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ABSTRACT

This study uses disaggregated panel data consisting of the published accounts of 694 major UK companies over the period 1969 to 1983 to investigate the determinants of UK company short-term financial decisions. Despite computational and econometric problems involved in handling such a large data set, disaggregated data has major advantages over aggregate time series. The results of our estimation work give important insights into firms' decisions on bank borrowing, liquid asset accumulation, and their trade credit policies, which were unlikely to be revealed by research at the aggregate level. Estimated relationships suggest the importance of cash flows from a company's mainstream activities, relative interest rates and the overall balance sheet structure in determining acquisitions of short-term assets and liabilities. We also find that inter-company differences appear to be an important factor in determining financial outcomes in the company sector as a whole.

"AN EMPIRICAL MODEL OF COMPANY SHORT-TERM FINANCIAL DECISIONS: EVIDENCE FROM COMPANY ACCOUNTS DATA"

I INTRODUCTION

The purpose of this study is to investigate the determinants of UK company short-term financial decisions. By "short-term", we mean those decisions which are concerned with a company's net acquisitions (or flows) of cash, liquid assets, trade credit and debt, and its flow of short-term borrowings from banks. We will refer to these flows collectively as "Quick Finance". Our work in this area breaks new ground in a number of important respects, the most significant of which is the choice of dataset. Virtually all previous research in this area has utilised CSO aggregate time series data. In contrast, our study makes use of disaggregated panel data drawn from the published annual accounts of 694 UK companies, each of which is quoted on the stock exchange and has reported in every year from 1971 to 1983 inclusive.

The importance of company short-term financial decisions scarcely needs emphasis. On the demand side, there is considerable evidence that firms rely quite heavily on short-term bank borrowing and trade credit to finance working capital (Wilson Committee 1980). Meanwhile, the cash and liquid asset position can be crucial to a company's short-term survival in the face of shocks, such as shifts in demand, which call for a longer-term restructuring of its activities. There is also a strong presumption that liquid assets, bank borrowing, and trade credit are highly substitutable in company balance sheets (see, for example, Artis et al, 1978). It is widely believed that aggregate bank lending is the principal driving variable of the broad monetary aggregates. On this view, control of bank lending in general and lending to companies in particular, are important

prerequisites for effective control over the broad monetary aggregates. (For an exposition of this argument, see Goodhart, 1984a). Thus, Quick Finance and its components are important strategic variables which, at the microeconomic level, are closely related to individual companies' production and investment decisions and, at the macroeconomic level, are likely to be key ingredients in the authorities' efforts to use monetary policy to influence aggregate output and inflation.

Despite the importance of company short-term financial decisions, we lack a generally accepted explanation of their determinants. As described in Section II below the theoretical basis for understanding these decisions is relatively weak. In consequence, most empirical work in this area has taken on an eclectic and descriptive character. The bulk of the empirical research has been concerned with explaining the time series behaviour of the flow of aggregate bank lending to companies (for a recent survey see Cuthbertson, 1985). In this area, implausibility and instability of estimated equations have been endemic problems which, not surprisingly, have made the forecasting and control of bank lending problematic. For example, the flow of aggregate lending often appears to respond "perversely" if at all to changes in bank interest rates (see Goodhart (1984b) for a survey of these issues).

Recent aggregate financial data for the UK company sector have posed a fresh set of puzzles, since they include an "unidentified" component which has grown rapidly in the last few years until it is now much larger in magnitude than any single identified component in the company accounts. This suggests that the aggregate data are becoming increasingly unreliable. In recent years too, the identified components of the aggregate data imply that the company sector as a whole has been borrowing heavily from banks and, simultaneously, building up liquid assets. How far does this represent precautionary behaviour on the part of each company and how far does it reflect differences in behaviour or in operating conditions between companies? One hypothesis is that in recent years the company sector has become more polarised with one group consisting of relatively profitable and expanding companies in "newer" industries, and another group struggling in declining industries. It is a reasonable supposition that

companies in these different groups will make differing short-term financial decisions which may not aggregate in any simple way. However, a test of this hypothesis is virtually impossible to construct using aggregate time series data. More generally aggregate data mask the diversity of experience within the company sector and can make it hard to identify independent influences on company decisions. Indeed, non-linearities in relationships at a company level or differences in decision-making rules between companies can mean that no equation can explain the properties of the aggregate data satisfactorily.

All these considerations suggest that studying short-term financial flows in a more disaggregated setting than that provided by the aggregate time series data might yield new insights into company behaviour. The company accounts data which we use in our work offer perhaps the principal route for such a disaggregated study. The dataset contains a wealth of detailed financial information on individual companies and makes it possible to test with some precision a wide variety of hypotheses about company behaviour without many of the distortions inherent in using aggregate data.

Other econometric studies of UK company accounts data are relatively few in number. Bain, Day and Wearing (1975) analysed the allocation of company cash flows among several broad classes of assets and liabilities; Cambridge Econometrics uses a disaggregated model of the company sector in its forecasting work, but this model has not so far been published; The Institute of Fiscal Studies is also working on disaggregated models of company behaviour. However, none of these projects have been directed to understanding the short-term financial decisions which are the concern of this paper. Heston (1962) comes closest to the subject of our work but he was concerned exclusively with the activities of US corporations.

Our study has two broad objectives. The first is to develop and test a general model of company short-term financial behaviour. The specification and estimation of this model concentrates in particular on assessing the responsiveness of the flows of the four components of quick finance to movements in other company cash flows and to interest rate changes, as well as on examining

the degree of substitutability among these four components. The second objective of the study is to explore, in a preliminary way, the extent to which there are differences in the behaviour of individual companies or company groups within the sample as a whole. We study such differences in the following ways. First, we use econometric estimators which allow for unobserved effects specific to each individual company. Second, we examine variations in marginal responses across different companies. We do this by testing for parameter stability across sub-groups of the sample, by varying the weights given to "large" and "small" companies in estimation, and by exploring the nature of possible non-linearities in the equations.

The Plan of The Paper

In Section II we review briefly the theoretical and empirical literature on corporate finance and consider what can be learned from this literature about the determinants of companies' short-term financial flows.

In Section III we set out our own model. We first provide a brief account of the data. Next we outline the general framework within which the model is set and discuss in detail the equations which we estimate and their interpretation. A final sub-section is devoted to econometric issues and practical problems of estimating our model.

Section IV is concerned with the results of estimating our model. We focus particularly on the impact of the structure of company cash flows and balance sheets, interest rates and the company tax system on firm behaviour. We also consider the substitutability of the various financial assets and liabilities. Evidence of diversity of responses across the companies in our sample is presented and evaluated and the implications for aggregate behaviour considered.

Section V presents our conclusions.

Two appendices give respectively: an account of the sources and definitions of the data, and a set of tables of regression results.

Section II: Theoretical and Empirical Background

II.1 The Theory of Corporate Finance

The theory of corporate finance has, in large part, emphasised sets of assumptions under which firms are indifferent among various sources of finance. The Modigliani-Miller (M-M) Theorem predicts that, under certain assumptions, the market value of a firm is completely independent of how the firm is financed: by debt, equity issues or retentions (Modigliani and Miller, 1958). Under these assumptions, a firm's financial policy is of little interest as it has no bearing on production and investment decisions. M-M has, moreover, proved remarkably robust in the face of relaxations of the basic assumptions of the original contribution. (See Stiglitz, 1969, Hay and Morris 1979). Empirical evidence suggests, however, that firms are concerned about their own capital structure. To explain this, recent theory has explored a number of issues notably: agency, signalling and taxation. Briefly, agency and signalling theories concentrate on the implications of the division between ownership and control of a modern company. They emphasise that financial decisions are, in part, a response to this separation of responsibilities and, in particular, that such decisions provide information about the company to outside investors. Tax theories concentrate on the incentives set up by different systems of corporate and shareholder taxation[1]. None of these offers a comprehensive theory of finance and only the tax theories offer simple testable empirical implications for capital structure.

Two serious deficiencies in this literature in relation to the present set of issues are first that it is aimed mainly at understanding the financing of fixed investment expenditures, and second that this understanding is couched chiefly in terms of broad categories of finance: debt, equity issues and retentions. On the first point, firms also borrow to finance working capital (to meet the costs of inventories and

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1 King (1977) discusses many aspects of corporate financial policy - especially tax theories. Other useful references on the theory of corporate financial policy are Stiglitz (1974), Jensen and Meckling (1977), Bhattacharya (1979) and Ross (1977).

work-in-progress) and such borrowing is, in theory, determined by an entirely different set of considerations from borrowing for fixed investment. Whereas theory predicts that a rise in the rate of interest (or cost of capital) reduces investment expenditures (and thus borrowing) it may equally well reduce or increase working capital requirements, and hence borrowing, (see Hirschleifer (1970)). The second problem, that of broad categories of finance, is also important. Even if we had a theory of debt finance, for example, it would not necessarily tell us how the debt is allocated between bank and non-bank finance or short-term and long-term debt.

In designing our empirical work, we have been impressed by two further strands in the theoretical literature. According to the first, certain assets or liabilities in company balance sheets are likely to act as "buffers" which, in the short-run, absorb the combined effects of all the fluctuations originating elsewhere in a company's accounts. On this view, the size of a buffer stock provides an indicator mechanism which, perhaps when it crosses certain limits (upwards or downwards), warns management to make changes to the company's mainstream activities. This buffer stock approach is discussed by Goodhart (1984c) and Bain and McGregor (1985) who argue that, particularly under an overdraft system, it is plausible to suppose that bank lending acts as the buffer for large firms. A second line of thinking has been developed by Sprenkle and Miller (1981). This emphasises a precautionary motive for corporations to hold non-interest bearing cash but also stresses that, where overdrafts are available, cash (assets) and bank borrowing (liabilities) are close substitutes. If this is so, small changes in the spread between borrowing and lending rates may induce significant changes in a firm's balance sheet.

II.2 Empirical Evidence

Past empirical research has concentrated mainly on aggregate company bank borrowing, and two main approaches have been pursued. Moore and Threadgold (1984) estimated an equation based explicitly on a working capital model with the flow of bank borrowing depending on changes in the wage bill, changes in imports, changes in tax payments and stockbuilding. The other

(eclectic) approach is exemplified by Cuthbertson (1985). His model makes lending depend on interest rates, firms' total borrowing requirement and upon the level of GDP. Cuthbertson interprets the borrowing requirement as reflecting buffer stock considerations but a variety of other interpretations are possible. Though differing in detail, the NIESR and Treasury equations are quite similar to his basic specification.

Wider studies of company financial behaviour using time series data are few in number. Bain (1975) reported on a general model of company financing which included equations to determine the flows of bank borrowing and liquid assets. He found it difficult to explain the allocation of company cash flows other than as a fixed response to the total cash surplus or deficit to be allocated at any particular stage of decision-making. Moreover, the model was estimated mainly using data from the 1960s and the equations generally broke down in the more turbulent conditions of the mid-seventies. More recently, Jackson (1984) studied the allocation of the financial assets of companies among five categories. She reported difficulty in modelling bank borrowing and the preferred model is confined to companies' gross financial assets. Even so, the model contains various anomalies associated in particular with the estimated lag structure. These studies do not exhaust all the possibilities but they illustrate the problems encountered in this area.

Non-econometric information about many important issues in UK company finance is provided by the Wilson Committee. Its findings are consistent with the view that overdrafts are very much a residual source of finance which accommodates unanticipated fluctuations elsewhere in a company's accounts. It reported that overdrafts are also used to finance working capital and to accommodate the (anticipated) timing of major funding decisions, especially calls for new equity. It found too that a firm's cash and liquid assets are substitutes for overdrafts in performing these functions, particularly when a rights issue precedes an investment programme or when there are incentives for arbitrage.[1] The committee also stated that small and medium

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1 See especially paragraphs 530 of the final report.

sized firms in particular tend to rely more heavily on trade credit as a source of finance for working capital. This, in turn, is suggestive of some substitutability between trade credit and bank finance.

In summary, theory and evidence provide only limited guidance in explaining company short-term financing decisions. However, they do suggest that it might be fruitful to study quick finance as a buffer, whose (four) components are probably closely interdependent.

SECTION III: The Model of Company Short-Term Financial Behaviour

III.1 The Data

The main source of our data consists of the published annual accounts of a sample of 694 medium and large quoted UK companies, each of which has reported in every year from 1971 through 1983.[1] The sample companies represent about 35% of all UK Industrial and Commercial Companies (ICCs) by pre-tax profits. A direct assessment of the sample size by quick finance variables is not possible because they are reported on different principles in the company accounts and in the national accounts. The aggregate stock of total borrowing (bank and non-bank, including loan capital) in our sample represents about 40% of the stock of all ICCs' debt and loan capital reported in the official statistics. By any reckoning these firms account for a substantial proportion of total non-financial corporate activity in the UK.

Companies mostly report at intervals of almost exactly twelve months. The report dates of the firms in the sample are distributed fairly evenly through the calendar year. We have exploited this fact to increase the variation in the external data (such as market interest rates) which are used in the study. We have allocated companies according to the quarter in which their report day falls and aligned the external data correspondingly. For example, companies which report some time in the second quarter are assumed to be influenced by movements in market interest rates, tax rates and the like through the end of the first quarter. With 13 annual observations on each firm this means that there are 52 different (quarterly) observations on each of the external variables, thus allowing greater variation and a more accurate alignment. External data used in the study included market interest rates, tax rates, and the like, and these were culled from the usual official sources.

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1 The companies are a sample of those whose accounts are collected and distributed by DATASTREAM. The choice of sample is described in detail in appendix A. The accounts consist of balance sheet, profit and loss, and sources and uses of funds.

III.2 The Overall Framework Of The Model

The accounting framework for the model is provided by the Sources and Uses Statement. We begin by partitioning a firm's activities into four groups each of which generates net positive or negative cash flows. We label these cash flows: production - including profits, taxes and dividends - (p); investment (q); long-term finance (e); quick finance (f). A firm's Sources and Uses statement can then be written in summary form as:-

$$q - p - e = f$$

We will refer to production, investment and long-term finance as the firm's "mainstream activities" (m). Thus, using the definition $q - p - e = m$, the Sources and Uses Statement can be written more compactly as:-

$$m = f$$

It should be understood that f, p, q and e (and therefore m) are themselves aggregates formed from a more detailed analysis of a firm's accounts. This analysis is given in Table I.

