WHY ARE UK BANKS' OVERSEAS ASSETS AND LIABILITIES SO LARGE?

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Abstract

The overseas assets and liabilities of UK banks account for over 50% of the overseas assets and liabilities of all UK residents and almost 50% of UK banks' total assets and liabilities. They are much larger than the overseas assets of banks in other developed countries. This paper adopts an institutional, theoretical and empirical approach to explain the large size of these overseas assets. We find that over 80% of these assets and liabilities are accounted for by foreign-owned UK banks and their large size may be traced to the development of the Euro-currency markets in London in the late 1950s and 1960s. Although net overseas bank assets can, in principle, be explained, the gross assets are more problematic. The theoretical literature is quite limited and the most appropriate macroeconomic framework would be complex and difficult to apply. We therefore examine some simpler empirical hypotheses about the size of these assets and liabilities but find that they are rejected by the data. We conclude that while an institutional and theoretical approach reveals the nature of UK banks' overseas assets and liabilities and suggests some of their determinants, developing a satisfactory empirical model is quite difficult.

Key words: UK banks, overseas assets and liabilities, foreign-owned, euro-currency markets.

JEL classification: G21, F32, F34.

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1. Introduction

To avoid confusion, we begin this paper by defining our terms. Our bank definitions are summarised in Figure 1. We make a crucial distinction between the residency and ownership of banks. For this paper, we use the term **UK banks** to refer to all banks (branches and offices) *resident* in the UK[1]. This is the definition used for UK balance of payments purposes and includes the UK offices of institutions authorised under the Banking Act 1987 plus the banking Department of the Bank of England (ONS, 1998, p. 139). It excludes the offices abroad of British-owned or foreign-owned banks, which we classify as **overseas banks**. We use the term British-owned to refer to banks owned by UK residents, and the term foreign-owned to refer to banks owned by non-UK (i.e. overseas) residents. The focus of this paper is on UK banks and the crucial distinction between British-owned and foreign-owned UK banks.

We define the **overseas assets** of UK banks as claims on overseas residents by UK banks and the **overseas liabilities** of UK banks as liabilities to overseas residents. These assets and liabilities are classified, for balance of payments purposes, into direct investment, portfolio investment, and other investment[2]. This paper focuses upon the other investment (i.e. loans and deposits) of UK banks.

The overseas assets and liabilities of UK banks account for over 50% of the overseas assets and liabilities of all UK residents and account for almost 50% of UK banks' total assets and liabilities. Further, they are much larger than the overseas assets of banks in other developed countries. Why are the overseas assets and liabilities of UK banks so large? This paper adopts an institutional, theoretical and empirical approach to this question.

To summarise the findings of this paper, most of these assets and liabilities are foreign currency loans and deposits, although overseas portfolio investments have become increasingly important since 1980. The size of these assets and liabilities is mainly attributable to the presence of foreign-owned UK banks and the location of the Euro-currency markets in London. Although they account for roughly half of the UK's gross overseas investment flows and investment income, these flows have very little impact on or relationship to the UK economy, except through their net investment income. Their relative size makes them of interest, and estimates of UK banks' international investment income would benefit from a model of the gross assets. Although net overseas bank assets can, in principle, be explained, the gross assets are more problematic. The theoretical literature is quite limited and the most appropriate macroeconomic framework would be complex and difficult to apply. We therefore examine some simpler empirical hypotheses about the size of these assets and liabilities but find that they are rejected by the data. We conclude that while an institutional and theoretical approach reveals the nature of UK banks' overseas assets and liabilities and suggests some of their determinants, developing a satisfactory empirical model is quite difficult.

The paper is structured as follows. The next section demonstrates the absolute and relative size of UK banks' overseas assets and liabilities and analyses their composition. Section 1.2 explains why it is important to understand and be able to model these overseas assets and liabilities. Section 2 adopts an institutional approach to the question using disaggregated data produced by the Bank of England. Section 3 surveys existing macroeconomic models that attempt to explain the size of banks' overseas assets. Section 4 empirically examines some simple hypotheses about the size of these assets. Section 5 concludes. Two short appendices complete the paper. Appendix A surveys reasons why foreign-owned banks might have located in the UK while Appendix B critiques microeconomic banking models.

1.1. The size of UK banks' overseas assets and liabilities

Comprehensive data on the overseas assets and liabilities of UK banks is published by the Office for National Statistics (ONS) in the *UK Balance of Payments,* also known as *The Pink Book.* Several important changes regarding the presentation, methodology and coverage of this data were made in the 1998 edition[3]. Grice (1998) explains how this data is compiled. The most recent data on the overseas assets and liabilities of UK banks at the end of 1997 is shown in Table 1. It shows that UK banks had gross overseas assets of £1,028bn (compared to UK GDP of £802bn), with net overseas liabilities of £79bn. These assets and liabilities comprise 53-55% of total UK overseas assets and liabilities, down from nearly 70% in 1983.

UK banks' overseas assets and liabilities are dominated by other investment, which mainly consists of loans and deposits. Over 86% of these loans and deposits are denominated in foreign currency. This proportion has varied around 90% since the early 1970s. Banks' other investment accounts for about 76% of total UK other investment overseas.

UK banks account for 32% of UK overseas portfolio investment, but 58% of investment in overseas bonds and money market instruments[4]. Portfolio assets have increased from less than 1% of UK banks' overseas assets in 1979 to 20% in 1997.

Equity investment and direct investment are relatively insignificant for UK banks. Inward direct investment in UK banks has exceeded outward direct investment by UK banks since 1982.

This data has shown the importance of UK banks in UK overseas assets and liabilities. It is also useful to consider UK banks' overseas assets in the context of their whole balance sheet. The Bank of England publishes balance sheet data for UK banks in *Monetary and*

Financial Statistics and the *Statistical Abstract* but the format and detail differs from that published by the ONS in the *UK Balance of Payments*. We carefully combine these two data sources to obtain the balance sheet analysis presented in Table 2.

Table 2 shows that overseas residents accounted for about 42-45% of UK banks' assets and liabilities at the end of 1997. While total assets and liabilities of UK banks are split fairly evenly between sterling and foreign currency, this masks a sharp difference between UK and overseas residents. For example, 79-84% of UK residents' loans and deposits with UK banks are denominated in sterling, while 86% of overseas residents' loans and deposits with UK banks are denominated in foreign currency. This may partly reflect a home currency preference of depositors and borrowers and the small role that sterling plays as an international currency.

Table 3 shows that the overall balance sheet composition of UK banks has remained fairly stable despite a rapid growth in total assets since 1977[5]. Deposits account for just over 80% of liabilities with issues of certificates of deposit (CDs) and other paper accounting for a further 10%. The main change to note is the increase in the investment/asset ratio from 3% to 6% between 1980 and 1985, and a further increase from 6% to 13% between 1990 and 1996[6]. The proportion of this invested overseas increased from 35% to 61% between 1980 and 1985 but only increased very slightly since[7]. The proportion of loans and deposits accounted for by overseas residents increased to a peak in the mid-1980s, before declining somewhat.

Finally, we note that UK banks' overseas assets (other than direct and portfolio investment) are large relative to the overseas assets of banks in other developed countries. Table 4 shows that in 1996 UK banks' overseas assets were 30% larger than those of Japan and the US. They were also a larger proportion of GDP and of total overseas assets for all five countries shown. UK banks (but not UK-owned banks)

currently have the largest share of overseas bank assets and liabilities in the BIS area (BIS, 1998).

1.2. The importance of UK banks' overseas assets and liabilities

The previous section demonstrated the large size of UK banks' overseas assets and liabilities. Why are they important to study? There are two main reasons. First, these assets and liabilities, and the associated flows of investment and investment income, form a large part of the UK balance of payments and international investment position. Between 1979 and 1995, UK bank's other investment averaged 53% of total UK overseas assets, 64% of total UK overseas liabilities, 40% of total UK investment outflows, 49% of total UK investment inflows, 59% of total UK investment income due on overseas assets, and 67% of total UK investment income due on overseas liabilities. UK banks' overseas investment income receipts and payments averaged 38-39% of the UK's exports and imports of goods over the same period[8]. Their large role in the UK balance of payments statistics makes it important to understand the nature of these assets and liabilities.

Second, we need a suitable theoretical and empirical model to provide forecasts and predictions of these assets and liabilities, and the associated income and investment flows, as part of a model of the UK balance of payments. Chaundy (1999a) shows that *net* flows of bank investment (other than direct and portfolio investment) are the accommodating item in the balance of payments and exogenous for banks as a whole. They are determined by the net flows of trade, transfers, investment income and direct and portfolio investment. In principle, we can therefore explain the *net* flows of bank investment and consequently the *net* overseas assets (i.e. overseas assets less overseas liabilities) of UK banks (*cf.* Bakker, 1993). However, we still need a banking model to explain the *gross* flows and the *gross* stocks of overseas assets and liabilities.

In addition, while we can predict the yield on these assets and liabilities (see Chaundy, 1999b), a complete model of bank investment income requires us to explain the *gross* stock of assets and liabilities[9]. We are unable to use our model of *net* overseas assets to explain *net* overseas investment income as the yield on assets differs from that on liabilities. To clarify, net bank investment income, y_b, may be defined as:

$$y_b \equiv i_A.A - i_L.L \qquad (1)$$

where A is the stock of overseas assets, L the stock of overseas liabilities, and i_A and i_L the respective rates of return. Clearly if $i_A = i_L = i$ we can use net overseas assets $(A\text{-}L)$ and the common yield, i, to predict y_b. However, as Figure 2 shows, i_A and i_L are not the same, and the difference between them varies over time. This difference is large enough, given the size of the gross assets and liabilities, to produce a large error in the estimate of UK banks' net investment income, particularly since 1979[10]. Figure 3 illustrates this where the predicted net income is equal to the yield on assets multiplied by the net assets. The predicted income for 1995 and 1996 is about -£9bn, compared to the actual net income of about -£4bn. Hence, a model of the UK banks' gross overseas assets and liabilities would be helpful in explaining their overseas investment income.

