. Econometric Estimates for Changes in Flows of External Finance—Canada
(1970Q3-1999Q4) ; t values in parentheses)

	D1 Real Credit Market Financing	D1 Real Securities Issuance	D1 Real Intermediated Lending
Constant	-405 (3.5)	-211 (2.5)	-58 (0.5)
D1 Real investment	520 (2.0)		969 (3.2)
D1 Short rate	24.1 (2.7)	-22 (2.9)	46 (5.0)
D1 Credit spread			-140 (1.8)
D1D1 Share price			-321 (3.0)
D1 Term spread			
Financing/Investment ratio (-1)	-0.86 (7.0)	-1.7 (13.7)	-1.1 (9.4)
Investment/GDP ratio (-1)	3067 (4.3)	1724 (1.3)	1040 (1.9)
Term spread (-1)			-28 (3.7)
Short rate (-1)			
D1 Share price (-1)			-457 (2.1)
Credit spread (-1)	-73 (1.9)		
R ²	0.39	0.62	0.54
DW	2.2	2.0	2.2
SE	98	89	101

Table 19. Inclusion of “High Yield Bond Issues” in the US Credit Market,
Loan and Securities Equations

(* instrumented by three lags)

Equation	Credit Market Financing		Securities Financing		Loan Financing	
Data period	Difference of real high yield bonds*	Lagged high yield bond/ investment ratio	Difference of real high yield bonds*	Lagged high yield bond/ investment ratio	Difference of real high yield bonds*	Lagged high yield bond/ investment ratio
1971-99	7.4 (2.1)	23.2 (2.0)	4.9 (2.5)	-	-	-
1982-99	-	-	5.7 (2.1)	-	-	-

Table 20. Dummies in Equations for Shifts in Financing after Crises
 (* significant at 90 percent, ** significant at 95 percent level)

Country	Period	Dummy for Credit Market Financing	Dummy for Securities Financing	Dummy for Loan Financing	
United States (USD billion AR)	Q2 74	34	13	-12	
	Q3 74	-1	31	-52	
	Q3 82	34	-21	40	
	Q4 82	-111	-84**	-5	
	Q4 87	20	29	2	
	Q1 88	59	-3	31	
	Q1 91	-96	-33	-124*	
	Q2 91	58	24	-22	
	Q1 94	31	-28	36	
	Q2 94	-42	-1	-71	
	Q3 98	-60	-55	16	
	Q4 98	20	-66*	137**	
	United Kingdom (GBP billion AR)	Q4 73	18	1	24
		Q1 74	-6	2	4
Q1 91		3	-2	-4	
Q2 91		-16	2	-24*	
Japan (JPY trillion AR)	Q3 90	905*	108	534	
	Q4 90	506	239	-28	
	Q4 93	-37	-80	-93	
	Q1 94	-471	-84	-308	
	Q4 97	825*	-121	779*	
	Q1 98	-2222**	-222	-1851**	
Canada (C\$ billion AR)	Q2 85	-14	-13	-1	
	Q3 85	13	19**	-13	

Chart 1. US Corporate Debt Securities Issuance and Intermediated Borrowing (1995 prices)