Quick finance consists of four components which are made up as follows. Short-term bank borrowing includes sterling and foreign currency borrowing of under one year's maturity (including overdrafts). Trade credit received and given are defined more widely than the corresponding concepts in company accounts: trade credit received includes short-term, non-bank borrowing and trade credit given is net of provisions for bad debts. Liquid assets consist of non-interest bearing and interest bearing sterling and foreign currency assets.[1] The remaining components of the Sources and Uses Statement are cash flows generated by a firm's mainstream activities. These components mostly correspond to accounting definitions.

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1 We are uneasy about the aggregation of sterling and currency claims but too few companies distinguish these components separately in their accounts to make it feasible for us to model them separately. We have controlled for this problem to some extent by excluding from our sample those companies which have a high proportion of business overseas, but we cannot claim that this is more than palliative treatment.

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TABLE 1

SOURCES AND USES STATEMENT OF THE FIRM

Production

Profits (trading plus non trading)	(1)	(s)
Stockbuilding	(2)	(s)
Miscellaneous sources	(3)	(s)
Dividends	(4)	(u)
Taxation	(5)	(u)
Miscellaneous uses	(6)	(u)

Investment

Acquisition of fixed assets and net investments (mainly subsidiaries)	(7)	(u)
Sales of fixed assets	(8)	(s)

Long term finance

Capital issues	(9)	(s)
Flow of loan capital	(10)	(s)

"Quick Finance"

Short-term, bank borrowing	(11)	(s)
Trade credit received	(12)	(s)
Trade credit given	(13)	(u)
Change in liquid assets	(14)	(u)

s = Sources
u = Uses

Sources/Uses Identity

q - p - e = f

[7-8] - [1-2+3-4-5-6] - [9+10] = [11+12-13-14]

The goal of the study is to provide an explanation of the determinants of the four components of quick finance. More precisely, given a total quick financing requirement in any time period, our model explains how this requirement is allocated among (or satisfied by) movements in bank borrowing, trade credit and liquid assets.

The main behavioural assumptions of the analysis are these. We view companies as operating in an environment in which, typically, the cash flows generated by its mainstream activities are all predetermined in the short run. These cash flows aggregate to a quick financing requirement (m = f) which in any time period has to be satisfied by increasing bank borrowing, changing trade credit outstanding or running down liquid assets. The idea that mainstream cash flows are predetermined means that, during the decision period within which quick finance is allocated, mainstream cash flows can be taken as exogenously given by those responsible for allocating quick finance.

The assumption that mainstream cash flows are predetermined is plausible since it is likely that firms make decisions in an hierarchical way, ie they "first" decide on their production, investment, pricing and longer-term financial decisions. The outcome of these decisions is a net cash deficit or surplus on mainstream activities which the firm "then" decides how to allocate among the components of quick finance. This scheme means that flows of quick finance can be modelled taking the other flows as given. A second reason why mainstream cash flows may be predetermined arises from the fact that, typically, decisions on these activities take time to make and further time to implement.[1] Moreover, once these decisions have been taken, their outcome will in general not be exactly predictable because of unanticipated shocks occurring during implementation. Quick finance variables are individually unconstrained; in total, however, quick finance has to absorb all the fluctuations

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1 For example, current sales may be constrained by demand and previous marketing decisions; production and costs by plant capacity and existing labour contracts; investment by previous decisions and contractual agreements; and equity finance by a firm's share price and, for a new issue, by the length of the new issues queue.

elsewhere in the accounts (anticipated or unanticipated) which cannot be modified to any great degree within the current period.

We do not claim that the level of quick finance has no influence on a firm's major activities. However we would argue that the gestation period for decisions on major activities is long relative to that for quick finance and that the costs of short-run changes in the former are likely to be prohibitively high relative to the costs of short-run changes in the level and allocation of quick finance. Thus, although liquidity considerations may impel a review of major decisions, the impact of such a review on actual cash flows will typically be felt only after a lag.

What criteria did we use to partition the company accounts among the main groups of activities? Investment and long-term finance were thought of as discretionary activities which entail long-term planning. Production consists of the normal business of the firm together with those claims on its resources which, in some sense, involve a prior charge (eg taxation, interest payments). The remaining variables are quick finance. We would judge that this partitioning between mainstream activities and quick finance would, on the whole, command general agreement. More contentious is our classification of stockbuilding and trade credit. We regard stockbuilding as predetermined vis-a-vis quick finance because of the overwhelming evidence that in the short-run stockbuilding is determined involuntarily by the difference between production and sales which are both mainstream activities. Moreover, a voluntary change in stocks can typically only be achieved either by a major sales drive with advertising and price-discounting or by temporarily closing production lines. Either strategy is costly and unlikely to be undertaken without advance planning and a substantial prior deterioration in a company's quick finance position. In short, a voluntary cut in stocks will be undertaken following a deterioration in the quick finance position but the effect of a cut in stocks on cash flows and hence quick finance is immediate. It is for these reasons that we believe that stockbuilding should be treated as a (predetermined) mainstream activity.

As far as trade credit is concerned, Heston argued that it could be regarded as predetermined vis-a-vis liquid assets and bank borrowing. We disagree. Heston's results show that short-term interest rates have an impact contemporaneously on both trade credit and cash holdings thus contradicting his own argument. In addition a high proportion of trade credit is of relatively short maturity and the highest grade bills are practically indistinguishable from liquid money market instruments. It would therefore appear arbitrary to argue that one grade of credit (trade credit) is pre-determined in relation to another grade included in liquid assets or bank borrowing. We conclude that Trade Credit is appropriately treated as part of Quick Finance.

Flows of trade credit given and received can both be considered as decision variables of the firms in our sample even though some proportion of the flows will be intra sample. All we require is that at the margin the firms in our sample can control credit given and received by "squeezing" either firms outside our sample (predominantly small companies) or the personal sector.[1]

III.3 The Empirical Model in More Detail

The notation in this section is as follows[2]:-

f_i ($i = 1, \ldots 4.$) are the quick finance cash flows

F_j ($j = 1, \ldots 4.$) are the stocks of quick finance assets and liabilities

m_k are the cash flows generated by mainstream activities ($k=1,\ldots.K$)

M_ℓ are the stocks of assets and liabilities associated with mainstream activities ($\ell=1,\ldots.L$)

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(1) Small firms often complain about delays in the payment of bills by larger firms; this is consistent with the hypothesis that firms in our sample are on average able to "squeeze" firms not in the sample.

(2) Time and company subscripts are omitted unless ambiguity results.

z_h are any other explanatory variables which are detailed below (h=1,....H)

u_i are white noise errors

α_i γ_{ij} β_{ik} $\delta_{i\ell}$ φ_{ih} are parameters

There are two basic identities which the stocks and flows satisfy:-

$$F_{it} = f_{it} + F_{it-1} + \text{Capital Gains or Losses}$$

$$M_{it} = m_{it} + M_{it-1} + \text{Capital Gains or Losses}$$

The sources and uses statement is now written:-

$$\sum_{i=1}^{4} f_i = \sum_{k=1}^{K} M_k$$

and the balance sheet:-

$$\sum_{j=1}^{4} F_j = \sum_{\ell=1}^{L} M_\ell$$

Our basic regression model consists of the following four equations (company subscripts are omitted)

$$f_i = \alpha_i + \sum_j \gamma_{ij} F_{jt-1} + \sum_k \beta_{ik} m_k + \sum_\ell \delta_{i\ell} M_{\ell t-1} + \sum_h \varphi_{ih} z_h + U_i$$

$$i = 1, \ldots, 4$$

These equations state that the allocation of total quick finance among its four components (f_i) is determined by linear combinations of the lagged stocks of quick finance (F_j), the structure of the mainstream cash flows (m_k), their lagged stocks (M_ℓ), and certain other variables (z_h). These equations are not independent of one another but are linked by the budget constraint provided by the sources-uses identity. For this reason we do not concentrate on any one of these equations separately. Instead, we follow Brainard and Tobin (1968) and model all four decision variables simultaneously in a consistent way. The estimation of these equations presupposes that in the short run firms have some control over the composition of quick finance but not over their total requirement for finance.

The justification for including particular explanatory variables and the interpretation of the associated parameters are as follows:-

(i) Mainstream Cash Flows: m_k

Mainstream cash flows can be interpreted as the disaggregation of a company's borrowing requirement. The existence of constraints and costs of adjustment suggests that the allocation of quick finance might be differentially influenced by the separate mainstream cash flows (m_k) rather than just by their total (m). Our strategy is to begin with a relatively disaggregated set of mainstream cash flows and then test statistically how far these flows can, in fact, be aggregated. If, for example, hierarchical decision-making predominates, it is possible that many of the components of m can be aggregated together. The regression parameters associated with the mainstream cash flows have the interpretation that each β_{ik} shows the effect on f_i of a £1 increase in quick finance requirement coming in the form of a £1 increase in m_k. Since a £1 increase in quick finance requirements must be met by one of the four components of f, each β_{ik} must sum across equations to unity[1] (or - 1 if m_k is a source of funds rather than a use). We would expect the β_{ik} to lie between +1 and -1 with the coefficients on uses of funds being positive and those on sources being negative (since the former require financing while the latter provide it).

(ii) Balance Sheet Structure:

Lagged Stocks of Quick Finance: F_{jt-1} and Lagged Stocks Associated with Mainstream Activities: $(M_{\ell t-1})$

The allocation of quick finance is hypothesised to be determined chiefly by mainstream cash flows and other currently dated variables. However, it is likely that firms also have some idea of the optimal allocation of the stock of quick finance in the longer-run. This longer-run allocation is represented by the

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1 For all other explanatory variables (common to each equation) the sum of the parameters across equations is zero.

lagged stocks of quick finance[1] (F_{jt-1}). We could begin with equations explaining the allocation of the stock of quick finance; the actual regression equations explaining the flows can then be derived by assuming that firms face simple (quadratic) costs of adjustment. The lagged stocks associated with a firm's major activities ($M_{\ell t-1}$) may be given a similar interpretation, although they reflect the longer-term structure of the firm's entire balance sheet. We would expect each γ_{ij} and $\delta_{i\ell}$ to lie between +1 and -1.

(iii) Sales and Cost of Sales

There is evidence that sales and cost of sales are determinants of movements in trade credit (Brechling and Lipsey 1963) and these variables were therefore included in the regressions as a check on this earlier finding.

(iv) Interest Rates

Quick finance consists exclusively of nominally-denominated claims. We would therefore expect the structure of nominal (rather than real) interest rates to influence both the equilibrium distribution of quick finance and its short-run allocation.[2] However, the components of quick finance are relatively heterogenous and it is not possible to argue that each component can be uniquely associated with a single interest rate which can be identified as the "own" rate. We therefore included six interest rates in our general specification: Interbank rate; 3 month CD rate; London Clearing Banks' base rate; covered Euro-dollar rate; uncovered Euro-dollar rate; and the rate on 3 month trade bills.

Base rate and the (covered or uncovered) Eurodollar rate can plausibly be regarded as the own rates on both company assets and

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1 It would be possible to include in the model additional stocks lagged two or more periods. We have not done so because it is not easy to provide an economic justification for higher than first-order dynamics. It is not obvious why stocks lagged two or more years should have an independent influence on the current allocation of quick finance.

2 Some crude measures of inflation expectations were tested but they all proved insignificant.

liabilities. For example, companies with large fixed-rate deposits and no fixed-rate loans will regard base rate as the own rate on deposits whereas companies in the reverse position will regard base rate as the own rate on loans. The responses of two such companies to a rise in base rate are therefore likely to be of opposite signs. Thus, pooled regressions may not provide very satisfactory estimates of the coefficients on these interest rates in the liquid asset and bank lending equations. However, it is difficult to correct for this problem without considerably increasing the complexity of the estimation procedures. The position is better for the CD rate and Interbank rate which can reasonably be assigned to liquid assets and bank borrowing respectively. A rise in the CD rate should increase the demands for liquid assets and for loans whereas a rise in the Interbank rate should reduce both demands. These two rates are highly correlated and, in the past, it has proved virtually impossible to isolate their separate effects. It is a severe test of the present data to see if such effects can be isolated.

We do not have direct information about the terms on which trade credit is supplied. In principle, the trade bill rate could represent trade credit terms. In practice, it is likely that the bulk of trade credit defined here is supplied on terms which are markedly less volatile than market interest rates. We expect therefore that a rise in market interest rates will increase trade credit received and reduce trade credit granted, provided firms can determine both credit extended and taken. This implies a relative squeeze on the household and small firm sectors which are outside our sample of firms.

The interest rate coefficients are all conditional on the lagged asset stocks (F_{jt-1}) and the exogenous flows (m_k). Such conditional coefficients can be signed in counter-intuitive ways even though the longer-run responses are quite sensible. (See Green 1984). We therefore adopted a pragmatic approach towards estimating and testing for interest rate effects. In testing down from our general model, we placed more weight on the statistical significance of interest rate coefficients than we did on their sign pattern and magnitude.

For each company the main interest rate variables are all defined as the averages of the monthly rates over the year to the last quarter of the company's financial year. Thus, companies reporting in different quarters are assumed to be influenced by different values of the interest rate variables. This framework presumes that annual flows of quick finance are influenced by (approximately) contemporaneous annual average interest rates. Flows of quick finance may be adjusted fairly rapidly in response to changing market conditions. We therefore examined how far the most recent interest rate experience had a differential effect on company behaviour by including as additional explanatory variables the averages of monthly interest rates during the last quarter of the company's financial year. We labelled this a test for timing effects of interest rate changes.

In addition to examining the significance of individual interest rates we also tested for the homogeneity of interest rate effects. This is a test of whether the allocation of quick finance is influenced by the structure and level of interest rates or only by the structure of relative interest rates. If the level of interest rates is important then the authorities have a relatively simple tool available for influencing company financial behaviour. If it is only the structure of relative interest rates that matters, this is likely to pose rather harder problems for monetary control.