2. A Statistical and Institutional Perspective

Analysing bank balance sheet data by ownership of bank reveals an important institutional feature of UK banks' overseas assets and liabilities. This is done in Table 5. It shows that British-owned UK banks are more orientated towards UK residents in their loans and deposits, while foreign-owned UK banks are more orientated towards overseas residents[11]. For example, in 1996, UK residents accounted for 80-87% of the deposits and loans of British-owned UK banks, while overseas residents account for 66-71% of the deposits and loans of foreign-owned UK banks.

Apart from this, the balance sheets of British-owned and foreign-owned UK banks are quite similar. Two minor differences are the greater use of the repo market by foreign-owned banks and their lower capitalisation compared to British-owned banks. The latter may partly reflect the fact that UK branches (but not subsidiaries) of non-UK incorporated banks are not required to maintain capital in the UK (Bank of England, 1990, p. 1). Differences in asset composition may also imply that foreign-owned banks need to hold less risk-weighted capital[12].

The implication of this difference in orientation for the composition of UK banks' domestic and overseas assets is shown in Table 6. The top part of the table shows that, in 1996, foreign-owned UK banks accounted for 56% of UK banks' assets, but 82% of their overseas deposits and 86% of their overseas loans. By contrast, British-owned UK banks dominated deposits from and loans to UK residents with 68% of the total. This suggests a somewhat segmented banking market. The bottom part of the table shows that this pattern is broadly representative of the whole period since 1975. Clearly, a major institutional reason for the large size of UK banks' overseas assets is the presence and activity of foreign-owned banks located in the UK.

We noted earlier that almost 90% of these overseas loans and deposits are denominated in foreign currency. They therefore form part of the Eurocurrency market in London. The current importance of these overseas deposits and foreign-owned banks can be traced to the growth of the Euro-currency market in London in the late 1950s and 1960s (Bank of England Quarterly Bulletin, 1964, 1968, 1970)[13]. This is shown graphically in Figures 4, 5 and 6 by carefully assembling the available data over the period 1951 to 1996. Note that comprehensive UK banking statistics began in 1975. Before this date, the data must be used with some caution. In particular, some deposits and advances were not allocated to UK or overseas residents prior to 1957-58 and comprehensive statistics on foreign banks only began in 1962. While

there are some breaks and incomplete data prior to 1975, the broad picture is quite clear[14].

Figure 4 shows that the share of UK banks' overseas deposits accounted for by foreign-owned UK banks grew steadily throughout the 1950s and 1960s. Foreign-owned UK banks have dominated UK overseas loans and deposits since the late 1960s. While UK accepting houses and other British banks were relatively more important in the early 1950s[15], total overseas bank deposits were less than 10% of total UK bank deposits (see Figure 5). Foreign-owned UK banks have always accepted a majority of their deposits from overseas residents as shown in Figure 5, while UK clearing banks (and British-owned UK banks in general) have only received a minority of their deposits from overseas. The main reason for the growth in overseas deposits as a proportion of total UK bank deposits in the 1950s and 1960s is due to the rapid growth in the size of foreign-owned banks in this period. This is clearly seen in Figure 6. The share of total UK bank deposits held by foreign-owned UK banks was less than 10% in the mid 1950s. It then grew quite rapidly through the 1960s and early 1970s and has fluctuated around 60% since the mid-1970s.

Further insight into the nature of these overseas assets can be found by examining the data in Table 7 (based on Lamb, 1986, Table C). It shows the major net suppliers (depositors) or users (borrowers) of funds to and from UK banks between 1965 and 1996. Most of these transactions are in foreign currency and with foreign-owned UK banks. Two main features of the data are evident. First, the volume of cross-border flows has increased considerably over time. For example, the supply of funds from Switzerland roughly doubled every five years between 1970 and 1990. Second, the pattern of funds has changed. While Switzerland has been a consistent net supplier of funds, and Japan a consistent net user, the USA was a net user up to the 1970s, a net supplier in the 1980s, and is now a net user again. Canada was an important net supplier in the early 1970s, but was a large net user in the 1990s. Other countries and areas have also

switched between net suppliers and net users. The ultimate residence of the suppliers and users of the funds may differ from that shown. For example, some US nationals may deposit money with Swiss banks, which is then lent to US banks via their London branches.

London serves as an international banking centre where deposits and loans are recorded (see Niehans, 1984, Ch. 9). For example, in 1985, Japanese banks booked 40% of their international business through their London branches and subsidiaries while US banks booked 25% of their international business through London (Lamb, 1986). Many of these assets and the associated flows are interbank deposits (Lamb, 1986; BIS, 1983).

Although these cross-border flows and the corresponding overseas assets and liabilities are recorded in the UK balance of payments, they have very little impact on the UK economy. As they are mainly in non-sterling they have little implication for the sterling exchange rate. The main contribution to the UK economy is probably through the net interest income on these loans and deposits and the associated employment and other operating expenses of the branches and offices. However, as much of this interest income is attributable to foreign-owned UK banks, the profits from these operations may be repatriated abroad[16].

We conclude from the above analysis that foreign-owned UK banks are primarily responsible for the large size of UK banks' overseas assets and liabilities. These assets form part of the Eurocurrency market in London, and their large size may be traced to the growth of these markets in the 1950s and 1960s. While a numerically important part of the UK balance of payments, they have little direct impact on the UK economy. The UK acts as an international banking centre through which deposits and loans are recorded, many of which are interbank transactions. The fluctuating pattern in the supply and use of funds, and need to explain the extent of interbank re-depositing,

may make it difficult to model the gross flows and assets. We now turn to theoretical explanations for these international banking flows.

3. A Theoretical Perspective

There are three broad strands of the banking literature that are potentially important in explaining the determinants of UK banks' overseas assets and liabilities: theories of bank location, microeconomic banking models, and macroeconomic theories. Given the importance of foreign-owned banks emphasised in Section 2, a complete explanation of the overseas assets of UK banks must explain why foreign banks have chosen to locate in London. However, as the number of foreign banks in London does not necessarily explain the size of their gross overseas assets we leave this discussion to Appendix A.

It has been increasingly popular to build macroeconomic models with explicit microeconomic foundations. The use of representative agent models is one example of this. We therefore examined the available microeconomic banking models to see if they could be used to build a macroeconomic model of UK banks' overseas assets. However, these models suffer from a number of serious weaknesses that make them unsuitable for this task. These models are reviewed and their weaknesses discussed in Appendix B.

Our focus in this section is therefore on macroeconomic theories of banks' overseas assets. Llewellyn (1983) discusses and critiques three approaches to modelling international banking flows: a flow of funds approach, a portfolio approach, and a multiplier approach. All three approaches seem to focus on Euro-currency flows rather than international cross-border banking flows. The flow of funds approach attempts to explain the pattern and size of non-bank supplies and demands for international banking funds. Banks are assumed to passively accept deposits and supply loans with no portfolio objectives or constraints. The volume of international banking flows

may then be supply determined or demand determined (e.g. Heller, 1979):

> The limitation of the pure non-bank supply and demand versions (flow of funds approach) can be seen in terms of their implications. A pure supply-side approach implies an infinite elasticity of demand [for loans], and banks lend what they receive irrespective of the terms. Conversely, an exclusive demand-side orientation postulates an infinite elasticity of supply which in turn implies that banks are pure liability managers and indifferent as to the cost or source (bank versus non-bank) of funds. This has been questioned empirically by Johnston (1980). (Llewellyn, 1983, p. 55).

The portfolio approach focuses on the supply of financial intermediation services. This is determined by the objectives of the bank (e.g. profit-maximisation, risk minimisation), its constraints (e.g. regulatory), and the costs of providing intermediation services. The non-bank supply and demand for funds may be assumed exogenous (e.g. Johnston, 1980). Briault and Howson (1982) and Ford, Yang and Dickinson (1990) develop financial models of the domestic and Eurocurrency financial markets that allow for the portfolio preferences of banks and determine various asset yields. However, real sector activity, such as income, wealth and current account balances, are treated as exogenous. This restriction must be relaxed if we are to explain the size of bank assets and liabilities:

> The pattern and volume of flow of funds of non-banks must be considered as banks cannot determine the volume and price of lending independently of the portfolio preferences of non-banks. (Llewellyn, 1983, p. 56).

The multiplier approach attempts to determine the scale of the Euro-currency market based upon a reserve asset credit multiplier (see Lewis and Davis, 1987 for further discussion). The portfolio

preferences of depositors are ignored (Johnston, 1983; Lewis and Davis, 1987). As with the domestic bank-credit multiplier, the multiplier depends upon the reserve ratio and the redeposit ratio. Llewellyn (1980, p. 124) argues that the multiplier model:

> is not a fruitful approach to the analysis of credit creation in the euro-currency market as there is no clearly defined reserve base in the euro markets, the reserve ratio is clearly not constant, and the leakages are high (redeposit ratio low).... (Llewellyn, 1980, p. 124).

The multiplier approach is not even a "useful representation" of the domestic UK banking system (Llewellyn, 1980, p. 124).

Llewellyn (1983) puts forward an integrated analytical framework that allows for both flow of funds factors and the supply of financial intermediation services. Flow of funds factors include the structure of financial surpluses and deficits and the portfolio preferences of the surplus and deficit sectors. This would explain the financial surplus or deficit of each sector or country and their preferences for bank intermediation (rather than the use of security markets), for UK banks (rather than banks in New York, Tokyo, or Frankfurt), and for the maturity, currency and choice of financial instrument.

