

Business Failures and Macroeconomic Factors in the UK

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Abstract

This paper investigates whether macroeconomic factors can account for the observed fluctuations of UK business failures in the period of 1966–2003, using vector error-correction model. The main finding is that macroeconomic variables, i.e. credit, profits, inflation and company births, appear to be important factors influencing business failures. In particular, the interest rate, informative about future movements of failure rates, can be used as a feasible policy instrument to reduce the incidence of failures. Corporate failures have been identified to play an important role in macroeconomic fluctuations. The findings also indicate that the deregulation policy adopted by the Thatcher government altered the relationships between failure rates and macroeconomic activities over the sample period.

JEL classifications: G33, E42 and C32

Key words: business failures, macroeconomy, monetary policy, financial deregulation and vector error-correction model

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1. Introduction

The economic literature contains studies focused on explaining the relationship between business failures and fluctuations in aggregate measures of economic activities. Increasing attention has been devoted in recent work to time-series analyses, ranging from forecasting single relationships between business failures and macroeconomic factors to examining the correlations of economic behaviour in a dynamic framework. These empirical studies consistently find that cyclical variations in business failures and macroeconomic aggregates are correlated. For example, Altman (1983) uses ADLs (augmented distributed lags) to demonstrate that GNP, gross corporate profits and the money supply may impact on a marginal firm's ability to survive. Wadhvani (1986) builds up a theory of inflation and tests it in an ADL format, which quantifies the impact of nominal interest rates on failure rates. Young (1995) in an extended version of the model argues that the changes in interest rate above the expected level are the main causes of bankruptcy, especially in the period of rising debt level. Utilising PDLs (polynomial distributed lags), the study by Turner et al. (1992) gives a prominent role to the level of company profitability, bank credit and the growth in money supply. Cuthbertson and Hudson (1996), in their ADL model, demonstrate that the interest rate, profits and income-gearing variables are the key variables influencing compulsory liquidations. Vlieghe (2001) examines UK aggregated corporate liquidations within the ADL framework and finds that the real interest rate and debt-to-GDP ratio are the long-run determinants of the liquidation rate, while the birth rate, property prices and nominal interest rates have significant short-term effects. Following a different, though related, line of research, Liu and Wilson (2002) have attempted to construct measures of the effects of the macroeconomy using error-correction information, and their results show that

interest rate and insolvency legislation are important variables in determining business failures in the long run.

Overall, these researchers recognise that the links between the corporate failures and the macroeconomy are two-way. Firstly, macroeconomic conditions can affect the health of the corporate sector. Tight monetary policy and an increase in the effective interest rate can sharply alter the cost of borrowing for companies, worsen the corporate sector's financial situation, and hence destabilize the corporate sector (Gordon, 1991). Changes in the level of inflation can affect the volatility of cash flows and reduce the firm's ability to pay interests on its debt in the case of higher inflation, thus increasing the risk of financial distress, and even threatening the viability of many firms (Wadhvani, 1986). A squeeze on credit to companies arising from credit rationing can cause valuable investment opportunities to be missed (Stiglitz and Weiss, 1981). Especially when firms are in financial difficulties, they are experiencing a more difficult time raising external financing for working capital to maintain the ongoing operations (Whited, 1992). Even though these firms are economically viable in the long run, they may not escape going bankrupt in the short run, leading to a higher probability of corporate failures (Hunter and Isachenkova, 2003). The general economic fluctuations can also be directly related to the company's survival. Economic recession creates financial distress by narrowing the margin between cash flow and debt services in general. The onset of recession strains the system by reducing the flow of income available to meet current obligations and by increasing uncertainty about future liquidity needs (Bernanke, 1983). If a firm is highly responsive to the ups and downs in the economy, shareholders and lenders may perceive a greater risk of liquidation and/or distress and demand a higher return in compensation for gearing. This increase in the investment costs inevitably reduces net cash flows, which becomes critical to the firm's continuance, particularly for the firms that have to service high levels of debt finance. Secondly, the financial status of the corporate sector may affect the macroeconomy through the following

links. It's been well-documented that corporate financial structure plays an important role in macroeconomic fluctuations (Fazzari et al, 1988; Carpenter et al, 1994; Gilchrist and Himmelberg, 1995). When firms are experiencing financial difficulties, they are often forced to dispose of assets at fire-sale prices (Pulvino, 1998), which result in falling asset values and reduction in the firms' net worth, and as a consequence, the firms bear the risk of being excluded entirely from access to credit, with an accompanying collapse in investment demand (Bernanke and Gertler, 1995). Corporate balance sheets become even weakened when the company incurs high direct costs to stay float financially, which offsets the value of tax relief of increasing debt level, hence exerting a negative effect on firm value. These two mechanisms lead the firms to curtail their investments and promote output contraction, thus exacerbating sharper economic downturns (Myers, 1993). The lower level of investment activities and the prolonged period needed for corporate restructuring can significantly impair economic growth (Vlieghe, 2001). Furthermore, in the presence of financial distress, the problem of informational asymmetries in credit markets is likely to be worsening (Stiglitz and Weiss, 1981). On the one hand, debt is enforced under threat of liquidation, and viable projects may be liquidated as a result of agency problem between creditor and borrower (Hart and Moore, 1998); on the other hand, the firms likely has little equity value against a relatively large amount of debt—a situation that is ideal for the expropriation of creditors. High liquidation rates can, by gradually eroding bank capital, weaken the banking system and trigger a financial crisis. Evidence has been shown that the corporate financial structure played a key role in the Great Depression (Mishkin, 1978; Bernanke, 1983) and Asian financial crisis (Gray and Stone, 1999). Given important implications for social welfares and macroeconomic consequences of corporate failures, it is important to understand what drives corporate liquidations, and how business failures are associated with macroeconomic fluctuations. The objective of the present study is to extend existing work by analysing the possible links between business failures and macroeconomic