(v) Credit Controls

There were various changes in credit control regulations during the data period. We tested for the effects of these changes using four 0-1 dummy variables. The first covers the introduction of Competition and Credit Control in 1971. The second covers the entire period of operation of the Supplementary Special Deposit Scheme (The "Corset"), on the grounds that, even when banks' interest-bearing eligible liabilities were not formally restrained, future restraint was anticipated and affected banks' and companies' behaviour accordingly. The third dummy is confined to those periods when the corset was formally in place on the banks. The final dummy covers pre- and post-exchange control abolition in 1979.

(vi) Tax effects

At the level of theory, possibly the most important relative prices affecting the choice between different types of finance are those which depend upon the interaction of the corporate and personal tax systems. King (1977, chapter 4) shows that under certain conditions a firm's choice between debt, equity and retentions depends only upon the values of three key tax ratios. These are:-

a) $\frac{(1-Y)}{(1-K)(1-C)}$ If this is >1 the firm will prefer debt finance to retentions.

b) $\frac{(1-S)}{(1-C)}$ If this is >1 the firm will prefer debt finance to equity finance

c) $\frac{(1-Y)}{(1-S)} + K$ If this is >1 the firm will prefer equity finance over retentions.

where

C = Corporate tax rate
S = Rate of imputation
K = Effective marginal capital gains tax rate
Y = Marginal income tax rate of shareholders

The major changes which have occurred in the UK tax system since 1970 make it particularly interesting to estimate the influence of these three variables. If, as we have assumed, capital issues, retained profits and long-term debt are predetermined with respect to quick finance flows then changes in the relative attractiveness of these broad categories of funds must in the short-term be reflected in quick finance variables. However, the expected signs of the tax ratio coefficients in each quick finance equation are not immediately apparent. If, for example, a tax change means that equity finance becomes a more desirable option, the effects this will have on bank borrowing or liquid asset flows in the short run is not easy to predict. We also include the stock of irrecoverable advanced corporation tax (ACT) in the regressions to test whether tax exhaustion has an impact on quick finance flows.

(vii) Cyclical and Trend Effects

In aggregate bank lending equations, GDP or a similar aggregate is generally used to measure the influence of cyclical variation in the economy as a whole. In our work, the unemployment rate is used as a proxy for the influence of economy-wide cyclical variables at the level of the firm. In addition, a time trend was initially included in all the regressions.

(viii) Economies of Scale, Integration and Company Profitability

Economies of scale in requirements for funds at the firm level amount to a non-linearity which would create distributional implications at the aggregate level. If there are economies of scale, the effect of an increase in aggregate company income on aggregate bank borrowing (say) depends inter alia on how that increased income is distributed among individual companies. We included both the square of sales and the square of profits as measures of scale economies. A measure of relative firm size was also investigated (company sales relative to total sample sales). It seems plausible that firms which are more vertically integrated will require less credit and liquidity for a given scale of operation than a less vertically integrated company of equal size. The ratio of value-added to sales would be a suitable index of vertical integration but value added data were not available for many of the firms in our sample. We therefore used as a proxy the ratio of pre-tax profits to sales on the grounds that profits are likely to be highly correlated with value added. More vertically integrated firms should have a higher ratio of profits to sales. A measure of the pre-tax real rate of return to companies is included in the general specification to test whether there is any difference in behaviour between more and less profitable firms.

(ix) Financial Stress

Companies are likely to take action to reduce unusually high gearing ratios for fear of bankruptcy or takeover. In the longer run, firms must react to such "financial stress" by altering production and investment. In the short-run, stress has to be

financed though it is not clear how stress would affect the pattern of quick financing. Two extreme policies can be described:-

a) "Solvency first": If a company places priority on solvency then financial stress would produce a switch to cash even at the expense of higher bank borrowing.

b) "Autonomy first": If, in constrast, a firm feared that reliance on the banks in time of stress would leave it vulnerable to winding-up, then increased stress may produce a cut in bank borrowing even at the cost of cash flow pressures.

Two measures of financial stress are included in our general specification: lagged income gearing and the lagged stock of loan capital.

(x) Interest Charges

Interest charges might be expected to have a separate impact on short-term financial flows over and above their influence via the effect on profits (which are net of interest charges). The current flow of interest charges is unlikely to be weakly exogenous with respect to the flow of short-term bank borrowing (which increases the stock of interest bearing debt). We therefore include the lagged value of interest payments as an explanatory variable.

III.4 Estimation and Testing Procedures

The general model that we estimate can be written:

$$
\begin{aligned}
f_{1nt} &= \alpha_{1n} + \sum_{k=1}^{K} \beta_{1k} (X_{knt}) + U_{1nt} \\
f_{2nt} &= \alpha_{2n} + \sum_{k=1}^{K} \beta_{2k} (X_{knt}) + U_{2nt} \qquad (1) \\
f_{3nt} &= \alpha_{3n} + \sum_{k=1}^{K} \beta_{3k} (X_{knt}) + U_{3nt} \\
f_{4nt} &= \alpha_{4n} + \sum_{k=1}^{K} \beta_{4k} (X_{knt}) + U_{4nt}
\end{aligned}
$$

n = 1,.....N companies N = 694
t = 1,.....T time periods T = 13

There are four dependent variables labelled f_1, f_2, f_3, f_4. Thus f_{3nt} is the observation of the third dependent variable (say trade credit given) for the n^{th} firm in the t^{th} period. We include a common set of explanatory variables in all equations to ensure that the estimated model always satisfies the sources-uses identity for each company. As written, the system (1) consists of unobserved effects (α_n) which are firm specific, though time-invariant, and a set of slope coefficents which are common across different firms. In principle, it would be possible to estimate firm-specific slope coefficents on all or some of the elements of X. In practice, this is not feasible here as there are only 13 annual observations on each firm. This severely limits the number of explanatory variables which could be estimated, and interpretation of results would be extremely difficult with 694 different estimates of <u>each</u> slope parameter.

Several assumptions can be made about the unobserved firm-specific effects, the most straightforward of which is that they are non stochastic: the fixed effects model. In this the "within" or covariance estimator is efficient and consistent, providing the errors satisfy the usual assumptions for the validity of ordinary least squares (OLS). The within estimator is obtained by performing OLS on the model transformed into deviations from the time mean specific to each company. This is equivalent to applying least squares to the pooled data using N step dummy variables for the intercept terms.

An alternative assumption for the firm-specific effects (α_n) is that they are a random sample drawn from some distribution: the "random effects" model. Models of this type are associated with the Balestra and Nerlove (1966) generalised least squares (GLS) estimator which is eqivalent to a weighted combination of the within and between[1] estimators, with weights inversely related to the variances of the two estimators. If the model is correctly specified and the α's are generated stochastically, then

---

1 The "between" estimator uses only the time means of each variable giving N observations for estimation.

the GLS estimator is more efficient than either the within or between estimators although the gains may be negligible with such a large data set. Moreover, where the α's are generated stochastically, the most likely form of mis-specification is that of omitted variables, and, in this case, the α's may in fact be correlated with the measured explanatory variables. Under these circumstances the within estimator is to be preferred as it remains consistent whereas the GLS estimator is, in general, inconsistent.

Additional problems are posed by the inclusion of lagged stocks of the dependent variable (the F_{jt-1}) in each equation. The within estimator is inconsistent as N increases with T fixed with bias of order 1/T. In this study T=13 which is reasonably large for panel data. The GLS estimator is consistent and unbiased but only under further strong conditions.[1] These considerations led us to rely mainly on the within estimator for estimation purposes. Computational feasibility precluded any adjustments for bias. However we have compared the results of within estimation with those of GLS estimation. A Hausman (1978) test can then indicate whether the GLS estimator is likely to be consistent.[2]

The size of firms in our sample varies greatly and it would be surprising if errors from regressions using the levels of variables were homoskedastic. Heteroskedasticity would lead to inefficiency in our estimates and the possibility of faulty inferences. To avoid this problem we have estimated equations in "ratio form", dividing flow and stock variables from company accounts by a factor reflecting the scale of the company:

---

1 If either the first observation on the dependent variable is independent of the individual effect or if the initial observation is fixed.

2 The Hausman test of the null hypothesis (H0) of no correlation against the alternative hypothesis of correlation (H1) relies upon a comparison between an estimator which is consistent under both H0 and H1 but inefficient under H0 and an estimator which is efficient under the null but is inconsistent under the alternative. In the present context (assuming the problem of the lagged dependent variable is not serious) the consistent estimator is the "within" estimator and the efficient estimator, provided there is no correlation between the individual effects and the explanatory variables, is the GLS estimator.

adjusted total liabilities lagged one year[1]. In these equations interest rates, dummy variables, tax rate terms, income and capital gearing and the other variables measured in common units across firms enter in unscaled form. In addition company-specific effects are proportional to the scaling factor. We have however also estimated equations without a heteroskedasticity adjustment: in "levels form".[2] In this specification, larger firms have a greater weight in the regression than they do in ratio form. It follows that a comparison between the results from ratio and level specifications gives an indication of whether large and small firms behave differently. We have therefore carried out such a comparison, though the main tests are undertaken on the equations in ratio form.

Exogeneity of the explanatory variables was considered at length above, where we argued that mainstream cash flows are weakly exogenous with respect to the contemporaneous cash flows of the quick finance variables. We have also assumed that the remaining explanatory variables are weakly exogenous. These assumptions justify the use of ordinary least squares and obviates the need for instrumental variable estimation. Weak exogeneity is, we believe, a plausible assumption, but it is an assumption, which can, in principle, be tested. However, exogeneity tests (Hausman 1978, Davidson and Mackinnon, 1981) require the estimation of correctly-specified equations for variables whose exogeneity is in question. With around 40 explanatory variables the scale of this problem is vast and the idea of estimating a string of sub-regressions for all 40 variables was not seriously considered. We have however investigated to some extent the exogeneity of one particularly important variable (stockbuilding) and the results of these investigations are reported below.

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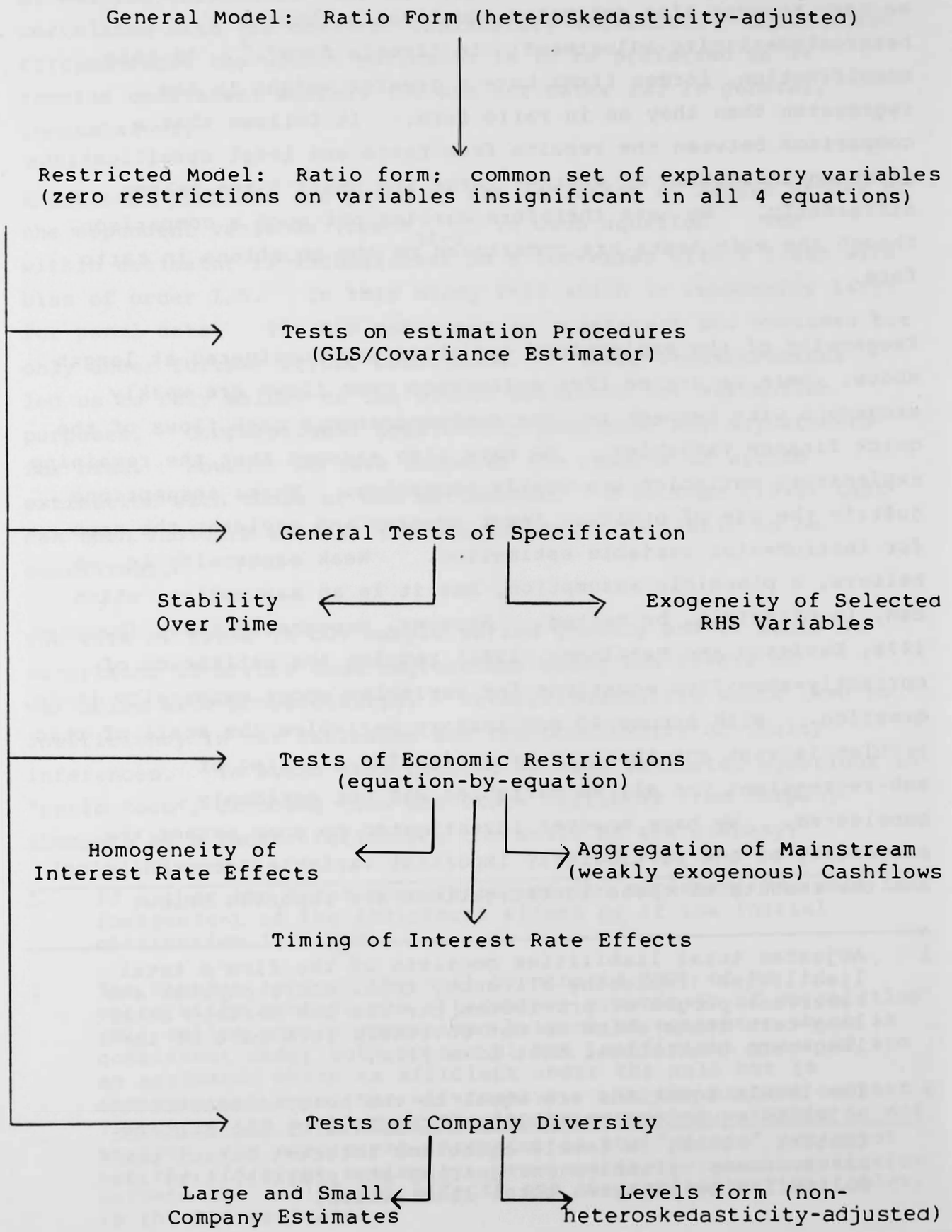
1 Adjusted total liabilities consists of the firm's total liabilities (including all debt, total share capital and reserves) purged of provisions for tax and certain other long-term items which do not obviously form part of the long-term contractual debt of a firm.

2 The levels equations are equal to the heteroscedasticity-adjusted equations multiplied throughout by the scaling factor. Thus, in levels equations interest rates, tax rates, dummy variables and gearing and profitability are multiplied by adjusted total liabilities.