The supply of intermediation services depends upon the efficiency of the banking sector, their portfolio preferences, and their portfolio constraints. The relative efficiency of the UK banking sector may reflect regulatory controls, the degree of competition, and the technical efficiency of the sector compared to banks overseas. The portfolio preferences of UK banks include their overall balance sheet objectives, preferences for domestic and overseas assets, relative demand for domestic and overseas credit, degree of risk aversion, and their assessment of risk and profit on loans. Portfolio constraints may include capital adequacy requirements, exposure limits, and other regulatory requirements.

The author is not aware of any attempt to formalise or empirically apply Llewellyn's framework[17]. Conceptually, such a model would be able to explain the gross size of UK banks' overseas assets and the structure of these assets and liabilities as illustrated in Tables 1, 2 and 7. However this would be a complex and ambitious undertaking. In principle, it would require a multi-country sectoral economic model to explain the financial surpluses and deficits of the non-bank sectors and their portfolio preferences plus a multi-country banking model to explain the supply of banking services by banks in each country. Modelling interbank deposits, which are an important part of the international banking market, may be difficult[18]. Such a model must also allow for the accommodating nature of net overseas bank deposits (Chaundy, 1999a) and account for the interdependency of overseas assets and liabilities as discussed in Appendix B. Financial innovation and structural changes in the world economy - such as the recycling of OPEC surpluses in the 1970s, the international debt crisis in the early 1980s, and the trend towards securitisation and financial disintermediation in the late 1980s and 1990s (Rose, 1994) - may make it difficult to obtain stable empirical estimates. Such a structural econometric model of UK banks' overseas assets is beyond the scope of this paper.

In conclusion, Llewellyn's (1983) integrated framework seems the most appropriate theoretical approach available, and is a useful analytical framework for identifying some of the factors that may determine UK banks' overseas assets and liabilities. However, it highlights the inherent complexity of these assets and liabilities and is difficult to develop either as an explicit theoretical or empirical model.

4. An Empirical Perspective

The previous sections highlighted the difficulty and complexity of developing a satisfactory model of UK banks' overseas assets and liabilities. It would therefore be useful to know whether simpler models have any empirical validity. In this section we examine some simple hypotheses about the gross size of these assets[19]. We conduct the only known empirical attempt to explain the size of UK or world overseas bank assets[20].

A graphical analysis indicates that UK and world overseas bank assets do not increase at a constant rate. Figure 7 shows that UK banks' share of world overseas bank assets and liabilities is not constant either. Rose (1994) also notes that there is "no obvious relationship" between the growth of world overseas bank assets and the world sum of current account deficits (p. 21). However, Rose (1994) does claim that the stock of world overseas bank assets (cross-border claims) is related to the growth of world trade (p. 22). He states that "both are impelled by the growth of economic activity, which gives rise to the need for a growing level of working capital" (p. 22). While this argument does not seem very strong, we can use cointegration techniques to examine whether there is indeed a long-run relationship between these two variables or whether the hypothesised relationship is just an example of spurious correlation between two unrelated but trending variables. We also examine whether the stock of UK banks' overseas assets is related to the level of UK trade[21].

4.1. Data

For the stock of world cross border bank claims (WOBA) we use the total external positions of banks in BIS reporting countries (US $bn) as published in the Statistical Annex of BIS (1998). For UK banks' overseas assets (UKOBA) we use the UK total from the same source. For world trade we use world exports (WX) and UK exports (UKX),

both in US $bn, from IMF *International Financial Statistics*. We use the prefix L to denote the log of a variable.

The BIS data is only available from the end of 1983 so our sample period is restricted to 1983(4) – 1997(4). Microfit 4.0 is used for all the empirical work.

4.2. Methodology

It is important to test the order of integration of variables in a regression to avoid spurious results. We use the Augmented Dickey-Fuller (ADF) test as computed by Microfit supplemented by graphical analysis. Following Dickey and Pantula (1987), we test down from a test for higher order integration (e.g. I(2)) to a test for lower order integration (e.g. I(1)).

It is important to select an appropriate lag length for the ADF test. Too small a value can lead to size distortion, while too large a value can lead to a loss of power (Harris, 1995; Pesaran and Pesaran, 1997). Pesaran and Pesaran (1997, p. 213) suggest using model selection criteria such as the Schwarz Bayesian Criterion (SBC) or the Akaike Information Criterion (AIC) to choose the lag length. Harris (1995, p. 36), by contrast, suggests that the lag length should "normally be chosen" using the formula in Schwert (1989), namely $l_{12} = \text{int}\{12(T/100)^{1/4}\}$ where T is the number of observations. This gives a value of 10 for the data in this study. However, the results from using this formula in a related study (Chaundy, 1999b) suggest this choice of lag length may have low power. We therefore use Schwert's formula to set the maximum lag length for the ADF test, and then use the model selection criteria (generally the SBC) in Microfit to determine the actual lag length for the test. If a small lag length is selected, we check for evidence of autocorrelation in the residuals. We generally include a time trend in the test for I(0) but not for I(1).

If the variables have compatible I(1) properties we may test for cointegration to examine whether the variables exhibit a long-run relationship. The Engle-Granger two-step procedure, which estimates the long-run parameters from a static equation in the levels of the variables, has been quite popular. However, this approach suffers from several weaknesses (Harris, 1995, p. 57): the test for cointegration is likely to have low power compared to alternative tests (Kremers, Ericsson, and Dolado, 1992); the estimates of the long-run parameters may be biased in small samples (Banerjee, Dolado, Hendry and Smith, 1986; Inder, 1993); the standard *t*-statistics for the long-run parameters are not valid (Phillips and Durlauf, 1986; Inder, 1993); and the resulting error-correction mechanism (ECM) provides a poorer basis for diagnostic checking than the method adopted here (Gerrard and Godfrey, 1998). The results of Inder (1993) indicated that the Fully Modified OLS approach of Phillips and Hansen (1990) provides "little" gain over the static Engle-Granger approach (Harris, 1995, p. 62)[22]. The multivariate Johansen method is not used as our equations have only one explanatory variable and this method also seems to be biased and have low power in small samples (Cheung and Lai, 1993; Harris and Judge, 1998).

We therefore follow Harris's (1995) recommendation and estimate a dynamic autoregressive distributed lag (ADL) model:

$$A(L)y_t = B(L)x_t + u_t \qquad (2)$$

where $A(L)$ is the polynomial lag operator $1-\alpha_1 L-\alpha_2 L^2-\ldots-\alpha_p L^p$; $B(L)$ is the polynomial lag operator $\gamma_0+\gamma_1 L+\gamma_2 L^2+\ldots+\gamma_q L^q$; and $L^r x_t = x_{t-r}$. The estimated long-run parameters $\hat{\beta}$ can be easily obtained from the estimated version of (2). For example, for a single explanatory variable with no constant term, the estimated long-run parameter is given by:

$$\hat{\beta} = \sum_{i=0}^{i=q}\hat{\gamma}_i \Big/ \left(1-\sum_{j=1}^{j=p}\hat{\alpha}_j\right).$$

Microfit automatically calculates the standard errors of the $\hat{\beta}$. This approach provides "generally unbiased estimates of the long-run model and valid *t*-statistics" (Harris, 1995, p. 61; Inder, 1993). The equation may also be used to conduct a unit root test of the null hypothesis of no cointegration as $\sum_{j=1}^{j=p}\hat{\alpha}_j$ must be less than one for the dynamic model to converge to a long run solution. Dividing $1-\sum_{j=1}^{j=p}\hat{\alpha}_j$ by the sum of their associated standard errors provides a *t*-type test of the null hypothesis (Harris, 1995, p. 61)[23]. The critical values are given in Banerjee, Dolado and Mestre (1992) and reprinted in Harris (1995).

If we reject the null of no cointegration we can re-estimate (2) in error-correction form and adopt a general-to-specific modelling strategy to obtain a more parsimonious representation. The RESET test for omitted variables and White's test for heteroscedasticity may not be valid in ADL models with I(1) variables (Gerrard and Godfrey, 1998). We therefore follow the recommendation of Gerrard and Godfrey (1998) and estimate the ADL but use the implied error-correction formulation, where valid, for further diagnostic checking.

4.3. Results

The results of the ADF tests are presented in Table 8. For each variable we reject the hypothesis of I(2) but are unable to reject the null of I(1). We therefore conclude that all the variables are compatible I(1). We may now test for the existence of a long-run relationship (cointegration).

To test the null hypothesis of no long-run relationship between world bank assets (LWOBA) and world trade (LWX) we estimate an ADL model with a constant and a 4-quarter lag on both variables. We estimate the model over 1984(4) –1995(4) and use the period 1996(1) – 1997(4) for post-sample testing. The ADL equation passes all the standard diagnostic tests except a RESET test[24]. However, this test statistic may not be valid with I(1) variables (Gerrard and Godfrey,

1998). The test statistic for cointegration is 0.85 and this is not significant even at the 10% level (critical value = 2.93). These results cast doubt on the claim by Rose (1994) that there is a long run relationship between world cross-border bank assets and world trade. While both series increase over time, we do not find any evidence to support the hypothesis of cointegration.

We now test whether there is any long-run relationship between UK banks' overseas assets (LUKOBA) and the level of UK exports (LUKX). We use the same approach as above. The ADL equation passes all the standard diagnostic tests. The test statistic for cointegration is 1.45 which is not significant at the 10% level (critical value = 2.93). Again, we reject a hypothesis between the stock of overseas bank assets and the level of trade.

We conclude from our empirical analysis that simple hypotheses about the size of UK or world overseas bank assets, including Rose's (1994) contention about their relationship to trade, are not supported by the data. These results are not necessarily surprising. The determinants of overseas bank assets are complex and empirical modelling of them is likely to be difficult, as discussed in Section 4. However, our results indicate that there seem to be no easy short cuts to providing empirical estimates of the gross stock of overseas bank assets.