aggregates using vector error-correction model (VECM), which features the dynamic responses of business failures to the innovations to macroeconomic aggregates, accounting for the interactions between business failures and real/financial variables in the economy and assessing the short-run intertemporal co-movements between the variables and their long-run equilibrium relationship. The VARs with cointegration analysis allows the simultaneous estimation of the speed with which the variables adjust in order to re-establish any equilibrium in the system, and such a procedure can uncover long-run equilibrium relationships among a set of non-stationary data, and, thus, should prove particularly useful as a guide to macroeconomic policy in relation to business failures (Kenny, 1999).

The remainder of the study is organised as follows. In Section 2 the VECM model is introduced and specification issues are discussed. In Section 3 a six-variable dynamic system is estimated using VECM, and the results of the VECM analysis, i.e., impulse response functions and variance decomposition, are reported and discussed. Section 4 contains a summary and policy implications.

2. VECM model and model specification

This section sets out a simple VECM framework, and discusses the specification issues for the analysis of macroeconomic shocks on business failures in the system, with particular attention to parameter stability and the cointegrating relationship between the variables.

2.1. The VECM model

The vector autoregression model is used to analyse the dynamics of business failures in the aftermath of a policy shock and to examine the interactions between systems of macroeconomic variables of interest and business failures. A general VAR model is

$$\Delta y_t = \Pi y_{t-1} + \sum_{j=1}^{p-1} \Gamma_j \Delta y_{t-j} + \varepsilon_t \quad (1)$$

in which y is an n -element vector of business failures and macroeconomic time series, Π and Γ are $n \times n$ matrices of unknown constants, and ε_t , the serially uncorrelated disturbance, has the multivariate distribution $N(0, I\sigma^2)$.

As it is well known that most economic series are non-stationary, although in the long run they tend to be cointegrated, a VAR that has a cointegration specification restricts the long-run convergence of the endogenous variables to their cointegrating relationships while allowing a wide range of short-run dynamics. We can think of each of the cointegrating vectors as characterising a long-run equilibrium involving y , with the convention that its numerical value is the ‘equilibrium error’ or ‘disequilibrium’, if we let $z_{t-1} \equiv \beta' y_{t-1}$ denote the n -vector of the last period’s equilibrium errors. Thus, equation (1) can be rewritten in the form

$$\Delta y_t = \alpha z_{t-1} + \sum_{j=1}^{p-1} \Gamma_j \Delta y_{t-j} + \varepsilon_t \quad (2)$$

where the parameters α and Γ can be estimated using ordinary least squares. Equation (2) is what is known as a vector error-correction model. It states that the total change in y can be decomposed into a response to the last period’s disequilibrium, a moving average of past changes and a white noise. On condition that the error-correction term is non-zero, the deviation from the long-run equilibrium is corrected gradually through a series of partial short-run adjustments until $\beta' y_{t-1} = 0$ (see Cochrane, 1998, for technical details).

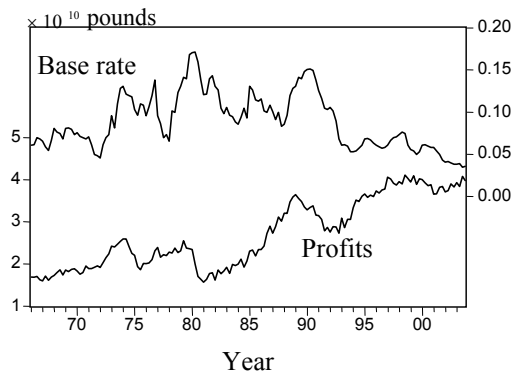
Since a shock to one variable directly affects the variable itself, and is also transmitted to all of the endogenous variables, VECM can be readily transformed to interpret the evolution of business failures as a function of orthogonalised ‘innovations’ in the macroeconomic variables, and break down the dynamics of business failures in terms of the relative contribution of underlying endogenous shocks and their transmission effects (Cooley and Dwyer, 1998). We’ll examine two different methods of depicting these system dynamics—

the impulse response function and variance decomposition (see Hamilton, 1994)—to detect the important shocks in the business failure fluctuations over time.