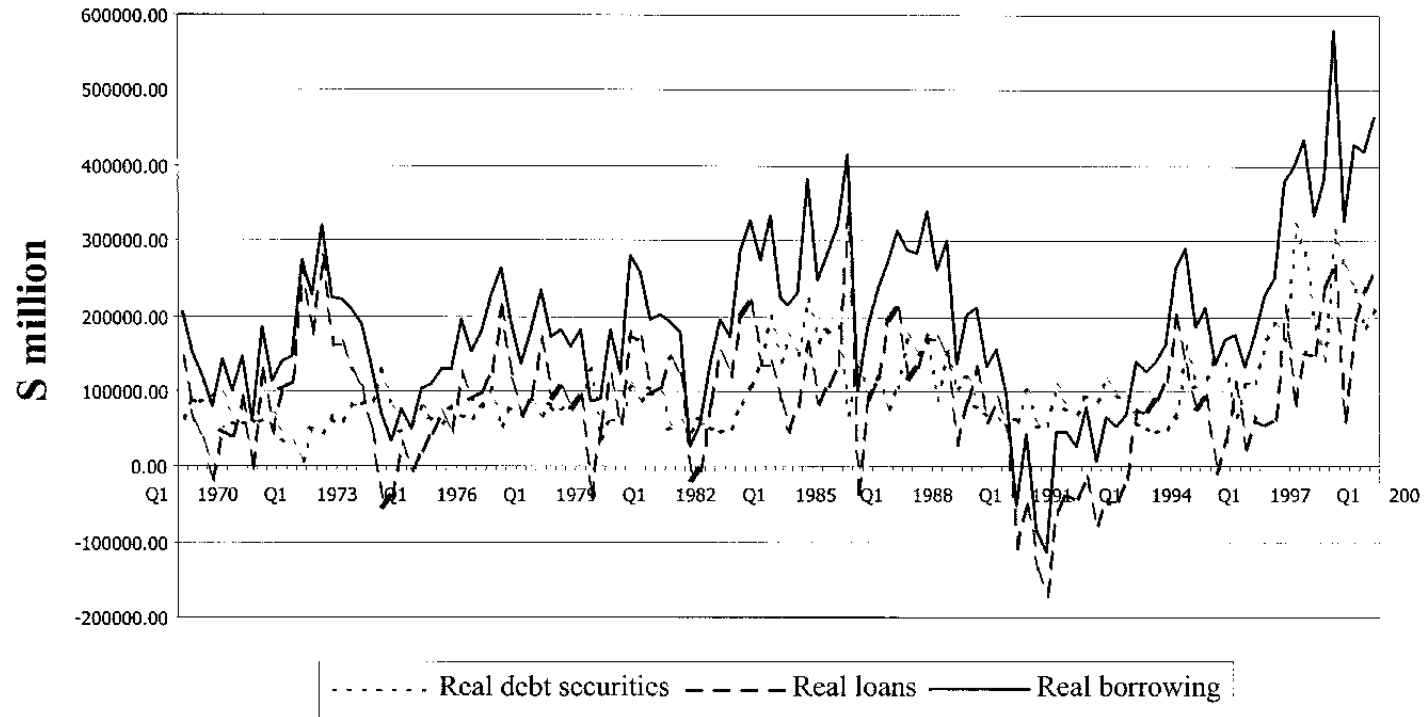


Chart 2. UK Corporate Debt Securities Issuance and Intermediated Borrowing (1995 prices)