5. Conclusions

UK banks overseas assets and liabilities are very large. They, and the associated investment flows and investment income, account for about 50% of the gross total in the UK balance of payments and international investment position. They account for almost 50% of the balance sheet of UK banks, and are larger than the overseas assets of banks in other developed countries.

We find that foreign-owned UK banks account for over 80% of these overseas assets and liabilities. As about 90% of these assets and liabilities are denominated in foreign currency they form part of the Eurocurrency market in London. We demonstrate that the large size of these assets and liabilities and the relative importance of foreign-owned banks can be traced to the development of the Eurocurrency markets in London in the late 1950s and 1960s. London acts as an international banking centre through which deposits and loans are recorded. However, most of these flows have little impact on or relationship to the UK economy, except through the net investment income on the associated assets and liabilities.

Theories to explain these overseas assets and liabilities are not well developed. While the net overseas assets can, in principle, be explained, the gross asset are more problematic. The most satisfactory approach is the integrated framework of Llewellyn (1983) but this has not been developed into an explicit model. Nor has it been subject to empirical testing. However, Llewellyn's approach indicates the complexity of the determinants and developing a suitable theoretical or empirical model would be difficult.

Rose (1994) suggests that world overseas bank assets are related to the growth of world trade. However, we find that this and other simple hypotheses about the level of UK and world overseas bank assets are not supported by the data. We therefore conclude that the gross size of UK banks' overseas assets and liabilities, while statistically important in the UK balance of payments, are not readily or easily explained by existing economic models.

APPENDICES

Appendix A: Theories of bank location

According to the list of UK banks in the Bank of England *Quarterly Bulletin* (1996), there were 338 foreign-owned banks in the UK in September 1996. The number and composition of foreign banks in London has varied over time (see Lamb, 1986; Brealey and Kaplanis, 1996; Fisher and Molyneux, 1996). At the end of 1996, these banks accounted for 71% of the UK banking community, 56% of UK banks' total assets and 80% of UK banks' overseas assets. A complete explanation for the large size of UK banks' overseas assets requires some understanding of why overseas banks have established branches and subsidiaries in the UK.

Several factors have been suggested to explain why banks establish offices and branches abroad. They include following domestic customers abroad in order to maintain the bank-customer relationship (Grubel, 1977; Walter, 1985; Rose, 1994); the desire to break into profitable and uncompetitive local markets (Walter, 1985); competition among regulators to offer the best regulatory environment (Hultman, 1990); and a desire to diversify earnings (Walter, 1985; Hultman, 1990).

Building on the eclectic theory of foreign direct investment, Kim (1993) discusses three sources of comparative cost advantage for foreign banks in overseas markets. Home-country-specific advantages may include the use of the home currency for international trade and investment leading to cheaper funding through domestic retail deposits (Lewis and Davis, 1987). Host-country-specific advantages may include a less regulated banking environment leading to lower operating costs (Grubel, 1977; Lewis and Davis, 1987); the existence of a banking cluster that facilitates interpersonal contacts and reduces communication expenses; and the existence of a skilled labour force. Individual bank-specific advantages may include the bank-customer relationship and the customer information contained in it (Grubel, 1977; Lewis and Davis, 1987, Lewis, 1992); economies of scale

(Walter, 1985; Lewis and Davis, 1987); superior financial technology and marketing skills (Grubel, 1977; Walter, 1985); and a global network of branches and offices to service customer needs (Lewis and Davis, 1987).

We therefore suggest the following reasons for the presence of foreign-owned banks in London[25]: trade and investment links with the UK (Rose, 1994; Brealey and Kaplanis, 1996; Fisher and Molyneux, 1996); a relatively liberal regulatory environment (Shaw, 1979; Walter, 1985; Lamb, 1986; Gardener and Molyneux, 1990); a history of political stability and impartiality in foreign banking activities (Shaw, 1979; Walter, 1985); London's time zone advantage in the related foreign exchange markets (Shaw, 1979; Lamb, 1986); a universally accepted language (Shaw, 1979); the existence of a banking cluster with lower communication costs and a pool of skilled labour (Kim, 1993); London's historic role as a leading international banking centre (Lamb, 1986)[26]; and London's continuing role as one of the three leading international financial centres (Gardener and Molyneux, 1990). Rose (1994) discusses several factors that may influence London's future competitive position.

Brealey and Kaplanis (1996) find that the number of foreign banks in London is much greater than that which can be explained by the size of the UK economy and its trade with the rest of the world. This emphasises London's role as an international banking centre and provides some support for the additional reasons suggested above. Fisher and Molyneux (1996) examined several potential determinants of foreign bank activity in London between 1980 and 1989. Their cross-sectional analysis suggests that the size of the banking sector in the foreign country, the level of trade, and the amount of foreign direct investment (from European and non-US or Japanese countries) were positively associated with the presence of foreign banks in London. A smaller cultural distance, and a less stable foreign country also tended to increase foreign banks presence in London. We do not investigate these determinants further as our focus is on the size of

UK banks' overseas assets rather than the number of foreign-owned banks in the UK per se.

Appendix B: Microeconomic banking models

There are two major strands in the microeconomic banking literature. The first strand examines why banks exist. It focuses upon the role of imperfect, asymmetric and costly information, and the role of banks as providers of payment, liquidity and information services (see Lewis, 1991, 1992; Chant, 1992; Bhattacharya and Thakor, 1993; and Van Damme, 1994 for recent surveys and a critique by Mayer, 1994). The second strand takes the existence of banks as given and focuses on explaining how banks operate (see Baltensperger, 1980; Santomero, 1984; and Swank, 1996 for the three major surveys of this literature). This appendix examines the usefulness of these microeconomic banking models as a basis for explaining UK banks' overseas assets and liabilities.

Swank (1996) divides banking models into four main groups - risk management models (including reserve management, capital decision, and gap management models), portfolio models, imperfect market or monopoly models, and real resource models.

Reserve management models focus on the issue of withdrawal or liquidity risk. The bank faces an uncertain demand for deposit withdrawal, and hence a risk that it will lack sufficient cash reserves to repay depositors, requiring the costly liquidation of other assets. The bank's problem is to choose the optimal allocation of assets between liquid, low-return reserve assets and illiquid but more profitable loans. These theories are "somewhat obsolescent" owing to the existence of well-developed money and interbank markets (Swank, 1996).

Capital decision models focus on the issue of credit or default risk. Loan defaults may render a bank insolvent with insufficient assets to repay depositors leading to a loss of confidence in the bank and withdrawal of regulatory approval. The bank's problem is to choose the optimal amount of equity capital, which is expensive but provides

a buffer against loan default. Insolvency may also result from adverse changes in the price of assets or the exchange rate. UK banks are given individual minimum capital adequacy limits above those required by EU directives (Bank of England, 1990). Bentley, Jarman and Winstone (1995) and Pilbeam (1998) provide an overview of current UK bank regulation.

Gap management models focus on interest rate risk when the interest rate on liabilities changes at a different time or by a different amount to that on assets. As the maturity of bank liabilities is typically shorter than their assets, banks are typically exposed to interest rate risk. Heggestad and Houston (1991) provide evidence that some banks may adjust the maturity of their investments to manage interest rate risk. Lewis and Morton (1995) provide a case study of how one UK retail bank manages interest rate risk through hedging.

Portfolio models attempt to model risk-averse banks in terms of portfolio selection theory. Pyle (1971) is an oft-cited example while Buckle and Thompson (1992) survey the empirical applications. Given a higher return on 'loans' than 'deposits', banks choose positive quantities of the former (its assets), and negative quantities of the latter (its liabilities). This approach is criticised for assuming rather than explaining the difference in returns (Baltensperger, 1980); for lack of attention to the differences between various types of assets and liabilities (Cherubini, Ciampolini and de Felice, 1993)[27]; for its critical dependence on the assumption of risk aversion (Swank, 1996)[28]; and for poor empirical performance (Buckle and Thompson, 1992);

Empirical applications of the portfolio approach treat some assets and all the rates of return as exogenous. For example, Courakis' (1980) monthly model of eleven London clearing banks had only three portfolio choice items with deposits, cash and advances assumed exogenous. Many of the empirical studies are "plagued by the presence of statistically insignificant or wrongly signed estimated

coefficients" (Buckle and Thompson, 1992, p. 10). This may be caused by a high degree of multicollinearity and/or instability in the interest rate-portfolio response. Thistle, McLeod and Conrad (1989) find that portfolio items depend upon the level of interest rates, the change in interest rates, and whether interest rates are rising or falling. Yet, "extending the standard portfolio model tends to add a lot of complexity to the analysis" (Swank, 1996, p. 187).

Imperfect-market or monopoly models assume that a risk-neutral bank acts as a price setter in the loan and/or deposit markets, in contrast to the risk-averse price-taking behaviour assumed in the portfolio approach. Klein (1971) is an early example. Deposits are increased until the marginal cost (i.e. the interest rate it must pay to attract deposits) is equal to the to the return on government securities adjusted for the cost of maintaining reserves. With the given equity capital, this determines total liabilities. Bank loans are extended until the marginal return is equal to the given return on investments (government securities). This determines the amount of loans and hence the residual amount of government securities. This approach has been critiqued because it breaks down if the bank is assumed to operate as a price taker (Baltensperger, 1980; Swank, 1996) and because loan decisions are independent of deposits.

Empirical applications appear less abundant than the portfolio approach. Slovin and Sushka (1983) find that both monopoly power and risk aversion factors are important influences on the commercial loan rate. Cherubini, Ciampolini and de Felice (1993) find some evidence for securities playing a residual or buffer role in the US and Italy.

The above models neglect the real resource costs of providing banking services such as labour costs, branches, and equipment. Real resource models focus on the resource costs of providing deposits and loans services, but tend to neglect issues of liquidity and solvency risk.