CHART 1

COMPANY FINANCE: TEST PROCEDURES



Tests of structural stability of the estimated equations are also important in assessing their value in explaining company behaviour. Three distinct such tests were undertaken. First, the sample was split arbitrarily into two groups of companies and a parameter equality restriction tested. Second, the sample was split systematically into companies of above and below average size and the same test undertaken. These tests help assess whether the same model can be used to explain the behaviour of different firms and their results are considered in the context of other indicators of diversity within the sample. Third, we used the total sample of companies but only over a subset of the time period to see if the model was stable over time.

Our estimation and testing proceeded in the following order, illustrated in Chart 1. Because of the large number of variables of interest, computing considerations precluded prior estimation of the most general model possible. We therefore began with a "general model" which included 40 selected explanatory variables. We then tested down to an acceptable basic restricted model on an equation-by-equation basis. We did not impose a zero restriction on a variable in an equation unless the same variable was insignificant in all four equations. This did not in practice necessitate the retention of a large number of insignificant coefficients and it ensured that the "adding-up" conditions were satisfied throughout.[1] The basic restricted model served as the benchmark against which we carried out all further tests of specification (stability over time and exogeneity of explanatory variables). Second, we tested "economic" restrictions focusing in particular on aggregation of mainstream cash flows and interest rate responses, including homogeneity and timing effects. Finally, we carried out tests broadly directed at looking at company diversity: comparing large and small companies, and ratio and levels estimates. Though we have not followed strictly classical statistical procedures, we believe that the size of the computational problems justified some short-cuts. Moreover, the only new variables introduced after

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1 We did not attempt to estimate all four equations as a system imposing cross equation restrictions. In such a large sample, efficiency gains from this procedure are likely to be small. Consistency is a greater concern in the present exercise.

we had tested down to the basic model were those measuring the timing of interest rate responses and their introduction had negligible effects on existing coefficients apart from (as expected) those of other interest rates.

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SECTION IV: Empirical Results

IV 1 The General Model and The Basic Model

The regression results are reported in full in Appendix B. Table B1 shows the results of estimating a general model for the four equations in ratio form. The CCC dummy and interest charges have been dropped since they proved insignificant in all equations. The remaining coefficients are mostly sensible in sign and magnitude, although there are, inevitably, some anomalies. The coefficients on sources and uses of funds in the four equations are nearly all correctly signed and between 0 and 1 in absolute value. These coefficients are very well determined and, within each of the four equations, they vary significantly from one source or use to another. This justifies the disaggregation within the model of the total requirement for quick funds. Coefficients on lagged stocks of assets and liabilities are highly significant and have the expected signs in all equations save that for trade credit received. The large negative coefficient on the lagged stock of bank borrowing is particularly noteworthy and suggests, plausibly, lower costs of adjustment here than for the other elements of quick finance. Coefficients on the profitability and interest rate terms are powerful and generally well-determined. Of particular note here is the large and almost exactly offsetting effects of changes in the interbank and CD rates. The equations also suggest that the tax system has a powerful influence.

The next step was to consider whether this general model could be simplified at all by dropping variables which were insignificant in all equations. Omitting the time trend, the term in profits squared, the income gearing term, and the uncovered euro-dollar rate all proved to be acceptable restrictions.[1] Omitting

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1 The F statistics (with 8289 degrees of freedom) for the overall restrictions of dropping these four variables were 0.94; 0.08; 1.38 and 1.04 for bank borrowing, liquid assets, trade credit given and received respectively. The 5% upper limit of the relevant F statistic is 2.4 and the 1% statistic 3.4.

these terms left the remaining coefficients virtually unchanged. Correlation between parameter estimates is low and we considered that further simplification was unlikely to improve significantly the specification but would involve some cost in imposing statistically unacceptable restrictions in at least some of the equations. The remaining coefficients, although not always well-determined statistically, are all economically significant so we have not sought a more parsimonious version[1] of the model. Our basic equations for the four variables, incorporating these restrictions, are given in Table B2.

We consider next whether we can improve our estimation procedure by comparing the GLS estimator and the within estimator for the basic model. Applying a Hausman test to each equation (see III 4 above) we can decisively reject the hypothesis that the two estimators give the same results.[2] This suggests that the company-specific effects are likely to be correlated with the explanatory variables and the GLS estimator is therefore inconsistent. This is, perhaps, not surprising; it is plausible that the level of a company's profits, and other mainstream cash flows should be related to at least some of its unobserved characteristics such as managerial ability. The result is disappointing in that we cannot gauge the inefficiency of using the within estimator since the alternative GLS estimator cannot be applied. On the other hand, an important positive consequence of this finding is that the disaggregated equations we estimate are most unlikely to be reproducible at the aggregate level. This is quite independent of whether there are non-linearities in the specifications; it is a result of the inability to pick up the effects of company-specific characteristics at the aggregate level. Pakes (1983) showed that the effect of the correlation between company-specific effects and explanatory variables upon the parameters of aggregate equations can be quite devastating.

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1 A major incentive for preferring parsimony in most applied econometric work is the gain in efficiency from having more degrees of freedom. This was not a major concern in this research.

2 The test statistic is distributed χ^2_{35} under the null hypothesis of the consistency of the GLS estimator. The values of the statistics were 1,216; 1,134; 634 and 557 for bank borrowing, liquid assets, trade credit given and received respectively.

This suggests that in order to model the true influences on companies' financial (and other) decisions disaggregated studies are almost certain to be essential.

The remaining set of preliminary tests of the basic model is concerned with specification. The robustness of the parameters to changes in the estimation period is investigated by splitting the sample into two time periods and carrying out the standard F tests on each equation separately. The sample was split by omitting the last two years' observations. The results of this test (table 1) suggest that, on the whole, the model is stable over time. This is a particularly reassuring result as it implies that, although parameter values may differ significantly <u>across</u> companies, the coefficients on the model for all companies are stable over time. The temporal stability combined with our findings on diversity across companies (section IV 3) suggests strongly that problems encountered at the aggregate level are due to a substantial extent to aggregation and not necessarily to any inherent complexity or instability in the behaviour of individual companies per se.

TABLE 1 TESTS OF STABILITY OVER TIME

	F Statistics[1]
Bank Borrowing	0.81
Cash acquisition	1.38
Trade credit given	0.99
Trade credit received	1.17

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1 The F statistic is given by

$$\frac{(RSS_{13} - RSS_{11})/1388}{RSS_{11}/6905}$$

which is distributed as F (1388, 6905) under the null with 95% critical value of 1. RSS_{13} is the residual sum of squares from the whole sample regression; RSS_{11} is the residual sum of squares using data on all companies but from 1971 to 1981. The degrees of freedom for numerator and denominator are equal to the difference in the number of observations and the degrees of freedom for the unrestricted model respectively.

The other aspect of specification concerns exogeneity tests which were carried out on stockbuilding. These tests suggested that stockbuilding was weakly exogeneous vis-a-vis liquid assets and trade credit given but not necessarily exogeneous vis-a-vis bank borrowing and trade credit received.[1] Given the weakness and ambiguity of exogeneity tests we find these results reassuring.[2] Of all our explanatory variables, stockbuilding appears most likely to be endogeneous. On balance therefore our exogeneity assumptions appear justified.

IV 2 The results in detail:

Turning back to the basic model (Table B2), we now consider in more detail the economic interpretation of our estimates.

(i) Mainstream cash flows

The estimated impact of these flows upon quick finance is shown in Table 2. The results suggest that, at the margin, about 40% of investment expenditure is financed by bank borrowing in the short run; about 30% is accounted for by running down liquid assets and a further 30% is financed by trade credit received: presumably from the producers of capital goods. Just over 40% of the cost of stockbuilding is financed by bank borrowing, while liquid assets cover about 15% of the expenditure. Interestingly, credit received accounts for over 50% of the cost of stocks in the short-run, a higher proportion than bank borrowing; this is not however implausible since a high proportion of basic materials and fuels will be brought on credit. The coefficients on dividend

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1 The test statistics are t statistics which were 9.7, 0.5, 1.7, and 7.1 for bank borrowing, liquid assets, and trade credit given and received respectively.

2 The exogeneity test is weak because it is valid only if the auxiliary model, in this case for stockbuilding, is not mis-specified. Detailed modelling of stockbuilding would defeat the object of the test which is intended partly to determine if such modelling is required. We used broadly the same framework as for quick finance but would not defend this approach as necessarily the best. The test is ambiguous because it cannot be made to discriminate between two sensible hypotheses: failure of exogeneity, and a difference between the impact of anticipated and unanticipated stockbuilding on quick finance flows. The latter hypothesis would not invalidate our exogeneity assumptions.

Table 2 - Impact of sources and uses of funds on quick finance[1]

	Bank Borrowing	Liquid Assets	Credit Given	Credit Received
Investment	.406*	- .289	- .016	.289*
Stockbuilding	.419*	- .160*	.100*	.521*
Dividends	.366*	- .156*	- .302*	.173**
Tax payments	.150*	- .500*	- .232*	.121*
Capital issues	-.358*	.300*	.432*	.085*
Loan capital	-.388*	.296	.230	-.085*
Profits	-.041*	.383*	.330*	-.243*
Miscellaneous sources	-.200*	.708*	.008	-.086*
Miscellaneous expend.	.359*	- .200	- .302*	.139*

1 coefficients represent impact upon quick finance of extra £ of inflow or outflow. eg extra £1 of investment increases bank borrowing by nearly 41p, reduces liquid assets by 29p etc.

* significant at 1%
** significant at 5%

and tax payments imply that firms are more willing to borrow to finance dividends than taxes. Nearly 40% of dividend payments, at the margin, are financed by bank borrowing; the comparable figure for tax payments is 15%. Between 35% and 40% of the proceeds from capital issues and long-term debt go to reduce bank borrowing with a further 30% being used to increase liquid assets. Finally, it is interesting to note that only 4p of each additional £1 of company income (profit) is used to reduce the stock of bank debt. This suggests that, in the short run, increases in aggregate company profits might do little to reduce the growth of bank lending. Most of the incremental profit goes to build up liquid assets (38%) and trade credit (33%).

There are, inevitably, some anomalies. For example, it may be thought surprising that over 40% of new capital issues are used to finance trade credit extended. One explanation for this is that there may be a positive correlation between past company growth, rapid extension of credit and frequent recourse to the stock market. Overall though, the coefficients on sources and uses of funds are very well determined and of the expected signs.

We next carried out tests on each equation to determine how far mainstream cash flows could be consolidated in explaining the quick finance variables. Since coefficient estimates were very well determined it proved difficult to aggregate flows of sources and uses of funds and accept the restriction in all four equations. Restrictions which were accepted in the case of bank borrowing at least, were the equality of coefficients on investments stockbuilding, capital issues and flows of loan capital.

(ii) Effects of Balance Sheet Structure

The coefficients on the stocks of assets and liabilities outstanding at the beginning of the financial year (Table 3) show the extent to which the firm's balance sheet structure induces shifts from the normal pattern of financing (reflected in the coefficients on current mainstream cashflows). The pattern of adjustments suggested by the basic model is generally plausible and illuminating. In particular, there is a very interesting asymmetry between the response of firms to an usually large stock of liquid assets. The higher is the outstanding stock of bank debt, the lower is the current flow of new borrowing almost exclusively by substituting non-bank borrowing in the form of increased trade credit received. This is an interesting disintermediation effect and it suggests that while the companies in our sample are able to substitute non-bank for bank borrowing with some ease, they find it considerably more difficult to reduce total short-term borrowings in response to balance sheet pressures. In contrast, the higher is the stock of liquid assets the lower is the current flow of liquid asset acquisitions and the lower the current flow of bank borrowing. Trade credit flows are hardly affected by the stock of liquid assets. In summary, more liquid companies use their liquid assets to repay bank debt, whereas less liquid companies improve their position vis-a-vis the banks largely by aiming to borrow from non-bank sources.

The stock of trade credit given has a relatively small effect on current flows. The stock of trade credit received has more effect, but the positive coefficient on trade credit received in the trade credit received equation is implausible, suggesting as it does a willingness by firms to build up liabilities from this source indefinitely.

A possible explanation for this result is that it represents a "clientele" effect: once firms find suppliers who are prepared to offer good credit facilities, they gradually switch to them from their old suppliers. This could account for the positive correlation between higher than usual stocks of credit received and higher than usual current flows of credit received.

The existence of anomalies in equations of this kind is not unusual. Overall though, the pattern of responses to balance sheet structure is both interesting and plausible. The coefficients are statistically and economically significant and, on the whole, suggest that firms switch fairly rapidly between the different assets and liabilities in response to disequilibria in their balance sheets. In general, the coefficients are also robust to changes in the sample.

TABLE 3 EFFECTS OF BALANCE OF SHEET STRUCTURE

	BB	LA	CG	CR
Lagged stock of:				
BB	-.624*	-.034	.083	.671*
LA	-.210*	-.247*	.044*	.008
CG	-.063*	.066*	-.083*	.045*
CR	-.239*	.085**	.132**	.454*
Loan Capital	-.333*	.122*	.096**	.549*
Equity and Preference Capital	-.256*	.091**	.108**	.453*

* Significant at 1%

** Significant at 5%.

The impact of the wider structure of company balance sheets on quick finance flows is reflected in the coefficients on the stocks of loan capital and on the stocks of equity and preference capital. Firms respond to an increase in the stock of loan capital in much the same way as to an increase in the stock of short-term bank debt. They reduce bank borrowing, increase non-bank borrowing (trade credit received) and, to a smaller extent, increase liquid asset

acquisitions. In short, high gearing ratios appear difficult to reduce in the short-run irrespective of whether the gearing results from long-term or short-term debt. The coefficients on the stock of equity are more of a puzzle as they suggest that lowly geared firms reduce bank debt and increase trade credit received. One explanation for this is that firms who have relied relatively heavily on equity finance in the past (for reasons which are not picked up by our other explanatory variables) will prefer to finance less of their current activities by bank credit than do other firms. A second possibility is that, as the coefficients on equity and loan capital are similar, firms are, in fact, indifferent about their long-term gearing but are concerned more with the balance between short-term debt and all other obligations including equity. Even on this interpretation however, the signs of the coefficients are not altogether plausible.