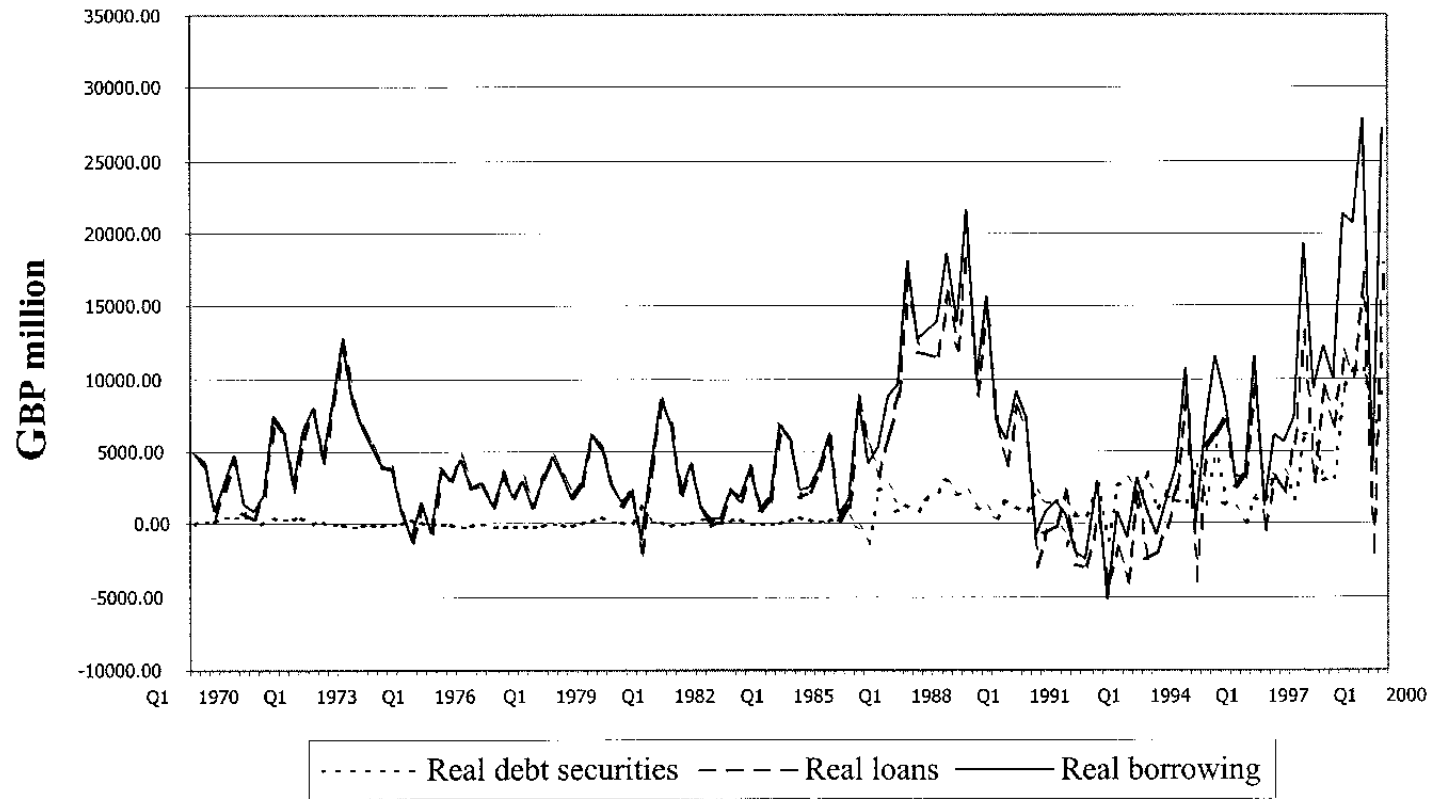


Chart 3. Japanese Corporate Debt Securities Issuance and Intermediated Borrowing (1995 prices)