There are several limitations of the above models as a basis for explaining UK banks' overseas assets. First, there are "a number of rival models and approaches which have not yet been forged together to form a coherent, unified and generally accepted theory of bank behaviour" (Baltensperger, 1980, p. 1). "Existing theories concentrate on a few aspects of banking, while neglecting several elements that are elsewhere proved to be crucial" (Swank, 1996, p. 198). This partly reflects the difficulty of the task. De Vany (1984) argues that a bank is "an entity of monstrous complexity; a model reasonably complete in more than a few dimensions would be beyond comprehension" (p. 605). Brodt's (1984) linear programming model illustrates the numerous complex decisions facing an international bank manager. The lack of firm-specific data, unobservable theoretical concepts, and inadequate attention to the environment within which banks operate may also have inhibited empirical work (Swank, 1996).

Second, most of the above models do not distinguish between domestic and overseas assets and liabilities. Spencer (1989) and Barr and Cuthbertson (1990) use net foreign currency assets as a choice item. While foreign currency assets are similar to but not synonymous with external assets, there is no theoretical justification for using *net* assets (Arjoon, 1994, p. 415). Choi, Elyasiani and Kopecky (1992) outline a model with domestic and foreign (currency) deposits and loans and price taking behaviour in all markets. However, this model is not developed empirically. Arjoon's (1994) portfolio model has foreign assets and foreign liabilities as choice items but uses the same interest rate for both. Moreover, there is no consideration of the accommodating nature of net overseas bank deposits (Chaundy, 1999a). Xu (1996) analyses the rate of return on domestic and international assets of five Canadian banks over the period 1978 to 1985 but does not model the level of the assets. He concludes that international diversification has reduced the variability of returns.

Third, most of the above models focus on an individual firm rather than the whole banking sector. It may not be valid to model the whole banking sector as if it were a single bank. Courakis (1980) found evidence of "considerable and persistent differences" in asset allocation and responses of the eleven banks in his study (p. 319). Hicks (1983) found that aggregate US statistics are representative of only a small class of US banks when classified by size: "the levels of the aggregate portfolio ratios are not even representative of the largest banks" (p. 222). Interbank deposits would be meaningless if the banking sector were modelled as a single bank.

Fourth, and related to the previous point, the portfolio and simple monopoly approaches discussed above assume that the volume of deposits and loans are independent. However, this assumption is not valid for total UK overseas deposits and liabilities.

Consider the bank asset-liability T-accounts (Kim, 1993) in Figure B1. In example (a), a UK bank makes a loan of £100 to an overseas customer (ROW) and credits their UK deposit account. Overseas assets and liabilities both increase by £100. If the loan is credited to the overseas account of ROW then the nature of the interdependence between deposits and loans depends on the mode of interbank settlement. In example (b), the UK bank credits the UK account of the overseas bank, and both gross assets and liabilities increase by £100. In example (c), the overseas bank debits the overseas account of the UK bank. Gross overseas assets of UK banks are unchanged – only the composition has changed.

We can use these same T-accounts to examine the purchase of £100 worth of overseas bonds by UK banks. In examples (a) and (b) gross assets increase but so do gross liabilities (deposits). In example (c), only the asset composition changes. Net overseas assets are unchanged.

What if an overseas resident (ROW) transfers £100 from an overseas bank account to a UK bank account? In example (d), the interbank settlement causes gross assets to increase by £100 as well while in example (e) total liabilities remain unchanged. In both examples, net overseas bank assets are unchanged. These same T-accounts would apply if the overseas resident purchased £100 of debt securities issued by a UK bank. Total net overseas assets of UK banks would remain unchanged, while total liabilities may or may not change (examples (d) and (e) respectively).

This interdependence between assets and liabilities would also apply to total domestic loans and deposits and makes it difficult, if not impossible, to define the size of the banking sector in both the portfolio and monopoly approaches. These examples also demonstrate how UK banks' lending and borrowing decisions leave their total net overseas assets unchanged.

Finally, stability in time series behaviour may be affected by the economic cycle (Thistle, McLeod and Conrad, 1989), and by long-term financial innovation. Gardener and Molyneux (1990) document changes in techniques of bank management since the 1960s, and the impact of competitive pressures, technological developments, financial innovations and regulatory changes. These include the increased importance of the interbank market, the increase in interest-sensitive liabilities, an increase in securitisation, a move from bank credit (such as syndicated loans) to capital market funding (such as note-issuance facilities), and the increase in off-balance sheet activities.

Figure B1: The interdependence of overseas bank assets and liabilities

(a) An overseas loan

	UK bank A		Overseas bank B	
Step	Liabilities	Assets	Liabilities	Assets
1.		Loan to ROW: **+£100**		
2.				
3.	ROW deposit: **+£100**			

(b) An overseas loan via an overseas bank

	UK bank A		Overseas bank B	
Step	Liabilities	Assets	Liabilities	Assets
1.		Loan to ROW: **+£100**		
2.	B's deposit: **+£100**			Deposit at A: +£100
3.			ROW deposit: +£100	

(c) An overseas loan via an overseas bank

	UK bank A		Overseas bank B	
Step	Liabilities	Assets	Liabilities	Assets
1.		Loan to ROW: **+£100**		
2.		Deposit at B: **- £100**	A's deposit: -£100	
3.			ROW deposit: +£100	

(d) An autonomous increase in overseas non-bank deposit liabilities with UK banks

	UK bank A		Overseas bank B	
Step	Liabilities	Assets	Liabilities	Assets
1.			ROW deposit: -£100	
2.		Deposit at B: **+£100**	A's deposit: +£100	
3.	ROW deposit: **+£100**			

(e) An autonomous increase in overseas non-bank deposit liabilities with UK banks

	UK bank A		Overseas bank B	
Step	Liabilities	Assets	Liabilities	Assets
1.			ROW deposit: -£100	
2.	B's deposit: **- £100**			Deposit at A: -£100
3.	ROW deposit: **+£100**			

Notes: UK deposit refers to deposits of UK residents, ROW deposit to deposits of overseas residents. Bank A is a UK bank and bank B an overseas bank. Step 1 refers to the autonomous loan creation or deposit withdrawal, step 2 to the international interbank settlement (where necessary), and step 3 refers to the final crediting of funds. Changes to UK overseas assets and liabilities are shown in **bold**. These transactions will be recorded in the UK balance of payments. The currency of the transactions has been ignored and all numbers are recorded in sterling. The different examples are described in the text.

Notes

1. For a detailed definition of residency see the ONS *UK National Accounts Concepts, Sources and Methods*, 1998 edition, London: The Stationery Office, pp. 555-57.

2. Detailed definitions are given in ONS (1998). Essentially, direct investments give the investor a "significant influence" in the operations of a company; portfolio investments include investment in equity and debt securities issued by a company or government but do not give the investor any "significant influence" over the operations of the company or institution; other investments include all other investments, such as trade credit, loans, currency and deposits.

3. The data in this paper for end-1997 (as reported in Tables 1 and 2) is compatible with the 5th edition of the IMF Balance of Payments Manual (BPM5) as described in ONS (1998). All other historical data in this paper up to and including end-1996 is shown on the pre-BPM5 basis. This data is published by the Bank of England but the historical series have not been revised on the new basis. The differences between the two formats are explained in ONS (1998) and Grice (1998). They mainly relate to the re-classification of offshore islands as non-resident, the use of accruals accounting, and a reduction in the threshold in the definition of direct investment. An important change in classification is that money market instruments were previously included under other investment but are now included as part of portfolio investment.

4. Separate data on money market instruments was not published prior to 1998.

5. The Bank of England began collecting comprehensive banking statistics in 1975. The data in this table is only available from

1977. The historical data in this and subsequent tables are on the pre-BPM5 basis. See footnote 3 for details.

6. Investments include direct and portfolio investment, but direct investment is only a very small part of the total. A small part of the increase between 1990 and 1996 is due to the inclusion of one new bank in the statistics. A more important factor may be that in the early 1990s many banks merged their previously separate securities operations into their banking operations thus causing a relative expansion in banks' portfolio investment activities. I am very grateful to Andrew Grice for pointing this out. Securitisation may also have played an important role (see Kendall and Fishman, 1996, for an introduction to securitisation). Securitisation has increased the range of securities that banks can invest in. These may be cheaper to screen and buy than traditional loans or securities, are more liquid, and may offer a better risk-return profile relative to traditional securities (Twinn, 1994). A bank may be better able to diversify its holding by investing in countries and markets that it does not lend to directly. By securitising its existing loans, a bank can reduce its capital requirements and, if it makes the same amount of money, increase its return on equity (Baron, 1996).

7. Part of the increase in the early 1980s may reflect a response to the abolition of UK exchange controls in 1979.

8. Grice (1999) examines in more detail the contribution of UK banks to the current account of the UK balance of payments since 1987.

9. The income y_t from an investment may be defined as $y_t \equiv i_t.S_{t-1}$ where i_t is the yield on the investment and S_{t-1} is the stock of the investment at the end of the previous period. Chaundy (1999b)

provides estimates of i_t for UK banks. However, a complete model of y_t also requires a model of S_t.

10. If we estimate net income by applying a common yield, i, to the net assets $(A\text{-}L)$, then the error in the estimate of net income is given by $(i_A.A - i_L.L) - i.(A\text{-}L) = (i_A - i).A + (i - i_L).L$. Hence the error depends upon the size of the gross assets and liabilities and the difference between the two yields.

11. The data does not permit a breakdown of investments into UK and overseas residents by bank ownership.

12. Under EU (Own Funds and Solvency Ratio) banking directives, which reflect the 1988 Basle Accord (Basle Committee on Banking Supervision, 1988), banks are required to maintain sufficient capital to cover at least 8% of their risk-weighted assets. Assets are classified into different risk weightings. If foreign-owned banks have a greater proportion of low risk-weighted assets, they would not need to hold as much capital (Bentley, Jarman and Winstone, 1995). The approach to capital adequacy requirements is changing and recent developments are discussed in Jackson (1995) and Jackson, Perraudin and Maude (1998).