(iii) Sales and cost of sales

The difference between sales and cost of sales constitutes a significant proportion of profits. These variables can therefore be interpreted as a disaggregation of profits. The level of sales has a small but significant effect on quick finance flows. High sales revenue reduces bank lending whilst increasing liquid assets and trade credit given and received. Coefficents on the cost of sales are larger in magnitude than those on sales revenue but are less well determined statistically. Nevertheless, higher cost of sales increases bank borrowing.

(iv) Interest rate effects

The coefficients on individual interest rates in the four equations are given in table 4. They show the effect of a one percentage point change in interest rates on the ratio of the flow of quick finance to total liabilities. An alternative presentation is given in table 5 which shows the effect of a change in the interest rate by a given number of percentage points on the growth rate of the stock of each component of quick finance. These are semi-elasticities and provide an approximate basis for comparison with aggregate studies. In our model, the impact of interest rates is constrained to induce a reallocation of the quick finance portfolio and it does not spill

over to other assets or liabilities. This means that the larger are the reponses of the assets/liabilities with respect to interest rates the more substitutable are the elements of quick finance. If the four assets and liabilities are not close substitutes the impact of interest rates will be negligible.

TABLE 4

Interest Rate Coefficients[1]

	Bank Borrowing	Liquid Assets	Trade credit given	Trade credit received
Interbank Rate	- .099*	- .058**	- .10*	- .059
C D Rate	.102*	.049	.106*	.054
Covered Euro $ rate	-.0007	.001*	.0005	.002*
Base Rate	-.0022	.009*	- .001	.010*
Simultaneous rise in all rates (sum)	.0001	.001	.0055	.007

* significant at 1% level

** significant at 5% level

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1 Coefficients represent the effect of a 1 percentage point change on:

$$\frac{\text{Flow of quick finance}}{\text{total liabilities}}.$$

To calculate the proportionate effect of, say, a change of one tenth of one point upon the stock of bank debt the coefficient can be multiplied by

$$.1 \times \left[\frac{\text{Total liabilities}}{\text{Stock of Bank debt}}\right] \times 100.$$

In Table 5 the mean values of the stocks of quick finance and of total liabilities are used to estimate these semi-elasticities.

In table 4, it can be seen that the coefficients on the interbank rate and on the CD rate are large, roughly equal in magnitude and opposite in sign in each equation. The overall sign pattern is sensible apart, perhaps, from the effect of the CD rate on trade credit given net of trade credit received. The coefficients are surprisingly well determined. Table 5 shows that a rise in the spread of the interbank rate over the CD rate of one tenth of one percentage point (eg a rise in the interbank rate from 10% to 10.1% with no change in the CD rate) which is sustained for six months will reduce the stock of short-term bank debt by around 6 1/2% in the short run. A rise of one tenth of one percentage point in the CD rate with other rates constant has an effect of broadly similar magnitude, though of opposite sign. The change in the flow of bank debt as a result of a change in the interbank or CD rate is matched by a change of equal sign and roughly equal magnitude in trade credit given (Table 4). Liquid asset flows and trade credit received are each altered by approximately half the change in bank debt.

Changes in the other interest rates have a much smaller impact upon the stocks of assets and liabilities than do movements in the CD and interbank rate (Table 4). The differentials between the covered Euro-dollar rate and the other rates and between banks' base rate and the other rates are, however, much more variable than between the CD and interbank rates. It therefore seems reasonable to consider larger changes in the base rate and in the covered Euro-dollar rate in calculating the percentage changes induced in the stocks of assets and liabilities. We consider first the impact of a change of one quarter of one percentage point (eg 10% to 10.25%) sustained for six months in the level of banks' base rate, other rates remaining constant. The stock of bank debt falls by about 1/3% while the flow of trade credit received and liquid assets both increase somewhat. Changes in the covered Euro-dollar rate have the smallest impact on firms' portfolios. A one quarter point increase in the rate held for six months reduces bank debt by about one tenth of a percent while trade credit received and liquid asset flows both increase. Changes in base rate and the Eurodollar rate each induce a modest but well determined switch from bank lending to credit received. This probably reflects a decision by companies to use funds whose cost is less closely linked to short-term market rates of interest

than is bank debt. In addition to the results reported, we also investigated the influence of the interest rate on trade bills. There are additional difficulties in interpreting this rate as it could be associated with any of the four quick finance variables, depending in part on the accounting practices of individual companies. In fact, the trade bill rate showed up significantly in some equations but it mostly appeared to be doing a similar job to the interbank rate. We therefore did not retain it in our subsequent tests.

TABLE 5 The Impact Of Interest Rates. Table shows the effect of change in the rate sustained for six months[1]

(Percent change in stock)

	Bank Debt	Cash and other liquid assets	Trade credit given	Trade credit received
Rise of 0.1% in Interbank rate	-6 1/2%	-4%	-1 1/2%	-1%
Rise of 0.1% in CD rate	+6%	+3 1/2%	+1 1/2%	+1%
Rise of 0.25% in Banks base rate	-1/3%	+1 1/2%	0	+1/2%
Rise of 0.25% in covered Euro-$ rate	-1/10%	+1/5%	0	+1/10%
Rise of 1.0% in all rates	-1/3%	+1.0%	+1.0%	+1 1/2%

1 Effect of a change sustained for one month is exactly one-sixth that shown here and if the change lasts one year the impact is twice the size.

The coefficients on individual interest rates mostly imply that a change in any single interest rate in isolation has a very powerful effect on quick finance flows. These effects are very much larger than those commonly found in aggregate time series studies[1] and in this respect accord more closely with intuition about the substitutability of such flows. However the magnitude

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1 The semi-elasticities reported in table 5 in the bank borrowing equation are some ten times larger than those in roughly comparable time series studies.

of these flows implies that, in practice, individual interest rates do not deviate very far from other comparable rates for any great length of time. The spread between the interbank rate and the CD rate, for example, rarely changes by more than one tenth of one percentage point. This, incidentally, makes it particularly noteworthy that the individual coefficients on these rates are so well determined in these equations. However, this also makes it important to consider the effect of a simultaneous rise in all interest rates. In this case, the relative costs and benefits of holding the different assets/liabilities are unaffected. As is clear from tables 4 and 5, the short-run impact of a simultaneous rise of one percentage point in all rates is very small compared with the impact of a rise in one rate in isolation, particularly in so far as bank borrowing is concerned.

The finding that changes in relative rates induce significant switching between elements of quick finance whilst changes in the overall level of rates have much smaller effects is an important one. We can go further and examine the stronger proposition as to whether it is only relative interest rates that influence quick finance flows. This is a test for homogeneity which, if accepted, implies that a general increase or decrease in the level of nominal interest rates has no impact at all on quick finance flows (see section IV). The test statistics for the one restriction implied by homogeneity (distributed F(1,8289) under the null) were 0.20; 1.48; 15.97 and 4.18 for bank borrowing, liquid assets, trade credit given and received respectively. The restriction is accepted for bank lending and rejected for the remaining flows. These results are extremely interesting and confirm the widely-held view that a general change in interest rates has the effect in part of changing the channels through which credit flows. The results imply that a general rise in interest rates produces a small but significant degree of re-intermediation in the form of an increase in net trade-credit received (trade credit received less trade credit given) accompanied by an increase in liquid asset holdings. It is plausible that the demand for net trade credit received would expand as the general level of interest rates rises. There is an advantage in postponing credit payments, to reduce reliance on bank debt whose cost goes up in line with interest rates. These results also imply that the firms in our sample are able to

squeeze credit from other sectors (mainly small firms and households) when interest rates are higher and this is consistent with the claims of small firms reported to the Wilson Committee. The second interesting aspect of these results is that bank lending is unaffected by a general change in all interest rates. This important result again confirms a widely-held view that, given other company cash flows, a change in the level of interest rates has little or no independent effect on the flow of bank borrowing. This in turn implies that control of bank lending by interest rates is likely to be exceedingly difficult in the short-run.

Our tests for timing effects produced some statistically and economically interesting results which, to save space, we report only briefly. Both the last quarter average and the year average interest rate made significant independent contributions to explaining bank borrowing and trade credit received. In the liquid assets equation however the last quarter's interest rates were not significant, whereas in the trade credit given equations it was the last quarter's rates which were significant and the one year average which became insignificant. There were some changes in the magnitude of the interest rate coefficients in comparison with the basic equations, but it was reassuring that, with only two exceptions (in trade credit received), the signs of the coefficients giving the effect of year average interest rates were the same as in the basic equations. There was no clear pattern discernable in the relative magnitudes of the last quarter and year average effects. However there was some degree of sign reversal with 11 out of 16 of the last quarter coefficients having opposite signs to those of the year-average coefficients. In several cases this could be interpreted as a "distress" effect. Thus a rise in the year average interbank rate reduced bank borrowing whereas a rise in the last quarter value increased bank borrowing. However, not all the sign reversals were significant and not all could be given such a simple interpretation. Homogeneity was again evident in the bank borrowing equation but not in the other three. It is important to bear in mind that the additional interest rate variables show the effect of one quarter's interest rates on the whole year's flows. Given the size and independent significance of these variables, they

reinforce our conclusions that changes in relative interest rates have strong effects which are underestimated in aggregate equations.

(v) Credit Control and Exchange Control Regulations

On the whole the corset dummy variables are not very well determined. It is perhaps not surprising that the effects of a relatively blunt policy instrument are difficult to detect at the level of the firm. However, the coefficients do carry the interesting implication that the corset was effective mostly as a general threat during its whole period of operation rather than as a specific weapon during the months it was actually in place on the banks.

In contrast the abolition of exchange controls appear to have had a strong effect, producing an increase in stocks of credit received and given by around 35% and a decrease of over 15% in stocks of liquid assets and bank debt. This movement from liquid assets and bank debt into trade credit probably reflects the fact that a significant part of trade credit is associated with foreign trade and such credit would have been curtailed as a result of exchange controls.

(vi) Tax effects

The coefficients on the tax discrimination variables are, on the whole, not well determined statistically though their magnitudes are large. An increase in the rate of corporation tax, which increases the attractiveness of debt relative to equity and to retentions, leads to an increase in bank borrowing. Tax changes which make equity finance more attractive relative to retentions (eg an increase in the rate of capital gains tax or cut in the income tax rate of shareholders) appear to encourage firms to acquire more liquid assets and borrow more from banks. Effects of tax rate changes on trade credit given and received are also powerful but to some extent offsetting. In contrast, the stock of irrecoverable ACT, our proxy for tax exhaustion, was mostly not significant. Instability of the tax rate coefficients is revealed in the split sample regressions described in section III 4

below. Consistently powerful effects were discovered though parameters were generally not well defined and some coefficients switched signs. A likely explanation for this problem is that there are interactions between tax rates and taxable capacity at the level of the individual firm, and these effects are not picked up by our current linear model. Inferences about the impact of the tax system cannot therefore be made with a high degree of confidence.

(vii) Unemployment

The coefficients on unemployment are well-defined in the trade credit equations and the effects are, again, quite large. There is clearly a "market" factor which has at least some influence on quick finance flows independently of that coming through other channels such as profits, investment and interest rates.

(viii) Economies of scale, integration and company profitability

Our measures of firm size mostly did not show up significantly. The squared terms in profits and sales were deleted at an early stage. The level of company sales relative to the total sales of the sample was significant only in the trade credit equations. The results suggest that the larger is the firm, the more credit it both gives and receives relative to its balance sheet.

Our proxy for the degree of vertical integration, the ratio of profits to sales, has the expected negative sign in all equations except that for trade credit received. The coefficients are, however, statistically significant only in the bank lending equation. Furthermore, the coefficients did not prove robust to changes in the sample of companies.

In contrast, company profitability has a well-determined effect in all four equations. More profitable firms borrow less heavily from banks and more heavily from non-banks (trade credit received). They also acquire more liquid assets and give less trade credit. An increase in the rate of return on capital employed from 10% to 15%, for example, decreases the stock of bank debt by about 7%, it increases the stocks of liquid assets by

about 1 1/2%, increases trade credit received by 1 1/2% and reduces trade credit given by a similar amount. The inverse relation between profitability and bank borrowing can be contrasted with the rather weak effect of the flow of profits upon the flow of bank credit.

IV 3 Diversity in Company Responses & Inferences for Aggregate Behaviour

Our basic model of companies' financial decisions allows for firm-specific constant effects in each of the four equations while the slope coefficients are common across the sample. The slope coefficients can be seen as averages of company-specific parameters and we have presented evidence of the stability of this model over time. Differences in slope coefficients across companies are, however, also possible. To examine this possibility we re-estimated our basic model on two sub-samples and tested whether the slope coefficients changed between the sets of estimates. We first split the sample into two randomly and then systematically, by reference to size. We initially chose the first 500 of the 694 companies by alphabetical order; this seemed as likely to produce a random sub-sample as any technique. We then split the companies into those with above average capital employed (104 firms) and those with below-average capital employed (590 firms). The F statistics associated with these tests are shown in table 6.

In both cases the F tests decisively reject the null hypothesis of equality of slope coefficient in each of the four equations. However, these tests need some care in interpretation since the very large degrees of freedom available to us make the restriction of equal slope coefficients across companies very hard not to reject at usual significance levels. Whether or not economically significant differences in parameters exist is only possible to gauge by inspection of individual coefficients. Appendix Tables B3 to B6 show the results of estimating each equation twice, first using only the smaller firms and then using only the larger group by size of capital employed. It is clear from the tables that, in terms of the magnitudes of coefficients, certain differences do exist in all four equations. These differences include, in

particular, economically and statistically significant variations in the allocation of the individual mainstream cashflows. There are also some economically large but not necessarily statistically significant changes in certain other coefficients, notably those on the tax rate variables.