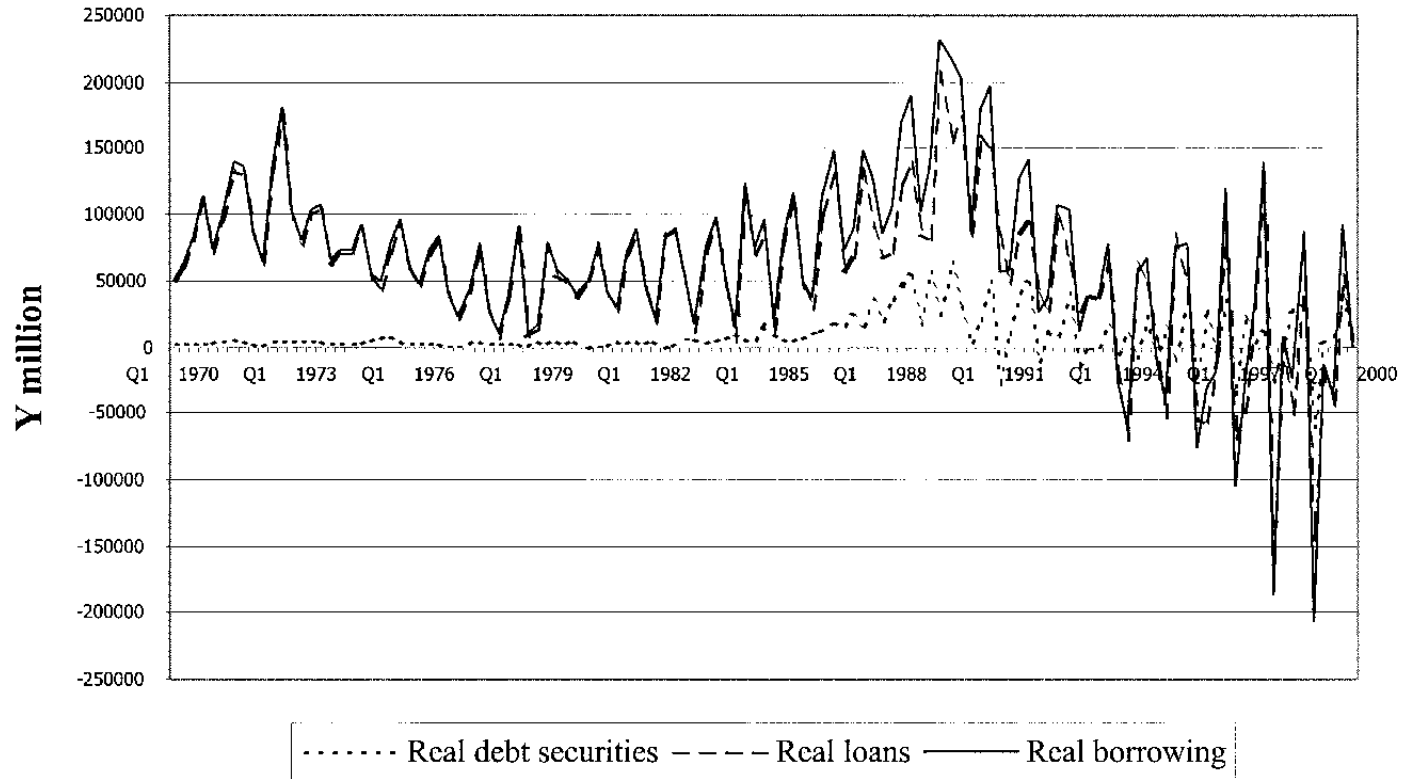


Chart 4. Canadian Corporate Debt Securities Issuance and Intermediated Borrowing (1995 prices)