2.2. Data

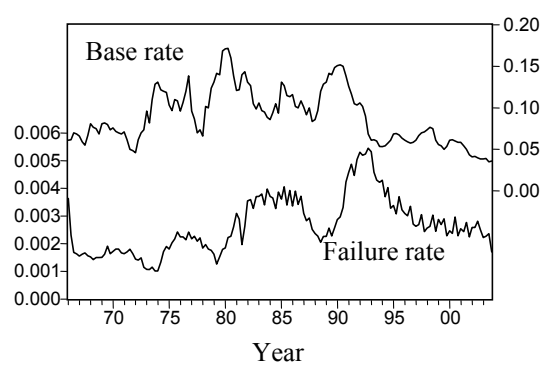
In investigating the information content of macroeconomic variables in relation to business failures and the interactions between policy operations and the real economy, we are interested in the impacts on business failures rates (FRATE) of a vector of macroeconomic endogenous variables, including real commercial banks' base rate (BSR), real credit (NSL), real profits (IP), the inflation rate (INFL), and business birth rates (BR) over the sample period, 1966:1-2003:4. Among these, the base rate is used as the policy variable. The co-movements of profits and failure rates with the base rate are illustrated in Figures 1 and 2.

Figure 1. Total profits and base rate



Source: DTI; Bank of England, 2004

Figure 2. Business failure rates and base rate



Source: Datastream; Bank of England, 2004

In Figure 1 an inverse relationship is apparent between total profits and the base rate over the period of 1966–2003. This may indicate that the base rate served as an indicator to markets, thereby influencing industrial performance. Furthermore, it is observable that the business failure rate fluctuations would seem to occur in response to expansionary or contractionary monetary policies over time (Figure 2).

The two figures indicate that there appears to be a strong and stable relationship between profits/failure rates and the base rate over the business cycles. Since the commercial banks' base rate is closely related to the official rate set by the monetary authorities to influence

market interest rates and the credit that the financial institutions are able to allocate, it is feasible to use it as an indicator of the stance of monetary policy¹. Hence, under the assumption that innovations to the base rate represent policy actions, the responses of other variables in the system to a base rate shock will show the effects on these variables of an unanticipated change in monetary policy. We employ total operating profits as the proxy of total corporate output, since the data can reflect the performance of the corporate sector (Altman, 1986). Credit, consisting of total sterling loans to the corporate sector in the UK, is used to account for lending activities in the economy (Bernanke and Gertler, 1995). Inflation is included because it is expected to have important predictive power for business incorporations and continuance (Gordon, 1981; Wadhvani, 1986), so is the company birth rate to account for the contribution of business incorporations to future business failures (Altman, 1983; Turner et al., 1992; Cuthbertson and Hudson, 1996; Liu and Wilson, 2002). The *ex post* real base rate is derived by subtracting inflation rate, and total credit and total profits have been deflated by the GDP deflator based on 1995 constant price. All the variables are quarterly and have been seasonally adjusted. Real credit and real profit are expressed logarithmically, while the interest rate, inflation rate, company birth rate and failure rate are expressed in decimals. More details about the data are provided in the Appendix.

2.3. System stability

It is often noticeable that the estimation of VARs over a relatively long period—38 years in the present study—may encompass periods of change in political or economic regimes. Parameter consistency is essential if VARs are to be valid for testing economic relationships subject to the changes in policy regimes, as the Lucas critique argues (see Lucas, 1976).

1. The actual interest rate imposed by the Bank of England as its instrument has varied over time. The (Gilt) repo rate, as the official interest rate, was introduced on 3 March 1997. Before the introduction of Gilt repo, the Bank's official rate was the Band 1 Dealing Rate, which was the minimum rate at which the Bank was willing to discount bills with up to 14 days maturity. The repo rate is not exactly the same as the Band 1 Dealing rate, which was the Bank's official rate before the introduction of the Gilt repo in 1997. The commercial banks' base rate is closely related to the official rate at all times. Using the commercial banks' base rate also has the advantage that the data can go back to 1966.1.

Accordingly, tests were run to determine the parameter stability of the system, starting with a recursive one-step Chow test, and proceeding to an N -down forecast test based on the full variance matrix of all forecast errors in the estimation (Hendry and Doornick, 1999). Neither test rejected stability for most of the possible sample splits from the beginning of the sample after initialisation, but there are a few significant structural breaks that occur mostly between 1977 and 1979 (Table 1). To take account of the interactions between the variables, vector Chow tests were further employed on the whole system for all the sample dates. The period of 1980.1 comes to the fore, as F-statistic is statistically significant in all the three tests (Table 1). This break-point can also ensure that there is a sufficient number of observations on either side of the break for the estimation to reveal the underlying changes in performance of the UK economy.