13. Rose (1994) discusses some of the factors that may have influenced the growth of the eurocurrency markets such as a relaxation of exchange controls in Europe, a catching-up process after the disruption of the interwar years and WWII, and US restrictions on interest and foreign investment. See also Llewellyn (1980, ch. 9) and Gardener and Molyneux (1990, ch. 8).

14. The data presented is for deposits, but a similar picture is apparent in the data for loans and advances.

15. Grady and Weale (1985, ch. 5) discuss the activities of the UK accepting houses.

16. I am grateful to Andrew Grice for emphasising this point.

17. Godley (1998) demonstrates a closed economy simulation model that explicitly models both flow of funds factors and the supply of financial intermediation. The model explains both the size and composition of bank assets and liabilities and the interest rates on them. The challenge is to develop such a model for an open economy and to include the euro-currency business booked though London. This is not straightforward as the nature of the latter, partially revealed in Table 7, suggests that a simple two-country model will not be adequate.

18. BIS (1983) estimates that up to 70% of total world cross-border bank assets and liabilities are accounted for by interbank deposits. Rose (1994) estimates a figure of 70-75% for the period 1971-1992 while Lamb (1986) gives a figure of 75% for UK overseas bank asset and liabilities at the end of 1985.

19. We do not attempt to explain the increase in the investment/asset ratio noted in Section 1.1 because of a lack of data. There is no known readily available data on the returns from domestic loans and advances. Data on UK mortgage rates for existing borrowers is only available since 1985 but does not take account of default rates. The same applies to overseas lending. Lack of data on securitisation prevents us from assessing its impact.

20. Much of the empirical literature on bank lending relates to domestic bank lending (e.g. Cuthbertson, 1985, Molyneux, Remolona & Seth, 1998). The literature on international bank lending seems to focus on lending to developing countries and much of this attempts to predict borrower default and rescheduling, rather than explaining total lending per se (see

Bhatt, 1991 for a review). Most of the models reviewed by Bhatt (1991) lacked a theoretical underpinning and suffered from poor out-of-sample performance. The few known articles on euro-currency markets also tend to focus on explaining interest rates rather than total assets or liabilities (e.g. Johnston, 1979, 1980; Briault and Howson, 1982).

21. Cross-sectional bank location models have found trade to be an important determinant of the number of foreign banks in London (e.g. Brealey and Kaplanis, 1996; Fisher and Molyneux, 1996).

22. The Fully Modified OLS approach makes non-parametric corrections to the parameter estimates and *t*-values in the Engle-Granger approach to take account of any bias due to autocorrelation in the OLS residuals (Harris, 1995, p. 62).

23. This approach is equivalent to that recommended by Kremers, Ericsson and Dolado (1992) which involves testing whether the coefficient on the error term in the ECM formulation is zero (Harris, 1995, p. 60).

24. The diagnostic tests computed by Microfit 4.0 are as follows. For serial correlation, the Breusch-Pagan-Godfrey LM(4) test; for omitted variables and functional form, Ramsey's RESET(2) test; for normality, the Bera-Jarque statistic; for heteroscedasticity, an LM test; and for predictive failure, Chow's test for the post-sample period. Except for the normality test which is chi-squared, the F-version of all the tests are used as Kiviet (1986) suggests these tend to have better small sample properties. Further details of the diagnostic tests are given in Pesaran and Pesaran (1997).

25. An anonymous reviewer also suggested that tax treatment, tax breaks for bank executives (prior to reductions in income tax),

and the general cost of amenities and lawyers and accountants may also be important.

26. This may have been more important when the euro-currency markets started to grow in the 1950s and 1960s.

27. For example, the liquidity of assets may be important (Roley, 1980, p. 355) and the risk weightings in the Basle approach to capital adequacy (Basle Committee, 1988) will affect the return on risk-weighted capital.

28. However, empirical studies (Simonson, Stowe and Watson, 1983; Heggestad and Houston, 1991), questionnaire studies (Swank, 1994), and case studies (Lewis and Morton, 1995), suggest that the assumption of risk aversion may not be unrealistic.

TABLES AND FIGURES

Table 1: Overseas assets and liabilities of UK banks, end 1997

	Total (£bn)			As proportion of bank total (%)		As proportion of UK total (%)	
	Assets	Liabilities	Net assets	Assets	Liabilities	Assets	Liabilities
Direct investment[1]	**3.2**	**21.3**	**- 18.1**	**0**	**2**	**1**	**13**
Portfolio investment[1]	**201.1**	**135.1**	**66.1**	**20**	**12**	**32**	**23**
Of which:							
Equity (shares)	2.7	15.0[2]	- 12.3	0	1	1	5
Bonds & notes	181.9	49.1[3]	132.8	18	4	57	25
Of which:							
Bonds	n.a.	24.1[3]	n.a.	n.a.	2	n.a.	n.a.
European medium term notes & other short term paper	n.a.	24.9	n.a.	n.a.	2	n.a.	n.a.
Money market instruments	16.6	71.0	- 54.4	2	6	68	81
Of which:							
Commercial paper	16.6	11.1	5.4	2	1	69	44
Certificates of deposit	0.0	59.8	- 59.8	0	5	0	100
Other investment[1]	**823.3**	**950.1**	**- 126.9**	**80**	**86**	**77**	**75**
Of which:							
Trade credit	5.8	0.0	5.8	1	0	33	0
Short-term loans	192.5	n.a.[4]	n.a.	19	n.a.	99	n.a.
Of which:							
Sterling	23.9	n.a.	n.a.	2	n.a.	n.a.	n.a.
Foreign currency	168.6	n.a.	n.a.	16	n.a.	n.a.	n.a.
Notes & coin	0.1	0.8[5]	- 0.6	0	0	33	90
Deposits	624.8	949.3[4]	- 132.0[7]	61	86	78[6]	76[6]
Of which:							
Sterling	83.2	134.4[4]	- 27.3[7]	8	12	n.a.	n.a.
Foreign currency	541.6	814.9[4]	- 104.7[7]	53	74	n.a.	n.a.
Total[1]	**1,027.6**	**1,106.5**	**- 78.9**	**100**	**100**	**53**	**55**

Notes: 1. Direct investments are valued at book value, whereas portfolio and other investments are valued at market value. Total investment is the sum of direct, portfolio and other investment.
2. Total for banks and building societies.
3. This assumes that banks' bond liabilities are in the same ratio to building society bond liabilities as the ratio for European medium term notes and other short-term paper. If is assumed that overseas bond liabilities of building societies are zero, overseas bond liabilities would be £25.4bn and total liabilities of bonds and notes would be £50.3bn.
4. Foreign loans to UK banks are included indistinguishably with foreign deposits with UK banks.
5. Note issue of Bank of England held by overseas residents.
6. Bank loans and deposits as a proportion of UK loans and deposits.
7. Short-term loans plus deposits.

Source: Unpublished data supplied by the ONS. This data is a revision of that published in ONS (1998).

Table 2: Balance sheet of UK banks, end 1997

	Total	As proportion of total assets		
		Sterling	Foreign currency	Total
	£bn	%	%	%
LIABILITIES				
Notes outstanding	2.8	0		0
Sight & time deposits (inc. repos[1])	1,948.9	38	42	80
- Overseas residents	**949.3**	**6**	**33**	**39**
CDs, CP, bonds & notes issued[2]	250.9	5	5	10
- Overseas residents	**120.0**			**5**
Capital and other funds	135.1	5	3	6
- Overseas residents	**36.3**			**1**
Items in transmission etc.	111.3	1	1	5
Total liabilities	2,449.1	49	51	100
- Overseas residents	**1,106.5**			**45**
ASSETS				
Notes & coin & deposits with BoE	8.0	0	0	0
Market loans & advances (inc repos[1])	2,001.7	42	40	82
- Overseas residents	**823.1**	**5**	**29**	**34**
Investments & bills	322.6	5	9	13
- Overseas residents	**204.3**	**0**	**8**	**8**
Of which: direct investment	3.2			0
Of which: portfolio investment	201.1			8
Other (inc. items in suspense)	116.8	2	3	5
Total assets	2,449.1	49	51	100
- Overseas residents	**1,027.6**	**5**	**37**	**42**
NET ASSETS	0	- 0	0	0
- Overseas residents	**- 78.9**			**- 3**

Notes: Totals may not add due to rounding.

1. Repos refer to sale and repurchase agreements. See Pilbeam (1988) for further details.
2. CDs refer to certificates of deposit, and CP to commercial paper.

Source: Author's calculations using a combination of Bank of England *Statistical Abstract* 1998 and the data in Table 1.

Table 3: Changes in balance sheet composition over time, UK banks, 1977 – 1996

	Year ending				
	1977	1980	1985	1990	1996
Total assets (£bn)	192	303	762	1,266	1,877
Of which:					
Deposits (%)	86	85	82	82	81
CD's, bonds & other paper (%)	9	9	11	10	11
Loans and advances (%)	90	91	90	89	82
Investments (%)	3	3	6	6	13
Foreign currency assets (%)	64	65	68	52	55
Identified overseas residents (%)	45	48	52	42	44
Proportion from/to overseas residents:					
Deposits (%)	52	52	57	50	49
Loans and advances (%)	50	51	53	43	42
Investments (%)	29	35	61	63	66

Notes: 'Loans and advances' roughly correspond to other investment on the ONS definitions, while 'investments' correspond to the sum of direct and portfolio investment. Direct investment is only a very small part of 'investments'.

Sources: Author's calculations using Bank of England *Statistical Abstract* 1996, Bank of England *Monetary and Financial Statistics*, March 1997, and the *United Kingdom Balance of Payments*, various issues.