Table 6 Tests of Stability Across Companies

	Random Split[1] F(2522, 5965)	Split by Size[2] F (K, 8258)
Bank borrowing	3.77	3.50
Cash acquisition	1.25	4.65
Trade credit given	2.24	2.79
Trade credit received	1.84	3.34

Elsewhere in the text we have indicated the main results which are robust with respect to splits in the sample. From the split sample estimates themselves however, it is difficult to draw any conclusions that are simultaneously general and interesting. It is clear that there <u>are</u> certain differences between companies, but this is only to be expected in such a large sample. One problem is that our sample splitting exercises are essentially rather arbitrary. This is underlined by the fact that both the random split and split by size produce statistically significant coefficient differences. In all probability, if slope coefficients differ in a systematic way between firms, they will do so continuously and in accordance with some underlying principles. Unless we know these principles a priori, it

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1 The F statistic is given by:

$$\frac{(RSS_{694} - RSS_{500})/2522}{RSS_{500}/5965}$$ which is distributed as F(2522, 5965)

under the null with 95% critical value of 1. Here: RSS_{694} = Residual sum of squares from a regression using all the observations RSS_{500} = Residual sum of squares from a regression using only the first 500 companies

2 The F statistic is given by:

$$\frac{[RSS_{694} - RSS_{590} - RSS_{104}]/K}{[RSS_{590} + RSS_{104}]/8258}$$ which is distributed as F (K, 8258)

under the null with 95% critical value of 1.43. Here K = number of slope coefficients, and the RSS have the same meanings as before.

is difficult to uncover them empirically without an enormous amount of data mining.

Nevertheless, if differences in firm size are important, then this could show up in a comparison between estimated equations which gave equal weight to all firms, and equations which gave a greater weight to large firms in a continuous way. This amounts to a comparison between our basic ratio specification and a levels specification where no correction for heteroskedasticity is made (see section III 4). Under the null hypothesis of no systematic differences between firms of different sizes, and subject to the caveats in section III 4, both the levels and ratios specifications will deliver unbiased estimates of the parameters although the standard errors in the levels specification will certainly be biased downwards due to heteroskedasticity. Thus variations in parameters between the ratio and levels specification are indicative of systematic size-related differences in company behaviour.

The levels equations are given in Appendix Table B7. The difference between the parameter values in levels and ratios specifications mostly accord well with intuition. Interest rate and tax rate effects are much more powerful in the levels equations than in the ratios equations. Income gearing, which proved insignificant in ratios equations, acts as a significant stabiliser in the levels model with high interest payments from the previous year reducing the current flow of bank borrowing. Interestingly, more than half the reduction is reflected in increased non-bank borrowing. The coefficients on the lagged stocks of quick finance in the levels equations are mostly consistent with the hypothesis that larger firms have lower costs of adjustment than smaller firms. It would be unwise to draw strong inferences from the levels equations because of the heteroskedasticity problem and the major influence that a few large outliers could have on the results. In conjunction with the results from the regressions on subsamples of the firms split by company size, they do, however, provide an indicator of some probably systematic differences in behaviour across companies.

V Conclusions

The disaggregated data used in this study describe the outcomes of actions taken by the decision-making unit which is the focus of

theory: the individual firm. There are, inevitably, a number of anomalies in the results we have reported. Overall, however, we believe that the results more than justify our claim that disaggregated data can provide important new insights into the behaviour of firms, particularly in respect of their short-term financial decisions which are the focus of this study.

Our work has had two broad objectives: to develop a model of company short-term financial behaviour and to explore systematic differences in the behaviour of individual companies. On the first, our approach of modelling quick finance decisions as a single bloc seems fully justified. We have uncovered numerous substitution effects between assets and liabilities and a variety of important intermediation effects involving substitutions between bank and non-bank finance. More specifically, we have identified some clear determinants of the structure of company short-term financial flows, notably: mainstream (predetermined) cash flows, the company's balance sheet structure and changes in relative interest rates. Other important influences include the structure of the tax system, direct credit controls, and measures of company profitability and size.

The allocation of quick finance flows in the short run depends significantly on the type of payment to be financed or the type of inflow to the firm. Profit flows, for example, are mainly used to build up liquid assets and credit given and only marginally to reduce bank debt. On the other hand, nearly 40% of equity and loan capital receipts go to reduce bank borrowing. As far as expenditures are concerned, all except tax payments are financed to a significant degree by bank borrowing; the impact of expenditures on other quick finance flows is, in contrast, considerably more varied. These results imply that one cause of problems in aggregate bank borrowing equations in the past must have been the failure to disaggregate the company sector borrowing requirement into some of its separate components.

The company's balance sheet structure has a number of interesting effects on the flows of quick finance. Perhaps the most important result here is that companies appear to respond to high levels of debt mainly by altering the structure of debt as between banks and

non-banks (credit received). A high level of liquid assets, on the other hand, generates a cut in borrowing as well as in lending. This suggests that companies find it difficult to reduce debt purely by restructuring their quick assets and liabilities, and when total debt is "too high", they aim in the short-run to switch borrowing as far as possible from bank to non-bank sources. An important caveat here is that our model predicts that the most effective way for a firm to cut short-term debt (bank and non-bank) is by a cut in stocks; each £1 of which reduces debt by 94p. There is some ambiguity in our exogeneity tests for stockbuilding but we are bound to note that where stockbuilding failed these tests was in the two borrowing equations. There may therefore be some simultaneity between short-term debt management and the level of stocks.

There are some notable results connected with the influence of interest rates. We find that changes in relative interest rates have large effects on the structure of short-term financial flows. Our estimated semi-elasticities are between ten and one hundred times larger than those found in aggregate studies and thus accord more closely with intuition. On the other hand, a change in the level of interest rates (with given relativities) has no effect at all on bank borrowing. It does however have a small but significant intermediation effect with the firms in our sample able to increase their net non-bank borrowing when the level of interest rates increases. In addition we find significant but somewhat diverse timing effects in interest rate changes.

Of the remaining influences on company financial behaviour we would single out two. First, the tax system is clearly an important influence but, at this stage, we cannot claim to have modelled it with great precision. This is probably because we have not attempted to control carefully for tax exhaustion effects specific to each firm. Second, there are a number of direct measures of company diversity in each equation which are important, notably profitability and balance sheet size.

On the specific issue of the determinants of company bank borrowing our results suggest that the principle driving variables of bank borrowing lie in the activities which determine a company's mainstream cash flows. Interest rates have a powerful effect but

this is essentially an effect of changes in relativities which are likely to be very transitory in nature. Where other variables, notably gearing, influence bank borrowing they do so to a significant extent by inducing substitutions between bank and non-bank borrowing. These findings suggest why company bank borrowing may be hard to control in the short-term. They also underline the point that control may be cosmetic in nature in so far as it is achieved by a switch from bank to non-bank borrowing.

On the second objective of our work, there appears to be ample evidence of diversity in company behaviour which may not aggregate in any simple way. However, while we have uncovered some aspects of that diversity, we cannot claim to have provided a complete account of how companies differ. Nevertheless several findings are worth recapitulating. The evidence of correlation between unobservable company-specific effects and the explanatory variables is as we noted (section IV) serious and implies inconsistency for direct estimates of even linear aggregate relationships. However, our own efforts to split the sample by size of company produced rather mixed results. Though our split sample estimates were significantly different from one another, the separate estimates were not always easy to interpret. More useful perhaps was the comparison between "ratios" and "levels" estimates which was generally plausible in its implications for differences between large and small companies. Finally, our direct measures of diversity given by the non-linear variables in each equation (such as profitability) also provide important evidence of diversity which will not aggregate in any simple way.

In interpreting these results on diversity, we attach importance to the finding that the parameters of our basic equations are nevertheless stable over time. This, we believe, legitimises our interpretation of the parameters of the full sample regressions as stable averages of parameters across companies (either unweighted or weighted depending on whether ratios or levels are estimated). Certainly, an important step in any future research will be to consider more systematically the influences of continuous measures of company diversity.

The econometric problems which arise with aggregate models have been stressed in this study and it is important to note the difficulties we have encountered with this huge, disaggregated data set. Only a subset of the usual barrage of test statistics which appear in modern applied work are reported in this paper. We have not undertaken instrumental variables estimation to gauge the bias which results from using the within estimator, although some indication of the size of the likely bias was reported. In using this dataset therefore, we are aware that one set of problems associated with aggregate time series modelling have been replaced by new difficulties. However, futher work should go some way towards resolving many of the econometric problems.

The research has shown that this data set can shed important new light on company behaviour. Furthermore, the benefits of using disaggregated data are not confined to modelling firms' financial decisions. We think it likely that this type of data can be used to make advances in our understanding of the forces which influence a whole range of company decisions such as stockbuilding, dividends, investment, and equity finance. Many of the issues we have addressed in this paper are likely to be relevant in further research in these areas.

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APPENDIX A The Data

The sample

A consistent sample was drawn from the Company Accounts data published by DATASTREAM. Applying extractive filters to those companies reporting every year between 1969 and 1983 yielded a total of 694 companies for empirical investigation. The estimation period extends from 1971 to 1983 with two extra years 1969 and 1970 permitting the use of lagged variables. The sector allocation of individual companies is based on the Financial Times Actuaries (FTA) classification.

Extractive filters were designed to:-

(i) exclude financial companies, investment trusts and 'unallocated' companies.

(ii) exclude companies with a ratio of foreign sales to domestic sales exceeding 0.7 in any year[1].

(iii) exclude companies having major discrepancies in their reported sources/uses statements. Exclusion applied where the discrepancy between sources/uses looked 'large' either in absolute terms or in relation to the company size.

(iv) exclude companies which had report years which were very different from 12 months in length at some time over the period; hence limited changing of year-ends is permitted in the sample.

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1 This effectively reduces the problem of bank borrowing and liquid assets being denominated in foreign currencies, hence some comparison with all industrial and commercial companies' (ICCs) bank borrowing (denominated in sterling) may be more meaningful. Furthermore this filter reduces the weight of overseas production in this sample.

Summary statistics of variables drawn from the Datastream sample are listed in Table A1. The basic data was drawn from the published sources/uses statements with additional information from the profit/loss and balance sheet statements. All companies except two in the sample are public (listed) companies and none are UK subsidiaries of foreign-owned parents. The sample represents mostly medium to large size companies with no discernable predominance of any industrial grouping. The distribution of companies by size, as represented by the adjusted liabilities variable,[2] is shown in Table A2. In 1982 85% of the sample had a stock of liabilities worth less than £132 million, the mean of the sample for that year. Table A3 shows the range of company activities.

Economy-wide variables such as interest rates and unemployment rates which were originally available as monthly figures were converted to annual values taking account of the individual company year-ends. Allocating companies to the four calendar quarters according to their reporting date revealed there was a fair spread of year ends over the quarters with Q4 as the most common report period. The three economy wide tax rate variables are in fact tax ratios (formulae in the main text) which relate to alternative forms of raising finance; they are also adjusted to take into account particular company year ends.

A couple of points regarding the use of company accounts data may be noted.

First, the practice of 'window dressing' the accounts is fairly common for companies (firms undertake transactions before the year-end to "improve" the reported position of the company - for example, measures to reduce borrowing, to delay payments to suppliers, pursuing debtors). Evidence suggests companies 'window dress' every year. This effectively smoothes down year

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2 Adjusted liabilities are defined as: total capital employed + total stock of credit received + stock borrowing repayable in one year - total provisions

to year variations. Window dressing is likely to be present in the profit/loss account, the balance sheets and the sources/uses statement.

Second, errors in the measuring balance sheet assets/liabilities can induce large errors in the measurement of profits/losses. This problem can arise when estimating the value of balance sheet assets/liabilities. This is not a problem with items in the sources/uses statement since these are expressed in cash terms.

TABLE A1

Summary Statistics

N=694 companies; T=13 1971-1983

Stock values are lagged one year

	Pooled sample	1983 cross section		
	mean	mean	standard deviation	range (maximum minus minimum)
£mn				
bank borrowing repayable in one year - flow	0.5	- 0.3	35.7	1049
capital issues	0.9	2.1	12.3	206
cash acquisitions	1.1	2.7	25.3	649
credit received (plus non-bank borrowing)	2.5	3.8	21.9	411
creditors equivalent - stock	21.0	34.4	103.2	1325
debtors equivalent - stock	20.9	36.6	145.8	2511
dividends	1.7	3.3	13.8	254
adjusted liabilities - stock (scale factor)	86.2	131.7	492	8383
equity and preference capital - stock	45.1	60.9	236.5	3689
interest charges	2.3	4.0	15.9	249
investment	9.0	14.5	70.9	1561
irrecoverable advanced corporation tax	0.1	0.1	1.9	55
loan capital - flow	1.4	0.9	17.7	404
miscellaneous expenditure	1.1	3.1	19.8	407
miscellaneous sources	1.3	1.7	12.8	294
profits	14.4	25.5	154.2	3563
sale of fixed assets	1.3	2.5	8.5	112
stock of bank borrowing	4.9	9.3	42.9	874
stock of loan capital	13.9	23.6	130.6	2743
stock of liquid assets	6.5	13.0	77.8	1476
stockbuilding	2.5	1.7	13.1	281
sources-uses difference	0.2	- 0.1	1.0	25
tax payments	3.4	4.8	29.3	634
total sales	133.2	144.1	804.5	19150
total stocks and work in progress	22.5	34.0	112.5	1597
trade credit given less short term provision	3.0	3.8	42.2	1080
cost of sales	30.4	103.8	565.1	12730
interest rates - % pa				
inter bank rate	11.1	10.5		
certificate of deposit rate	10.9	10.3		
covered eurodollar rate	7.6	10.7		
uncovered eurodollar rate	9.6	9.3		
bank/base rate	10.6	10.1		
tax rates - ratios				
debt/equity	1.5	1.5		
debt/retentions	1.6	1.9		
retentions/equity	1.1	1.3		

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TABLE A2

SIZE DISTRIBUTION OF COMPANIES - 1982 VALUES

Adjusted liabilities - Stock £mn			Number of companies
0	-	132	590
132	-	300	32
300	-	600	33
600	-	1,000	19
1,000	-	3,000	17
3,000	-	6,000	1
6,000	-		2
		TOTAL	694

mean=131.7 minimum=0.27, maximum=8383.1

TABLE A3

INDUSTRIAL SECTORS - Percent of sample

brewers and distillers	3.9	motors and distributions	4.6
building	5.9	newspapers and publication	3.0
chemicals	3.0	office equipment	0.7
commodities	0.9	oil	1.3
contracting	5.3	other consumer goods	4.3
electricals	2.6	other industrial materials	1.9
electonics	1.3	packaging and paper	3.2
food manufacturing	4.3	shipping and transportation	2.3
food retailing	1.0	stores	7.6
health and household	0.9	textiles	8.6
leisure	4.6	tobacco	0.1
mechanical engineering	15.4		100%
metals and forming	4.9		
miscellaneous	8.4		