Table 1. Structural break tests (extracted^a)

Periods (quarter)	1-step Chow tests	N-down Chow tests	Vector Chow tests
1977.1	1.8227 [0.1915]	1.3888 [0.0457] *	1.6539[0.0389]*
1977.2	0.4917 [0.8019]	1.3322 [0.0623]	1.9170[0.0070]**
1977.3	1.3849 [0.2966]	1.3925 [0.0333] *	1.7977[0.0084]**
1977.4	1.5227 [0.2463]	1.3710 [0.0353] *	1.7547[0.0072]**
1978.1	1.3388 [0.3042]	1.3407 [0.0415] *	1.8209[0.0031]**
1978.2	2.5403 [0.0670]	1.3242 [0.0439] *	1.7647[0.0031]**
1978.3	0.2084 [0.9690]	1.2402 [0.0893]	1.8873[0.0008]**
1978.4	0.4639 [0.8254]	1.3080 [0.0431] *	1.7623[0.0015]**
1979.1	0.2192 [0.9656]	1.3551 [0.0237] *	1.6180[0.0044]**
1979.2	3.1598 [0.0278] *	1.2831 [0.0196] *	1.5677[0.0056]**
1979.3	1.3481 [0.2827]	1.2769 [0.0482] *	1.5812[0.0039]**
1979.4	0.9779 [0.4644]	1.2626 [0.0536]	1.5301[0.0055]**
1980.1	3.9183 [0.0082] **	1.2682 [0.0467] *	1.5262[0.0478]*
1980.2	3.9239 [0.0076] **	1.2331 [0.0672]	1.2442[0.0827]
1981.3	3.1688 [0.0168] *	1.0854 [0.2676]	1.0482[0.3764]
1983.3	3.1406 [0.0140] *	0.7602 [0.9892]	0.8500[0.9016]
1985.1	3.8078 [0.0041] **	0.6685 [0.9997]	0.7560[0.9885]
1987.2	2.5063 [0.0335] *	0.5119 [1.0000]	0.5076[1.0000]
1989.1	3.8078 [0.3231]	0.6685 [0.0091] *	0.7560[0.4365]
1990.3	3.0810 [0.4385]	0.5848 [0.0536]	0.8287[0.0077]*

^a: Periods with any statistically significant F-statistic are included. The statistics reported are F-statistics with p -values in brackets.
*: statistically significant at 5% level; **: statistically significant at 1% level.

It is interesting to note that the results of the structural stability tests coincide with those economic and political regimes under which the most widespread privatisation and financial liberalisation in the economy took place in the UK. As soon as Mrs Thatcher took office in May 1979, there swept across the country a rapid and virtually complete deregulation of the

UK economy, which inevitably wrought fundamental changes in the real and financial sectors of the economy. British economy in the 1970s was seen as over-planned and stagnating in terms of real growth and productivity growth, but high in unemployment level and inflation rate. The period in 1980s has witnessed a complete turnaround in its economic performance. This change in performance coincides with a shift in macroeconomic policy away from the short-term demand management policies largely conducted through fiscal policy to control unemployment in the 1960s and 1970s, “which has produced a series of ‘stop-go’ cycles in activities but had done nothing to reverse the process of long-run decline, to much greater emphasis on longer-term supply-side policies” (Curwen, 1990). Specifically, the post-1980 period saw the UK seeking to embrace a market-related policy with interest rates implemented as a principle tool in regulating the demand for and supply of money. Monetary policy prior to 1979 was in effect credit policy and was conducted through direct controls in the form of a ceiling on overall lending and interest rate (minimum lending rate, i.e. MLR), a ceiling on interest-bearing eligible liabilities (“Corset”), and restrictions imposed with the Bank of England periodically setting guidelines on lending to certain categories of borrowers (consumer credit controls and hire purchase controls), accompanied by an aggressive debt management policy and manipulation of the public sector borrowing requirements (PSBR) for monetary purposes. The election of a new Conservative government in 1979, headed by Margaret Thatcher, led to a reappraisal of monetary policy to target inflation. Monetary policy was thus the dominant weapon in the government's array of macroeconomic policy instruments. The ‘Corset’ was removed in 1980 and replaced by a plethora of new instruments, such as a reiteration of the interest rate weapon as a tool to control bank lending; hire purchase controls were abolished in 1981, and the PSBR and debt management instruments of monetary policy were finally abandoned in 1985. The exchange controls was also abolished in November 1979 to influence overseas flows. In addition, the minimum lending rate was replaced by the flexible ‘intervention rate’ as a means of controlling the short-term rate of interest so as to reinforce their impact

through changing expectations (Curwen, 1990). Since then, the monetary policy has relied solely on indirect controls, namely interest rates.

1980 represents a major shift in macroeconomic policy following the change of government in the previous year and the start of the Thatcher's market-oriented economic and financial reform. The effect on the corporate sector has been investigated only recently by Turner et al. (1992), using the ADL method, and they conclude that the reforms adopted by the Thatcher government tended to lead to the major structural break in real activity seen in the 1980s. None the less, it remains possible that such a break reflects the long-term effects of the 1970s oil crisis on the macroeconomy. Hence we may relate the structural break to Thatcher's reform and its resulting macroeconomic policies, as well as to the impact of the oil crisis, which were occurring in parallel during the two sub-periods under examination.