Table 4: Overseas assets of banks in five major countries, end 1996

	UK	Japan	US	Germany[1]	Switzerland[1]
Total[2] (US $bn)	1,114	861	858	473	185
As proportion of GDP (%)	96	17	11	21	60
As proportion of total overseas assets (%)	40	29	20	28	21

Notes: 1. End 1995.
2. Excluding direct and portfolio investment

Source: IMF International Financial Statistics, October 1998.

Table 5: Balance sheet composition of UK banks: British-owned vs. foreign-owned

	1980		1996	
	British %	Foreign %	British %	Foreign %
LIABILITIES:				
Sight and time deposits	83	86	75	75
- UK residents	58	27	60	22
- Overseas residents	**25**	**59**	**15**	**53**
Liabilities under repos	n.a.	n.a.	2	10
CDs, & other bonds & paper issued	4	12	9	12
Capital & other items	13	1	14	4
ASSETS:				
Loans & advances (inc. repos)	83	98	75	70
- UK residents	59	34	65	24
- Overseas residents	**24**	**64**	**10**	**46**
Claims under repos	n.a.	n.a.	4	14
Bills & commercial paper	2	1	2	1
Investments	6	1	14	13
Other	8	0	5	2
TOTAL ASSETS (£bn)	129	174	817	1060

Sources: Author's calculations using Bank of England *Statistical Abstract*, 1996 and Bank of England *Monetary and Financial Statistics*, March 1997.

Table 6: Domestic and overseas assets of different UK bank groups, 1975 - 1996

	Domestic deposits %	Domestic loans %	Overseas deposits %	Overseas loans %	Total assets %
a) End 1996					
UK retail banks	60	59	15	12	38
UK merchant banks	3	2	1	1	2
Other British banks	5	6	2	1	3
Total British-owned banks	**68**	**68**	**17**	**14**	**44**
American banks	6	5	13	13	8
Japanese banks	6	6	15	19	10
Other foreign owned banks	21	21	55	54	39
Total foreign-owned banks	**32**	**32**	**82**	**86**	**56**
Total (£bn)	719	781	687	573	1,877
b) Average 1975 - 1996					
Total British-owned banks	67	58	19	18	41
Total foreign-owned banks	33	42	81	82	59

Note: Totals may not add due to rounding.

Source: Author's calculations using Bank of England *Statistical Abstract* 1996 and Bank of England *Monetary and Financial Statistics*, March 1997.

Table 7: Net cross-border supply of funds to UK banks, 1965 – 1996

Year ending	Net suppliers[1] (-)	US $ bn	Net users[1] (+)	US $ bn
1965[2]				
	Switzerland	- 0.9	USA	+ 1.0
	Middle East	- 0.5	Japan	+ 0.6
	Canada	- 0.3	France	+ 0.4
	Overseas sterling area	- 0.3		
1970[2]				
	Switzerland	- 7.0	USA	+ 6.9
	Canada	- 2.2	West Germany	+ 2.2
	Other Western Europe	- 1.8	Japan	+ 2.0
1974[2]				
	Switzerland	- 13.0	USA	+ 3.0
	Canada	- 2.2	Eastern Europe	+ 2.5
	Other Western Europe	- 0.8		
1980				
	Switzerland	- 28	Other Western Europe	+ 27
	USA	- 20	Japan	+ 18
	Asia	- 4	Latin America & Caribbean	+ 18
			Eastern Europe	+ 9
1985				
	Switzerland	- 65	Other Western Europe	+ 43
	USA	- 39	Japan	+ 35
	Asia	- 4	Latin America & Caribbean	+ 34
	Offshore centres	- 4	Eastern Europe	+ 15
1990				
	Switzerland	- 111	Japan	+ 114
	Middle East	- 65	Italy	+ 40
	Germany	- 49	Latin America & Caribbean	+ 18
	Asia	- 16	Eastern Europe	+ 11
	USA	- 9	Canada	+ 12
1996				
	Switzerland	- 92	USA	+ 76
	Middle East	- 56	Japan	+ 63
	Other Western Europe	- 22	Italy	+ 42
	Africa	- 8	Offshore centres	+ 23
	Eastern Europe	- 1	Canada	+ 11
			Latin America & Caribbean	+ 9
			Asia	+ 6

Notes: 1. Only major or selected suppliers/users shown. These may not reflect the residence of ultimate users.
2. Non-sterling claims and liabilities only. Figures converted to US $ at end-year exchange rates.

Sources: Author's calculations using Bank of England *Quarterly Bulletin* March 1970, June 1972, March 1975; Bank of England *Statistical Abstract*, 1996; and Bank of England *Monetary and Financial Statistics*, March 1997.

Table 8: ADF tests for orders of integration[1]: Bank assets and trade

	Ho: I(2)[2]		Ho. I(1)[3]	
Variable	Lag (l)	t-statistic	Lag (l)	t-statistic
LWOBA	2	- 3.12	0	- 3.44
LUKOBA	1	- 5.77	0	- 1.96
LWX	4	- 3.10	4	-3.29
LUKX	4	- 3.45	4	-2.96

Notes: 1. Sample period 1986Q4 – 1997Q4. Variable definitions are given in the text (Section 4.1).

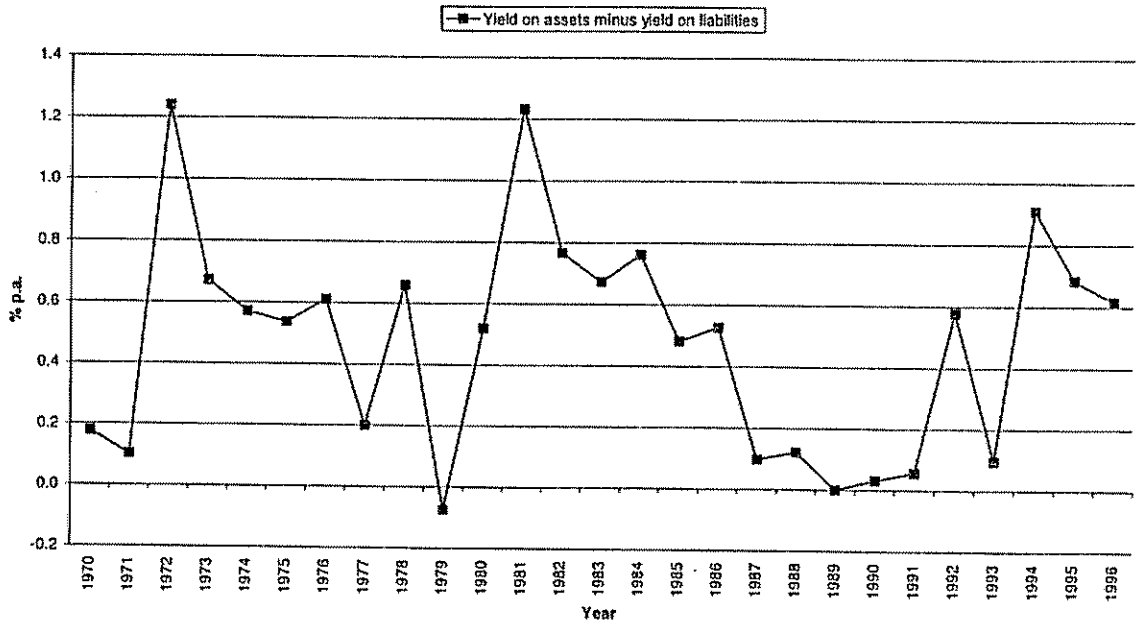
2. t-ratio on α_1 in regression $\Delta^2 X_t = \alpha_0 - \alpha_1 . \Delta X_{t-1} + \sum_{i=1}^{i=l} \beta_i . \Delta^2 X_{t-i} + u_t$. Critical value is 2.93.

3. t-ratio on α_2 in regression $\Delta X_t = \alpha_0 + \alpha_1 . t - \alpha_2 . X_{t-1} + \sum_{i=1}^{i=l} \beta_i . \Delta X_{t-i} + v_t$. Critical value is 3.51.

Figure 1: Summary of bank definitions

		Residency	
		UK	Overseas
Ownership	UK	British-owned UK bank	British-owned overseas bank
	Overseas	Foreign-owned UK bank	Foreign-owned overseas bank

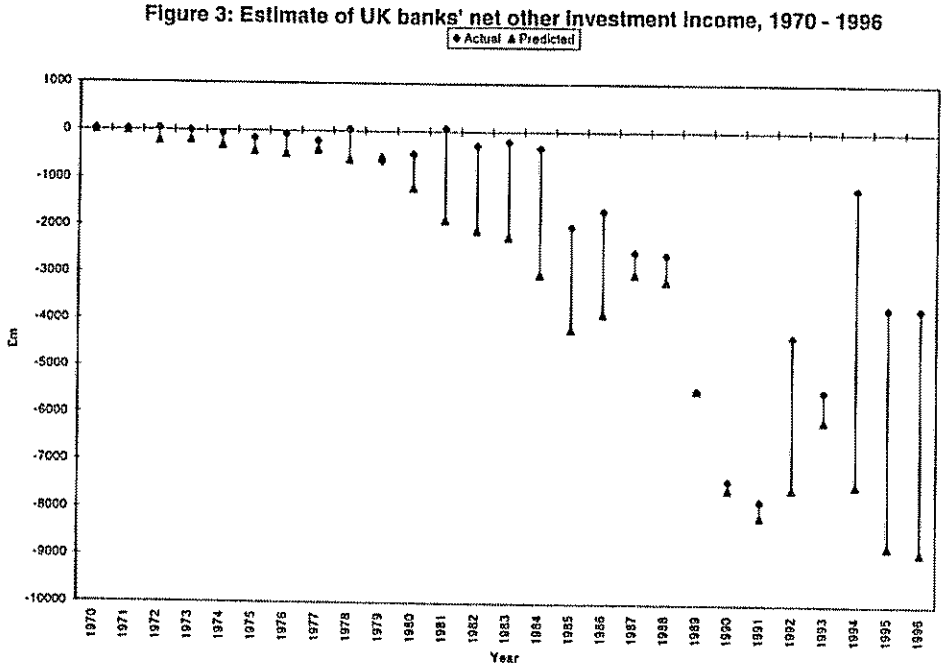
Figure 2: Income yield on UK banks' other investment, 1970 - 1996



Note: The data used for this chart is on the pre-BPM5 basis. See footnote 3 for details.