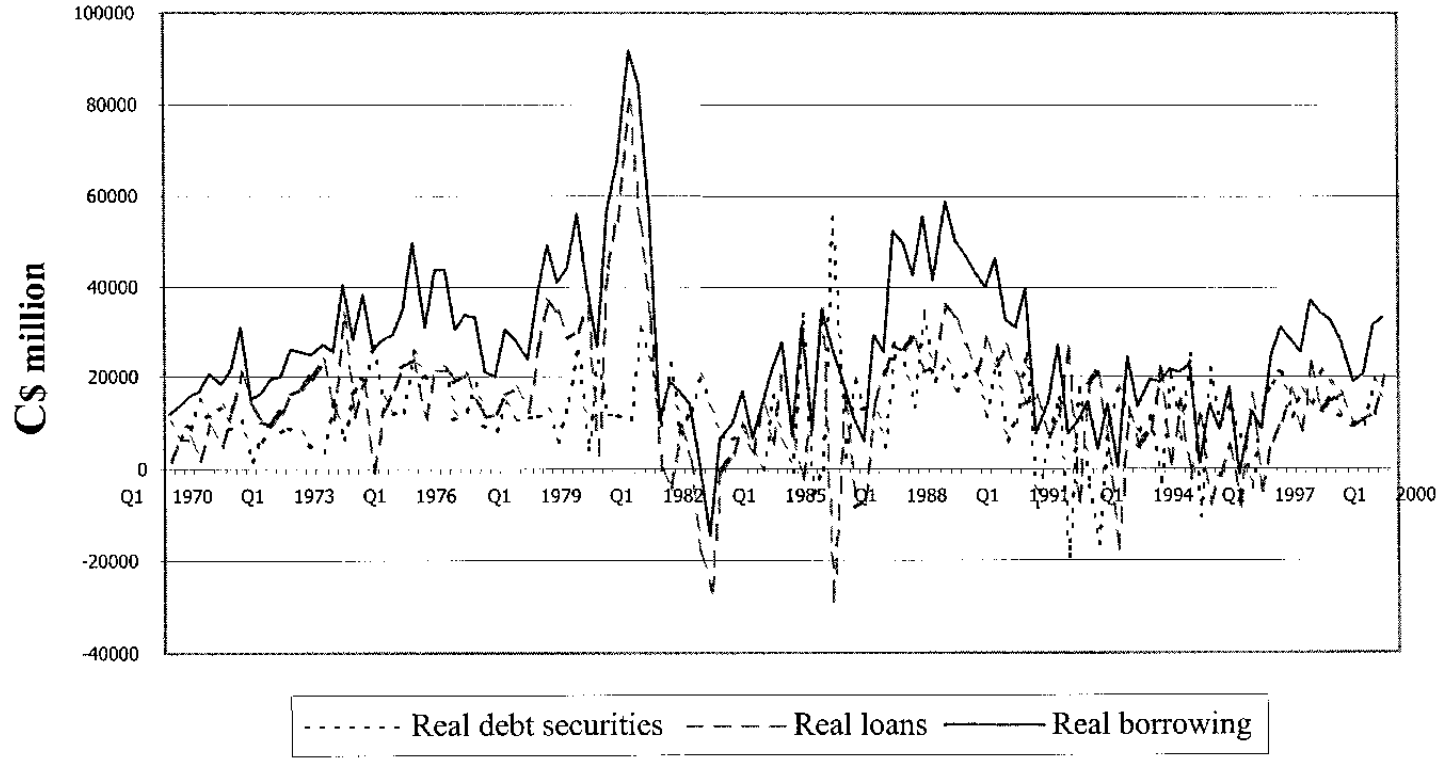
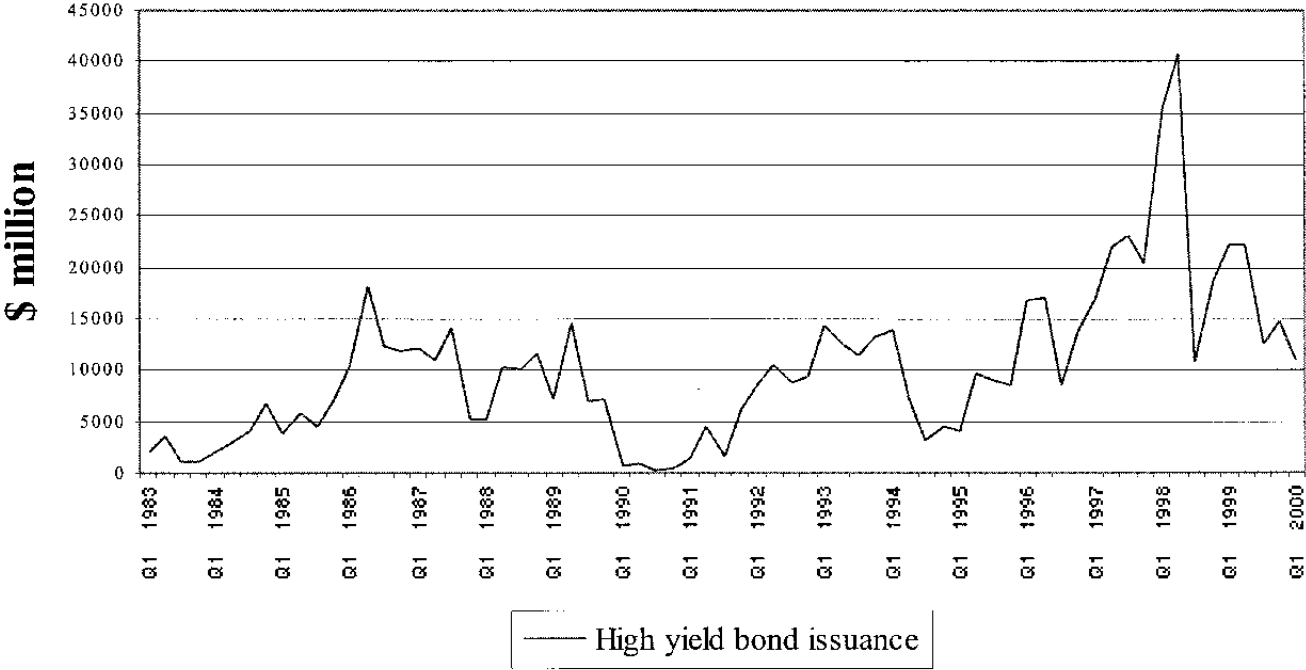


Chart 5. US high-yield bond issuance (1995 prices)



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