Further checks using the Granger-causality test confirm that the splitting of the whole period into two parts seems better able to capture the changes in the real economy and the financial sector under different regimes (see Appendix). Both the stability tests and the facts indicate that these two time spans, i.e. pre-1979.4 and post-1980.1, provide a suitable division for the present study of the impact of policy-induced changes in the real economy on business failures. Hence, in reporting the results of the estimation, we shall compare the different responses between these two periods from an analysis of impulse response functions and variance decomposition, in order to encompass the possibility of structural changes consistent with the major events that have influenced the performance of the corporate sector during this time span.

2.4. Long-run relationship and co-integration test

Cointegration implies that the linear combination of some nonstationary time series is stationary. The plots of the time series of interest rates, failure rates and profits in Figures 1 and 2 show that the aggregates are drifting together, suggesting that the series might be cointegrated. To establish cointegration, we first test whether each series contains a unit root

and is integrated in each sub-period, using the augmented Dickey-Fuller test (ADF) and Phillips-Perron test (PP).

Table 2. Unit root tests ^a

Variables	Level				First difference			
	Pre-1980 period		Post-1980 period		Pre-1980 period		Post-1980 period	
	ADF ^b	PP ^c	ADF	PP	ADF	PP	ADF	PP
FRATE	-1.48	-2.01	-1.84	-1.66	-3.63	-7.43	-3.96	-7.35
BSR	-2.53	-2.43	-2.68	-2.35	-4.22	-6.11	-4.76	-6.87
BR	-1.81	-2.99	-2.31	-1.42	-5.07	-4.58	-3.54	-5.31
NSL	-1.79	-1.13	-1.26	-1.12	-3.17	-3.40	-3.43	-4.86
INFL	-1.86	-1.75	-2.73	-2.19	-4.75	-3.69	-4.35	-6.36
IP	-2.67	-2.61	-2.62	-2.58	-4.92	-7.12	-4.26	-7.21

^a: MacKinnon critical values for rejection of the hypothesis of a unit root. Unit root tests include constant and trend; the optimal lag length is chosen by AIC criterion.

^b: ADF test statistic.

^c: PP test statistic.

Variable description: FRATE: business failure rate; BSR: base rate; BR: company birth; NSL: national lending to corporate sector; INFL: inflation rate; IP: corporate gross profits.

Table 2 shows that in no case can one reject a unit root in levels at the usual level (5%) of significance. First differences are found to be stationary, and hence all the series are of integrated order one I(1). As individual series are non-stationary in levels, there may exist a cointegration relationship between them. We used the Johansen (1988) likelihood method to determine the number of cointegrating vectors. This is based on the maximal eigenvalues, testing for the null hypothesis that at most r cointegrating vectors exist against the alternative of a $r+1$ vector.

Table 3. Cointegration test ^a

Eigenvalue	Likelihood ratio ^b	5 % critical value	1 % critical value	Numbers of cointegration ^c
Pre-1980 period				
0.672123	158.0473	82.49	90.45	None **
0.582223	100.0611	59.46	66.52	At most 1 **
0.355295	54.67511	39.89	45.58	At most 2 **
0.329557	31.84906	24.31	29.75	At most 3 **
0.159648	11.05858	12.53	16.31	At most 4
0.037990	2.014002	3.84	6.51	At most 5
Post-1980 period				
0.551284	148.1678	82.49	90.45	None **
0.371828	89.66805	59.46	66.52	At most 1 **
0.298531	55.72730	39.89	45.58	At most 2 **
0.237181	29.84305	24.31	29.75	At most 3 **
0.125706	10.07944	12.53	16.31	At most 4
0.003729	0.272761	3.84	6.51	At most 5

^a: All tests were computed with three lagged differences, allowing for no deterministic trend in the cointegrating relation of both periods.

^b: L.R. test indicates the number of cointegrating equation(s) at 5% significance level.

^c: *(**) denotes rejection of the hypothesis at 5%(1%) significance level.

The results reported in Table 3 indicate that there are up to four cointegrating vectors between the variables in each sub-period. Since the cointegration tests confirm the existence of long-term relationships between economic activities and business failures, we therefore estimate the systems in a vector error-correction format allowing for four cointegrating relationships. To ensure a suitable specification of the VECM, the choice of lag length is determined by the use of the Akaike's Information Criterion. The results indicate that three lags are optimal in each variable for the two separate periods of data.

3. Empirical results

3.1. Impulse-response functions

Impulse response functions are used to trace the effect of an unanticipated shock to one variable on the time path of all the endogenous variables in the systems. The time paths of each variable in response to the shocks in the two sub-sample periods are shown in Figures 3–4. The vertical axes refer to the changes of the variables in response to one standard deviation of the shocks, while the horizontal axes denote elapsed time in quarters. Each figure gives both point estimates and one-standard deviation bands obtained by Monte Carlo simulations. We focus on the responses of business failures to the innovations to macroeconomic aggregates, including a discussion on the responses of company births, and also the responses of other variables to the business failure innovations.