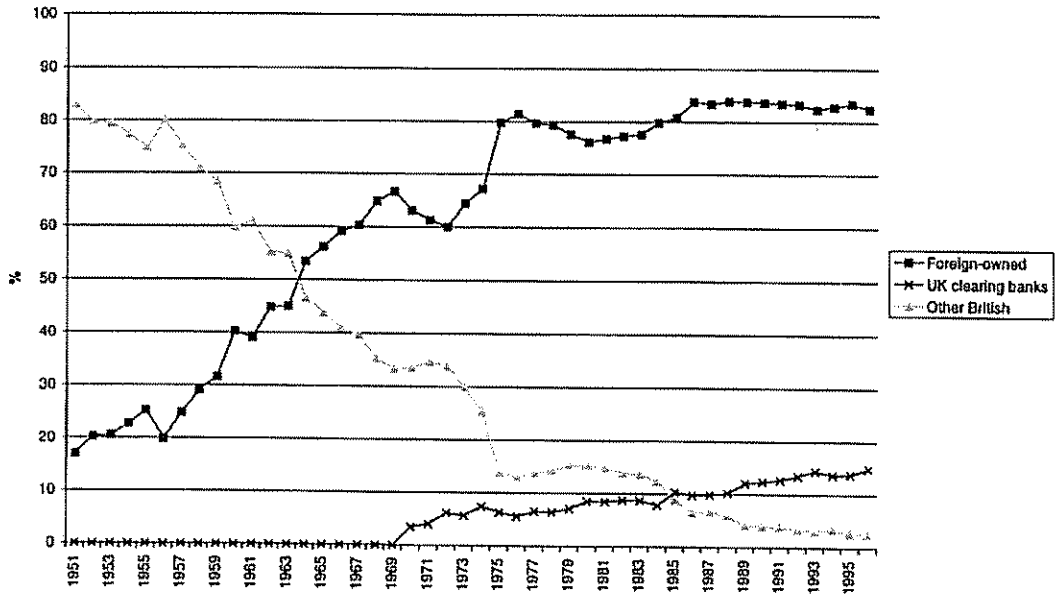
Source: Author's calculations using ONS data.

Figure 3: Estimate of UK banks' net other investment income, 1970 - 1996



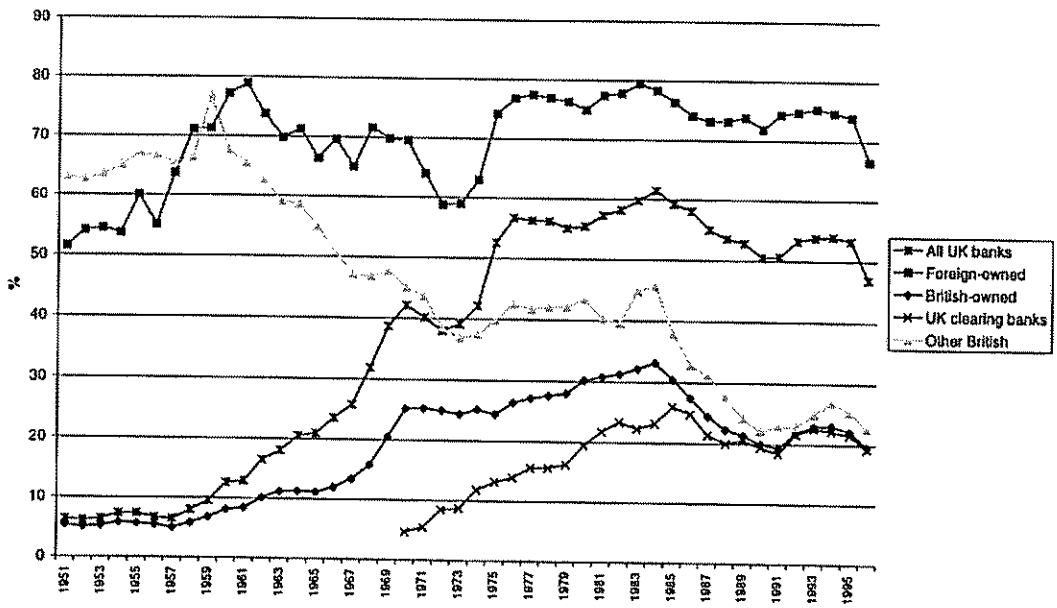
Note: The data used for this chart is on the pre-BPM5 basis. See footnote 3 for details.
Source: Author's calculations using ONS data.

Figure 4: Share of UK banks' overseas deposits, by category of bank, 1951-1996



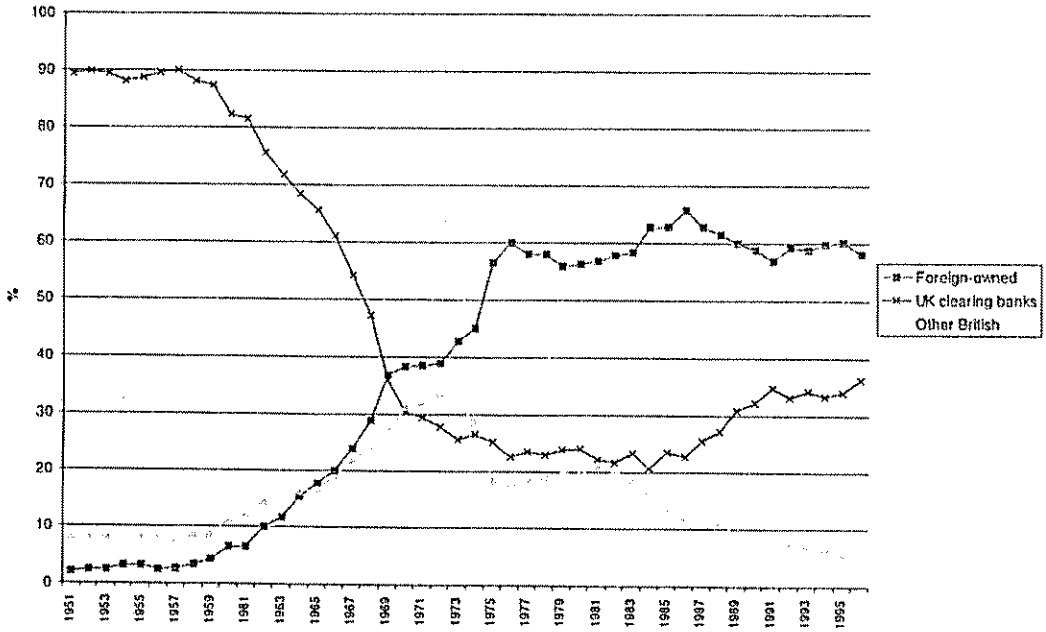
Source: Author's calculations using data from Bank of England *Quarterly Bulleting*, various issues; *Statistical Abstract,* 1996; and *Monetary and Financial Statistics,* March 1997.

Figure 5: Overseas deposits as proportion of total deposits, by category of UK bank, 1951 - 1996



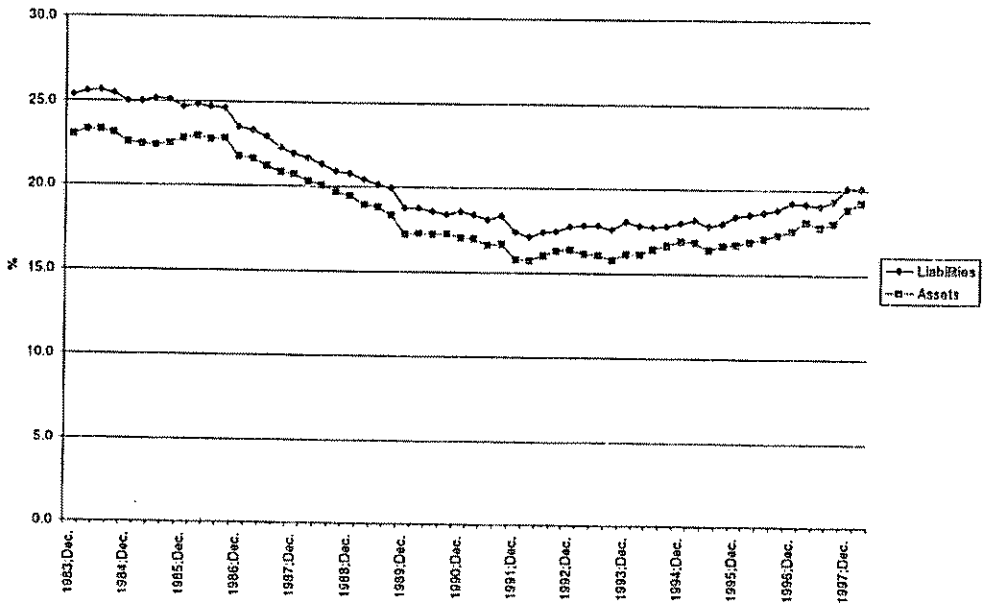
Source: As for Figure 4.

Figure 6: Share of total UK deposits by category of bank, %, 1951-1996



Source: As for Figure 4.

Figure 7: UK banks' share of world overseas bank assets and liabilities, 1983(4) - 1998(1)



Note: World overseas bank assets and Liabilities are the totals for all banks in the BIS reporting area. The graph shows UK banks' share of these totals.

Source: BIS (1998).

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