APPENDIX B RESULTS ANNEX TABLE 1

Results for General Specification of Flows Equations (Ration forms)

(t values in parethesis)

Explanatory variables	(1) Bank Borrowing		(2) Liquid Assets		(3) Trade Credit Given		(4) Trade Credit Received	
Investment	.406	(30.1)	-.289	(28.3)	-.016	(1.2)	.289	(20.4)
Miscellaneous Sources	-.200	(9.6)	.708	(44.9)	.008	(.4)	-.086	(3.9)
Stock building	.419	(38.4)	-.160	(19.4)	.100	(9.4)	.521	(45.4)
Dividend Payments	.366	(5.4)	-.157	(3.1)	-.300	(4.6)	.176	(2.5)
Miscellaneous Expenditure	.359	(23.5)	-.200	(17.3)	-.302	(20.1)	.139	(8.6)
Capital Issues	-.357	(24.0)	.300	(26.3)	.431	(29.7)	.085	(5.4)
Tax Payments	.152	(4.6)	-.497	(20.0)	-.231	(7.2)	.119	(3.4)
Change in Loan Capital	-.388	(20.2)	.296	(20.4)	.231	(12.2)	-.084	(4.2)
Profits	-.041	(3.2)	.384	(39.0)	.330	(26.0)	-.243	(17.8)
Sale of Fixed Assets	-.002	(.1)	-.271	(12.6)	.121	(4.3)	-.148	(4.9)
Sales	-.00003	(4.2)	.00001	(1.6)	.00001	(1.8)	.00005	(6.8)
Cost of Sales	.005	(2.2)	-.0008	(.5)	.004	(1.6)	-.002	(0.9)
Stock of Equity & Preference Capital$_{-1}$	-.256	(5.1)	.091	(2.4)	.110	(2.2)	.455	(8.6)
Stock of Loan Capital$_{-1}$	-.334	(6.3)	.122	(3.1)	.098	(1.9)	.551	(10.0)
Stock of Trade Credit Received$_{-1}$	-.238	(4.7)	.085	(2.2)	.134	(2.7)	.456	(8.5)
Stock of Trade Credit Given$_{-1}$	.063	(6.6)	.066	(9.1)	-.084	(8.9)	.045	(4.5)
Stock of Liquid Assets$_{-1}$	-.210	(15.1)	-.247	(23.4)	.044	(3.2)	.008	(.6)
Stock of Short-Term Bank Borrowing$_{-1}$	-.624	(12.0)	-.034	(.9)	.086	(1.7)	.674	(12.4)
Stock of Irrecoverable Act$_{-1}$	.247	(1.0)	.200	(1.1)	-.137	(.6)	-.167	(.7)
Rate of Return on Capital	-.001	(7.8)	.0002	(2.1)	-.0007	(4.5)	.0007	(4.7)
Inter Bank Rate	-.076	(1.8)	-.055	(1.7)	-.081	(1.9)	-.059	(1.3)
CD Rate	.086	(2.1)	.047	(1.6)	.083	(2.1)	.044	(1.1)
Uncovered Euro $ Rate	-.0007	(0.9)	.002	(0.3)	.0006	(0.9)	.011	(1.4)
Covered Euro $ RAte	-.003	(0.8)	.002	(0.7)	-.003	(.38	.004	(1.0)
London Clearing Banks Base Rate	-.007	(1.3)	.008	(2.3)	.0002	(0.1)	.015	(2.9)
Coraet Dummy (Period of Operation)	-.007	(1.7)	-.011	(3.6)	-.004	(1.0)	-.008	(1.8)
Coraet Dummy (Period when Effective)	.002	(0.2)	-.0001	(0.1)	-.029	(3.3)	-.028	(3.0)
Debt/Equity Tax Discrimination	.092	(1.5)	-.007	(0.2)	-.033	(0.5)	-.064	(1.0)
Debt/Retentions Tax Discrimination	.158	(1.4)	-.124	(1.4)	.212	(1.9)	.240	(2.0)
Retentions/Equity Tax Discrimination	.277	(1.9)	.152	(1.4)	-.300	(2.1)	-.417	(2.7)
Profit/Sales	-.013	(2.1)	-.004	(0.9)	-.0009	(.2)	.008	(1.2)
$(\text{Profits})^2$	0.0	(0.3)	0.0	(0.1)	.00001	(0.9)	0.0	(0.7)
Income Gearing$_{-1}$	-.0001	(0.8)	.00008	(0.2)	-.00001	(0.1)	-.0001	(0.8)
Unemployment RAte	.002	(0.8)	.0005	(0.2)	0.0003	(0.9)	0.006	(1.7)
Exchange Control Dummy	-.0007	(0.1)	.015	(1.3)	-.126	(8.4)	-.112	(6.9)
1/Total Liabilities	.016	(6.1)	.004	(1.8)	.0004	(0.1)	-.013	(4.5)
Trend	.005	(1.1)	.0003	(0.1)	.009	(2.1)	.005	(1.1)
Sales of Companmy Relative to Total Sample Sales	.165	(0.7)	.031	(0.2)	.906	(3.9)	.772	(3.1)
Residual Sum of Squares	79.0301		45.2366		75.772		87.2627	
Standard Error	.0976		.0739		.0956		.1026	
$\bar{R}^2$	.4918		.3833		.3450		.4742	
Durbin Watson Stat	1.90		1.95		2.09		2.05	
Sample Size	9,022		9,022		9,022		9,022	
Degrees of Freedom	8,293		8,293		8,293		8,293	

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RATIOS SPECIFICATIONS - PREFERRED EQUATIONS TABLE 62

Explanatory variables	(1) Bank Borrowing		(2) Liquid Assets		(3) Trade Credit Given		(4) Trade Credit Received	
Investment	.406	(30.1)	-.289	(28.2)	-.016	(1.2)	.289	(20.4)
Miscellaneous Sources	-.200	(9.6)	.708	(44.9)	.008	(.4)	-.086	(3.9)
Stockbuilding	.419	(38.4)	-.160	(19.4)	.100	(9.4)	.521	(45.4)
Dividend Payments	.366	(5.5)	-.156	(3.1)	-.302	(4.6)	.173	(2.5)
Miscellaneous Expenditure	.359	(23.4)	-.200	(17.3)	-.302	(20.2)	.139	(8.6)
Capital Issues	-.358	(24.1)	.300	(26.3)	.432	(30.0)	.085	(5.4)
Tax Payments	.150	(4.5)	-.500	(20.0)	-.232	(7.2)	.121	(3.5)
Change in Loan Capital	-.388	(20.2)	.296	(20.4)	.230	(12.2)	-.085	(4.2)
Profits	-.041	(3.1)	.383	(39.0)	.330	(25.9)	-.243	(17.8)
Sale of Fixed Assets	-.003	(.1)	-.271	(12.6)	.121	(4.3)	-.147	(4.9)
Sales	-.00003	(4.2)	.00001	(1.6)	.00001	(1.8)	.00005	(6.8)
Cost of Sales	.005	(2.3)	-.0008	(.5)	.0037	(1.7)	-.0022	(1.0)
Stock of Equity & Preference Capital$_{-1}$	-.256	(5.1)	.091	(2.4)	.108	(2.2)	.453	(8.6)
Stock of Loan Capital$_{-1}$	-.333	(6.4)	.122	(3.1)	.096	(1.9)	.549	(9.9)
Stock of Trade Credit Received$_{-1}$	-.239	(4.7)	.085	(2.2)	.132	(2.6)	.454	(8.4)
Stock of Trade Credit Given$_{-1}$	.063	(6.6)	.066	(9.1)	-.083	(8.9)	.045	(4.5)
Stock of Liquid Assets$_{-1}$	-.210	(15.1)	-.247	(23.4)	.044	(3.2)	.008	(.5)
Stock of Short-Term Bank Borrowing$_{-1}$	-.624	(12.1)	-.034	(.9)	.083	(1.6)	.671	(12.3)
Stock of Irrecoverable Act$_{-1}$	.262	(1.1)	.200	(1.1)	-.123	(.5)	-.167	(.7)
Rate of Return on Capital	-.001	(7.7)	.0002	(2.1)	-.0007	(4.4)	.0008	(4.8)
Inter Bank Rate	-.099	(2.5)	-.058	(1.9)	-.100	(2.5)	-.059	(1.4)
CD Rate	.102	(2.6)	.049	(1.7)	.106	(2.8)	.054	(1.3)
Covered Euro $ Rate	-.0007	(1.4)	.001	(2.9)	.0005	(1.2)	.002	(4.5)
London Clearing Base Rate	-.0022	(0.6)	.009	(3.5)	-.001	(.3)	.010	(2.8)
Corset Dummy (Period of Operation)	-.006	(1.5)	-.011	(3.6)	-.002	(.6)	-.007	(1.7)
Corset Dummy (Period when Effective)	.004	(0.6)	-.00002	(0.1)	-.015	(2.6)	-.019	(3.1)
Debt/Equity Tax Discrimination	.029	(0.7)	-.013	(.4)	-.067	(1.7)	-.109	(2.6)
Debt/Retentions Tax Discrimination	.002	(.1)	-.101	(1.8)	.325	(4.6)	.222	(2.9)
Retentions/Equity Tax Discrimination	.098	(.9)	.125	(1.6)	-.405	(3.9)	-.380	(3.4)
Profit/Sales	-.013	(2.1)	-.004	(.9)	-.0009	(.2)	.008	(1.2)
Unemployment Rate	-.001	(1.0)	.0003	(.3)	.008	(5.9)	.010	(6.7)
Exchange Control Dummy	.013	(1.1)	.018	(2.1)	-.128	(11.2)	-.124	(10.1)
1/Total liabilities	.016	(6.0)	.004	(1.9)	0.0001	(.1)	-.013	(4.5)
Company Sales Relative to Total Sales	.164	(0.7)	.031	(.2)	.909	(3.9)	.776	(3.1)
Residual Sum of Squares	79.066		45.238		75.8226		87.3067	
Standard Error	.0976		.0739		.0956		.1026	
$\bar{R}^2$	.4918		.3836		.3449		.4742	
Durbin Watson Stat	1.90		1.94		2.08		2.05	
Sample Size	9,022		9,022		9,022		9,022	
Degrees of Freedom	8,293		8,293		8,293		8,293	

BANK BORROWING

RESULTS FOR LARGE AND SMALL COMPANIES

(Ratios Specifications)

	Large Companies		Small Companies	
EXPLANATORY VARIABLES	COEFFICIENT	(T RATIO)	COEFFICIENT	(T RATIO)
Investment	0.394	(14.69)	0.409	(27.50)
Miscellaneous Sources	-0.329	(7.56)	-0.193	(8.38)
Stockbuilding	0.391	(16.16)	0.422	(35.34)
Dividend Payments	0.781	(4.81)	0.321	(4.39)
Miscellaneous Expenditure	0.459	(13.84)	0.346	(20.18)
Capital Issues	-0.289	(8.07)	-0.366	(22.52)
Tax Payments	0.231	(3.19)	0.143	(3.98)
Change in Loan Capital	-0.338	(10.88)	-0.409	(18.59)
Profits	-0.253	(8.17)	-0.030	(2.19)
Sale of Fixed Assets	-0.001	(0.01)	-0.0039	(0.12)
Stock of Equity	-0.221	(3.16)	-0.282	(4.85)
Stock of Loan Capital	-0.259	(3.63)	-0.376	(6.17)
Sales	0.0015	(2.67)	-0.000030	(4.02)
Cost of Sales	-0.0042	(1.56)	0.0088	(3.14)
Stock of Trade Credit Received	-0.182	(2.58)	-0.265	(4.49)
Stock of Trade Credit Given	0.0869	(3.84)	-0.0691	(6.55)
Stock of Liquid Assets	-0.1155	(3.62)	-0.2190	(14.43)
Stock of Short Term Bank Debt	-0.512	(7.43)	-0.659	(0.97)
Stock of Irrecoverable ACT	0.147	(0.39)	0.2345	(0.85)
Profits/Sales	0.059	(1.50)	-0.0139	(2.09)
Return of Captial	0.00012	(0.26)	-0.0011	(6.94)
Unemployment	0.0001	(0.03)	-0.001	(0.67)
Company Sales/Total sample Sales	-0.457	(1.06)	0.187	(0.69)
Exchange control Dummy	-0.010	(0.53)	0.014	(1.05)
Corset Dummy - Effective	-0.015	(1.13)	0.0039	(0.59)
Corset Dummy - Period of Operation	-0.0042	(0.59)	-0.00615	(1.33)
Interbank Rate	-0.0515	(0.60)	-0.0877	(1.90)
CD Rate	0.047	(0.53)	0.0899	(2.04)
Covered Euro-$ Rate	-0.0005	(0.72)	-0.0004	(0.80)
Banks' Base Rate	0.0044	(0.58)	-0.0015	(0.37)
Debt - Equity Tax Discrimination	-0.299	(0.67)	0.0319	(0.76)
Debt - Retentions Tax Discrimination	0.427	(0.82)	-0.016	(0.19)
Retentions - Equity Tax Discrimination	-0.690	(0.74)	0.1132	(0.97)
1/Total Liabilities	-0.039	(0.32)	0.0155	(5.46)
RSS	3.48681		74.42242	
S Error	0.05361		0.10278	
Observations	1352		7,670	
$\bar{R}^2$	0.4685		0.4997	
DW	1.88		1.90	

Test for Equality of Coefficients F(35, 8258) = 3.50

LIQUID ASSETS

RESULTS FOR LARGE AND SMALL COMPANIES

(Ratios Specifications)