Figures 3-4 here.

Policy shocks Figures 3 displays the estimated impulse response functions of business births and business failures to one standard error monetary shocks in the two regimes. In the pre-1980 period, tight money, i.e. a positive innovation in the base rate, generates an initial short-lived rise in the company birth rate followed by a fall, which peaks after about 18 quarters, to reflect the impact of high interest rate; we then see the birth rate settling back to

its initial level. In response to the monetary shock, the business failure rate increases in the short run and then tends to converge. In the long run, the pattern of the responses suggests that the monetary shock does not account to any considerable extent for the variability of business failures. The evidence that the signal of the policy shock does not affect business incorporations and failures in the long run indicates that monetary tightening is not as effective as we would have been led to expect from the first sample period. The relatively low correlation between the policy shock and the real economy may imply that at least business births and business failures contain a degree of variability that is not due to unexpected monetary actions in the long run. The responses to the monetary shock take a different pattern after 1980 from those seen in the years leading up to 1980. Tight money causes the birth rate to decline, in anticipation of a shrinkage in credit and an increase in the cost of borrowing, slowly reverting to the starting level. The failure rate shows a negative response to monetary tightening at the early stage, a fact that may be accounted for by the ‘credit-rationing effect’ that holds when funds are channelled to small firms in distress in monetary tightening and business failures fall as a consequence. Afterwards, the positive responses gradually accumulate, reaching a peak after about a year, and persist above the level with tendency to converge in the end, showing that the unexpected monetary shock has a long-term negative impact on business survival—the real effect. This evidence is in favour of the Gordon’s theoretical conclusion that the interest rate lead to the rise in bankruptcy. In terms of the size of these effects, the implied impact on the failure rate reaches a maximum that is roughly ten times that of the pre-1980 for a given change in the base rate. We could say, therefore, that monetary tightening produces more severe and longer-lasting effects in the post-1980 period than in the pre-1980 period.

Other shocks To extend the interpretation of the movements in the business failure rate, Figure 3 further shows the effects of non-policy shocks on company failure rates and birth

rates in the pre- and post-1980 periods, respectively. In both periods, we find an inverse relationship between the credit shock and the business failure rate in the immediately succeeding years, but a direct relationship between them in more distant years. The mechanism is associated with a rise in credit availability, which results in an increase in production, and hence a fall in business failures, in the short run; however, the debt cost burdens eventually lead to an increase in the cost of input and a consequent reduction in profits, pushing up business failures in the long run. We also find that in both periods the positive credit shock causes the company birth rate to rise in the short run and then converge, with the stronger effect seen in the first period. This upward response of business births to an increase in credit suggests that credit is crucial for business set-up.

The effect of the profit shock on increasing business incorporations and reducing business failures seems permanent in the two periods. The patterns are consistent with our expectation that business failures are negatively related to the corporate performance. The deteriorating corporate performance may adversely affect its liquidity position and capacity to meet interest payments, triggering debt default in the short run, and in the long run, firms with low or negative profits are bound to go into bankruptcy. The significance of the profit shock in predicting future birth rates suggests that positive profits over time drive up business formations, reflecting the company births' endogenous response to the real activities.

As regards the effects of the inflation shock, in the pre-1980 period the company birth rate decreases immediately in response to an unexpected rise in the inflation rate, and then shows a path back towards equilibrium. However, its positive effect on the business failure rate appears to be permanent, suggesting that inflation is directly associated with business failures. In the post-1980 period the inflation shock exerts a lengthy, negative impact on the birth rate. Furthermore, the positive shock causes the failure rate to decline initially but to

rise afterwards and remain at a high level persistently, indicating that the adverse effect of an unanticipated shock to inflation ultimately falls on the rate of business failures. The findings from the two periods lend supports to the claims of Wadhvani (1986) that inflation raises the bankruptcy rate.

The patterns of the responses of the business failure rate to the company birth rate shock appear to be similar in both periods. Business failures fall before rising above the original level. Here we see the significant, but opposite, role of business incorporations in business failures over the time horizon. In the short run the increase in new company incorporations results in a decrease in failure rates within the first few periods of establishment, which confirms the 'honeymoon' effects reported by Altman (1983) and Hudson (1986). However, in the medium term and long run they are positively correlated. This is because some of the new companies, which have a competitive disadvantage and are less able to withstand financial and economic problems, begin to encounter difficulties a few years later after their incorporations. This positive relationship implies that business failures are partially supply-determined because new firms are more prone to bankruptcy (Hudson, 1987; Platt and Platt, 1994).

The responses of economic aggregates to the failure rate shock are depicted in Figure 4. In the first sub-period the failure rate shock raises credit and the birth rate in the long run, and the contractions of the interest rate, profits and the inflation rate seem relatively persistent. In the second sub-period profits and the birth rate increase in the long run following an initial fall, while the interest rate and credit experience a long period of depression and their convergence takes a good deal of time. Moreover, the negative effect of the failure rate shock on the inflation rate seems to be permanent, with no apparent tendency to converge. The results from the two periods confirm the importance of corporate financial distress to

the national economy. This may indicate that financial distress should play an important role in the macroeconomic analysis of business cycles.

Overall, the patterns of the responses in the two sub-samples are differing in terms of timing and magnitude. The results from the impulse response functions seem to be consistent with the course of political and economic events in the UK, particularly in the cases of interest rate, credit and inflation shocks. Essentially, the 1970s saw a serious break in which economic performance along every dimension deteriorated following the effects of the first oil crisis on the UK economy: higher inflation accompanied by low real GDP growth, quantitative controls on credit supply and an inadequacy of macroeconomic policies. Many inefficiencies inherited from the old economic system were bound to be reformed. The upshot was a shift to a new regime since 1979, as financial liberalisation accelerated in the 1980s and qualitative and quantitative restrictions on bank lending were removed. The exchange rate was devalued, and inflation was on the wane. In the late 1980s the intermediate targeting of monetary aggregates was phased out in favour of interest rate control, in order to hit first exchange rate targets and then inflation targets. Hence the aggregate macroeconomic shocks relating to interest rates, credit and inflation rates produce a differential joint effect on the corporate sector across these two periods. In particular, the monetary policy shocks generate more significant and longer-term impacts on the non-policy variables, and the responses of the endogenous variables are somewhat stronger and faster in the post-1980 period. This is to reflect the effect of moving away from non-market direct controls of monetary policy prior to the Thatcher regime to market-based interest rate instrument as the mainstream of monetary policy ever since. The dynamics of both the short run and the long run in the systems seem plausible for the two different political and economic regimes.

3.2. Variance decomposition

Further insights into the relationships between business failures and macroeconomic activities can be gained by analysing the variance decomposition of business failure rates resulting from innovations to the macroeconomic variables. Table 4 reports the percentage of the 36-step-ahead forecast error variance in business failure rates that is accounted for by the policy shock and non-policy shocks in the two sub-systems, providing us with information about the relative importance of these random innovations in the business failure fluctuations. In general in the pre-1980 regime, the inflation shock and the profit shock are the main short-run sources of failure rate fluctuations, whereas in the long run the credit shock and the birth rate shock also contribute to the variability in failure rates. The results are consistent with conditions of the inflationary economy in the 1970s, when the overall economic performance deteriorated accompanied by the adverse effects of global oil price shocks as expected. The interest rate shock shows a short-run effect, accounting for 30 percent of business failure fluctuations in the first four periods, but its importance diminishes rapidly over time. In the post-1980 regime, the short-run variability of failure rates is mostly explained by its own shock and the interest rate shock, indicating that monetary policy is more predictive for the real sector in the deregulated market; whereas in the long run, with the dominant role of the interest rate shock, the contributions of other shocks do not differ from each other by much. These results seem to provide some favourable evidence for our conjecture that no single shock plays an influential role in explaining business failure fluctuations at all the horizons: rather, they result from the policy shock accompanied by the other macroeconomic shocks, which influence the corporate activities at different intervals in the two regimes.

Table 4. Variance decomposition of business failure rates (%)

Forecasting period (quarter)	S.E ^a	BSR	NSL	IP	INFL	BR	FRATE
Pre-1980 period							
6	0.012977	4.065740	1.188252	26.42190	22.27811	7.175302	18.87070
12	0.016322	0.975530	7.173447	23.28594	42.64217	7.248857	8.674056
18	0.017517	8.162286	16.65148	21.64470	32.48765	14.19372	6.860161
24	0.018440	7.833841	17.24752	21.43343	26.96186	18.45119	8.072167
30	0.021431	8.430591	15.74655	22.60186	25.06165	19.02110	9.138245
36	0.022262	7.428197	16.56700	23.44453	24.65400	19.45028	8.455994
Post-1980 period							
6	0.021824	11.78691	0.272863	3.305242	3.054145	1.493322	80.08752
12	0.030113	26.62655	4.877190	8.878387	6.638392	4.269530	48.70995
18	0.033925	33.15967	11.18582	12.86890	9.753439	4.287251	28.74491
24	0.036113	34.69758	14.60916	13.93225	11.24526	3.439014	22.07673
30	0.037592	35.23354	15.27798	14.20912	12.07880	3.132431	20.06814
36	0.039173	35.94436	15.05080	14.52515	12.78900	2.975454	18.71524

^a: S.E: standard errors.

Variable description: BSR: base rate; NSL: national lending to corporate sector; IP: corporate gross profits; INFL: inflation rate; BR: company birth; FRATE: business failure rate.