	Large Companies		Small Companies	
EXPLANATORY VARIABLES	COEFFICIENT	(T RATIO)	COEFFICIENT	(T RATIO)
Investment	-0.347	(14.89)	-0.293	(26.38)
Miscellaneous Sources	0.331	(8.74)	0.716	(41.39)
Stockbuilding	-0.306	(14.53)	-0.156	(17.48)
Dividend Payments	-0.214	(-1.52)	-0.161	(2.93)
Miscellaneous Expenditure	-0.386	(13.41)	-0.186	(14.48)
Capital Issues	0.404	(12.97)	0.298	(24.49)
Tax Payments	-0.367	(-5.84)	-0.505	(18.79)
Change in Loan Capital	0.399	(14.74)	0.302	(18.31)
Profits	0.527	(19.57)	0.378	(35.84)
Sale of Fixed Assets	-0.165	(2.21)	-0.264	(11.43)
Stock of Equity	0.058	(0.96)	0.086	(1.98)
Stock of Loan Capital	0.043	(0.70)	0.125	(2.75)
Sales	0.0001	(0.26)	0.00001	(1.46)
Cost of Sales	-0.0036	(1.55)	0.0007	(0.31)
Stock of Trade Credit Received	0.0716	(1.17)	0.080	(1.805)
Stock of Trade Credit Given	0.056	(2.82)	0.070	(8.86)
Stock of Liquid Assets	-0.258	(9.31)	-0.241	(21.28)
Stock of Short Term Bank Debt	-0.050	(0.84)	-0.042	(0.94)
Stock of Irrecoverable ACT	0.315	(0.97)	0.152	(0.74)
1/Total Liabilities	0.013	(0.40)	-0.0046	(0.94)
Return of Captial	-0.0004	(1.23)	-0.0003	(2.25)
Unemployment	0.0011	(0.64)	0.00014	(0.11)
Company Sales/Total sample Sales	-0.383	(1.02)	0.095	(0.47)
Exchange control Dummy	0.003	(0.21)	0.015	(1.57)
Corset Dummy - Effective	-0.022	(1.94)	0.0012	(0.24)
Corset Dummy - Period of Operation	0.0064	(1.03)	-0.0138	(4.02)
Interbank Rate	0.0065	(0.08)	-0.063	(1.82)
CD Rate	-0.0105	(0.148)	0.0523	(1.58)
Covered Euro-$ Rate	0.0007	(1.20)	0.0011	(2.89)
Banks' Base Rate	0.005	(0.72)	0.011	(3.74)
Debt - Equity Tax Discrimination	-0.348	(0.90)	-0.012	(0.38)
Debt - Retentions Tax Discrimination	0.368	(0.81)	-0.093	(1.55)
Retentions - Equity Tax Discrimination	-0.684	(0.85)	0.116	(1.34)
Profits/Sales	-0.137	(1.28)	0.004	(1.91)
RSS	2.63552		41.72787	
S Error	0.04661		0.0769	
Observations	1352		7,670	
$\bar{R}^2$	0.420		0.3925	
DW	1.81		1.95	

Test for Equality of Coefficients F(35, 8258) = 4.65

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TABLE 8b

TRADE CREDIT GIVEN

RESULTS FOR LARGE AND SMALL COMPANIES

(Ratios Specifications)

	Large Companies		Small Companies	
EXPLANATORY VARIABLES	COEFFICIENT	(T RATIO)	COEFFICIENT	(T RATIO)
Investment	0.011	(0.37)	-0.011	(0.79)
Miscellaneous Sources	0.159	(3.26)	-0.0029	(0.13)
Stock building	0.164	(6.07)	0.096	(8.32)
Dividend Payments	0.361	(1.98)	-0.357	(5.00)
Miscellaneous Expenditure	-0.109	(2.95)	-0.304	(18.21)
Capital Issues	0.218	(5.43)	0.442	(27.93)
Tax Payments	-0.168	(2.08)	-0.225	(6.44)
Change in Loan Capital	0.161	(4.62)	0.227	(10.62)
Profits	0.179	(5.15)	0.336	(24.45)
Sale of Fixed Assets	-0.062	(0.65)	0.128	(4.26)
Stock of Equity	-0.145	(1.85)	0.110	(1.94)
Stock of Loan Capital	0.095	(1.18)	0.091	(1.53)
Sales	0.0023	(3.69)	0.000011	(1.50)
Cost of Sales	0.0034	(1.15)	0.00336	(1.23)
Stock of Trade Credit Received	0.095	(1.21)	0.142	(2.46)
Stock of Trade Credit Given	0.546	(2.15)	-0.095	(9.31)
Stock of Liquid Assets	0.1306	(3.65)	0.031	(2.11)
Stock of Short Term Bank Debt	0.0692	(0.89)	0.083	(1.43)
Stock of Irrecoverable ACT	-0.4175	(0.99)	-0.086	(0.32)
Profits/Sales	0.079	(1.79)	-0.00185	(0.28)
Return of Captial	-0.0013	(2.60)	-0.00062	(3.76)
Unemployment	0.0058	(2.48)	0.00918	(5.79)
Company Sales/Total sample Sales	-0.583	(1.21)	0.990	(3.77)
Exchange control Dummy	-0.101	(4.90)	-0.131	(10.10)
Corset Dummy - Effective	-0.0318	(2.16)	-0.015	(2.68)
Corset Dummy - Period of Operation	0.00015	(0.01)	-0.000065	(0.01)
Interbank Rate	0.072	(0.75)	-0.1049	(2.33)
CD Rate	-0.084	(0.86)	0.112	(2.62)
Covered Euro-$ Rate	0.0005	(0.66)	0.00076	(1.49)
Banks' Base Rate	0.0176	(2.06)	-0.0023	(0.59)
Debt - Equity Tax Discrimination	-0.851	(1.71)	-0.070	(1.70)
Debt - Retentions Tax Discrimination	1.213	(2.09)	0.305	(3.89)
Retentions - Equity Tax Discrimination	-2.078	(2.01)	-0.380	(3.37)
1/Total Capital Employed	0.171	(1.24)	-0.00076	(0.27)
RSS	4.37458		70.56242	
S Error	0.06005		0.1000	
Observations	1,352		7,670	
$\bar{R}^2$	0.3562		0.3509	
DW	1.91		2.09	

Test for Equality of Coefficients F(35, 8258) = 2.79

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TABLE 86

TRADE CREDIT RECEIVEDG

RESULTS FOR LARGE AND SMALL COMPANIES

(Ratios Specifications)

	Large Companies		Small Companies	
EXPLANATORY VARIABLES	COEFFICIENT	(T RATIO)	COEFFICIENT	(T RATIO)
Investment	0.269	(8.38)	0.285	(18.37)
Miscellaneous Sources	-0.179	(3.43)	-0.094	(3.93)
Stockbuilding	0.467	(1.87)	0.517	(2.05)
Dividend Payments	-0.364	(0.67)	-0.157	(10.30)
Miscellaneous Expenditure	0.043	(1.09)	0.162	(9.04)
Capital Issues	-0.087	(2.04)	0.106	(6.29)
Tax Payments	0.233	(2.69)	0.126	(3.38)
Change in Loan Capital	-0.100	(2.68)	-0.060	(2.61)
Profits	-0.039	(1.06)	-0.252	(17.10)
Sale of Fixed Assets	-0.226	(2.20)	-0.131	(4.06)
Stock of Equity	-0.425	(5.06)	0.477	(7.84)
Stock of Loan Capital	0.398	(4.65)	0.590	(9.26)
Sales	0.0095	(1.40)	-0.000048	(6.23)
Cost of Sales	0.0039	(1.24)	-0.0046	(1.60)
Stock of Trade Credit Received	0.349	(4.14)	0.485	(7.85)
Stock of Trade Credit Given	0.0234	(0.86)	0.043	(3.92)
Stock of Liquid Assets	-0.0119	(0.31)	0.093	(0.58)
Stock of Short Term Bank Debt	0.5303	(6.43)	0.698	(11.12)
Stock of Irrecoverable ACT	-0.2481	(0.55)	-0.149	(0.52)
Profits/Sales	0.0338	(0.71)	0.0075	(1.08)
Return of Captial	-0.0019	(3.56)	0.00085	(4.82)
Unemployment	0.0069	(2.76)	0.0105	(6.22)
Company Sales/Total sample Sales	-0.510	(-0.98)	0.897	(3.19)
Exchange control Dummy	-0.088	(-3.98)	-0.130	(9.39)
Coraet Dummy - Effective	-0.038	(-2.49)	-0.0187	(2.68)
Coraet Dummy - Period of Operation	0.0108	(1.26)	-0.0076	(1.59)
Interbank Rate	0.1301	(1.26)	-0.0808	(1.67)
CD Rate	-0.142	(-1.35)	0.0752	(1.63)
Covered Euro-$ Rate	0.0017	(2.10)	0.0023	(4.23)
Banks' Base Rate	0.018	(1.97)	0.0104	(2.48)
Debt - Equity Tax Discrimination	-0.897	(-1.69)	-0.113	(2.58)
Debt - Retentions Tax Discrimination	1.151	(1.86)	0.229	(2.71)
Retentions - Equity Tax Discrimination	-2.067	(-1.87)	-0.379	(3.13)
1/Total Capital Employed	0.0801	(0.54)	-0.011	(3.71)
RSS	5.0003		81.08692	
S Error	0.06421		0.1073	
Observations	1,352		7,670	
$\bar{R}^2$	0.3952		0.4850	
DW	1.97		2.05	

Test for Equality of Coefficients F(35, 8258) = 3.34

LEVELS SPECIFICATIONS

TABLE 7

(t values in parenthesis)

Explanatory variables	(1) Bank Borrowing		(2) Liquid Assets		(3) Trade Credit Given		(4) Trade Credit Received	
Investment	.338	(31.2)	-.480	(53.1)	-.027	(2.8)	.154	(10.5)
Miscellaneous Sources	-.226	(17.7)	.588	(55.3)	.127	(11.0)	-.059	(3.4)
Stockbuilding	.302	(29.0)	-.483	(55.8)	.157	(16.6)	.371	(26.5)
Dividend Payments	.465	(11.3)	-.458	(13.4)	-.692	(18.6)	-.615	(11.1)
Miscellaneous Expenditure	.250	(18.7)	-.527	(47.0)	-.026	(2.2)	.200	(10.9)
Capital Issues	-.226	(14.4)	.644	(49.1)	.123	(8.7)	-.007	(.3)
Tax Payments	.306	(18.8)	-.526	(38.8)	-.076	(5.2)	.092	(4.2)
Change in Loan Capital	-.278	(23.1)	.591	(58.9)	.202	(18.5)	.071	(4.4)
Profits	-.144	(11.7)	.592	(57.8)	.396	(35.6)	.133	(8.0)
Sale of Fixed Assets	.194	(5.6)	-.178	(6.2)	-.133	(4.2)	.505	(10.8)
Cost of Sales	-.011	(18.4	-.001	(2.4)	.004	(7.4)	.013	(17.2)
Stock of Equity & Preference Capital$_{-1}$	-.596	(40.2)	.375	(30.3)	.086	(6.4)	1.06	(52.9)
Stock of Loan Capital$_{-1}$	-.610	(35.2)	.355	(24.5)	.085	(5.4)	1.05	(44.8)
Stock of Trade Credit Received$_{-1}$	-.608	(41.0)	.375	(30.2)	.076	(5.6)	1.06	(52.8)
Stock of Trade Credit Given$_{-1}$	.115	(13.9)	.111	(16.0)	-.162	(21.6)	-.167	(14.9)
Stock of Liquid Assets$_{-1}$	-.009	(1.3)	-.126	(20.1)	.042	(6.2)	-.074	(7.3)
Stock of Short-Term Bank Borrowing $_{-1}$	-.870	(60.4)	.209	(17.4)	.180	(13.8)	1.26	(64.8)
Stock of Irrevocable Act$_{-1}$	.006	(.1)	-.318	(4.5)	-.120	(1.6)	-.44	(3.9)
Interest Charges$_{-1}$	.072	(4.1)	.033	(2.3)	-.053	(3.4)	-.092	(3.9)
Rate of Return on Capital	-.0006	(10.0)	-.001	(17.7)	-.0009	(14.8)	-.001	(13.4)
Inter Bank Rate	-.142	(12.1)	.130	(13.3)	-.135	(12.7)	.137	(8.7)
CD Rate	.133	(12.0)	-.128	(13.8)	-.126	(12.5)	-.135	(9.0)
Covered Euro $ Rate	-.0004	(3.4)	.002	(22.1)	.002	(22.2)	.005	(31.1)
London Clearing Base Rate	.009	(8.3)	-.0003	(.4)	.008	(8.4)	-.001	(.7)
Corset Dummy (Period of Operation)	-.021	(15.9)	-.010	(9.2)	.006	(5.0)	.017	(9.4)
Corset Dummy (Period when Effective)	-.001	(.5)	-.013	(8.8)	-.017	(10.4)	-.029	(12.1)
Debt/Equity Tax Discrimination	.316	(36.1)	-.172	(23.5)	-.084	(10.7)	-.572	(48.5)
Debt/Retentions Tax Discrimination	-.366	(17.9)	-.055	(3.2)	.203	(10.9)	.514	(18.6)
Retentions/Equity Tax Discrimination	.701	(25.3)	-.081	(3.5)	-.236	(9.4)	-1.01	(27.2)
Profit/Sales	.103	(15.2)	.095	(16.8)	.011	(1.7)	.003	(.3)
(Profits)^2	-.0001	(22.8)	.00004	(11.1)	-.0001	(24.0)	.00005	(7.2)
Income Gearing$_{-1}$	-.013	(35.2)	-.004	(12.2)	-.003	(7.5)	.007	(13.5)
Unemployment Rate	-.005	(12.8)	.002	(6.0)	.002	(6.5)	.009	(17.6)
Exchange Control Dummy	.004	(1.5)	-.002	(.8)	-.049	(18.4)	-.054	(14.0)
Trend	.066	(2.7)	.012	(.6)	-.03	(1.3)	-.084	(2.5)
Sales of Company Relative to Total Sample Sales	-.198	(5.0)	-.516	(15.5)	-.447	(12.4)	-.765	(14.3)
Residual Sum of Squares	540,132		376,293		443,223		983,152	
Standard Error	8.07		6.74		7.31		10.89	
$\bar{R}^2$	.725		.713		.572		.674	
Durbin Watson Stat	1.84		1.74		2.02		2.14	
Sample Size	9,022		9,022		9,022		9,022	
Degrees of Freedom	8,291		8,291		8,291		8,291	

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