4. Summary and conclusion

This paper has considered whether macroeconomic factors can account for the observed fluctuations of UK business failures for the period of 1966–2003, and how monetary policies operate in a setting in which the monetary variable generates cyclical fluctuations through its effects on the real economy to business failures. The main finding is that differential variations in UK business failures result from a series of monetary policy shocks, compounded by credit policies and a system of market conditions in different economic regimes. This study confirms that economic deregulation, which began to take place in mid-1979, has had a considerable effect on economic activities and monetary policy operations. In particular, monetary policy shocks have been identified as important sources of fluctuations in business failures in the post-1980 period, just as they are important sources of fluctuations in inflation, credit and corporate performance. This demonstrates that market-based monetary policy has become a much more active tool of macroeconomic policy in the post-Thatcher regime. Moreover, both short-run and long-run effects of inflation shocks indicate that high inflation, which increases the cost of production and debt-servicing, and

hence reduce the company cash flows, will result in a rise in failure rates. This association between business failures and inflation provides evidence for the argument that inflation is costly. Unlike some previous studies (Hudson, 1987; Platt and Platt, 1994; Vlieghe, 2001), which did not examine the dynamic impact of business incorporations on business failures, this study has separated the short-run effect of the birth rate shock from its medium-term and long-term effects on failure rates, showing that the birth rate shock produces the ‘honeymoon effect’ within the first few periods of business establishments, while in the medium and long run business failures increase as a consequence of a rise in new business incorporations. Importantly, the results clearly show that the shocks to business failures can generate large fluctuations in interest rates, credit, inflation and profits, suggesting the potential severity of economic and social consequences of sharp rises in company failures, and the inexorable link of corporate distress and failures with financial stability and economic growth.

The paper’s findings carry important policy implications that are related to the efficient conduct of monetary policy in the course of financial deregulation, the survival of firms in distress and financial-driven business cycles. Direct controls were rejected by the Thatcher regime on the grounds of their distortionary impact on the banking sector: they reduced the efficiency of and competition among the financial institutions and produced disintermediation. The reform measures, with focus on the reduction in government regulation and increase in reliance on market determined outcomes, the enhanced role of monetary policy in adjusting the real economy, the rise of the “independent” central bank, and, more importantly, well-functioning social and political institutions, in which financial markets deliver socially desirable market outcomes, led to the monetary policy manipulations based on market rules with rational reactions to the symbols of policy adjustments produced by the policy-makers. Following the Thatcher doctrine, many other

nations, such as in Asia, experienced the similar financial reform in 1980s and 1990s, but the reform process was severely hampered by the outbreak of the financial crisis in 1997. The financial crisis has revealed tensions between the growth and the domestic policy-making processes and market-based mechanism and malfunctions of institutions (Gray and Stone, 1999). The nature of the continuing tendency of government regulations and protections throughout the region to guide capital flows, especially in Korea and Thailand, is not compatible with the fundamental characteristics of the competitive financial markets. The situations are even deteriorating in China, India and Korea with highly regulated financial systems, as the value destruction is caused by many poor investment decisions, and a huge amount of bad debts has been accumulated *ex post*, which is threatening the banking system (Beim, 2002). Monetary policy operations in these countries faced with not only the problems of aggregates, but also the conflicts between the marketisation reform of macro-control mechanism of monetary policy and the traditional economic system. This suggests that they need not only to perfect market-based instruments of monetary policy, but also to create the institutional conditions and the microeconomic foundations gradually so that these instruments can function effectively in predicting future fluctuations in real sector and maintaining macroeconomic stability.

The paper documents the central role that monetary policy has played in the business establishment and continuance. Most of the firms in distress are small and medium-sized firms (SMEs) (Altman, 1983; Hudson, 1987). When monetary policy is contractionary, the quantity of loans supplied to firms will shrink. The SMEs, who are bank-dependent, cut their production more than their less bank-dependent counterparts. This situation can be aggravated by informational asymmetries (as in Stiglitz and Weiss, 1981) and can be made even worse by the imperfect substitutes for bank credit in financial markets (Bernanke and Blinder, 1992; Gertler and Gilchrist, 1993; Bernanke et al, 1996). Therefore, to the extent

that these borrowers are bank-dependent, the reduced supply of loans can result in an increase in business failures, thereby depress the economy. Since macroeconomic conditions are critical to the existence of marginal firms, this study suggests that the policy reaction to the ‘credit rationing’ problem should be accommodating. For instance, some special loan guarantee schemes activated during the recessive periods may be necessary to redress the perceived flaw in the credit market, which would otherwise amplify the effects of a given policy shift on business failures. In addition, the results indicate that new business incorporations would lead to an increase in future business failures. Some previous studies (Altman, 1983; Hudson, 1987; Dun and Bradstreet, 1994) have also noted that firms are most likely to fail within three to five years of incorporation. An examination of national policies is advised to focus on improving the business climate in the economy, in which the new firms are encouraged to start and develop. Furthermore, this study reveals the links between corporate balance sheets and the macroeconomy, providing a potential suggestion that the financial fragility of corporate sector in the worsening economic environment may play a role in triggering the financial and monetary instability as well as deepening and prolonging recessions. The recent Asian crisis has illustrated the contribution of the corporate financial structure and credit market imperfections to the depth and duration of the economic recessions (Hussain and Wihlborg, 1999). It is suggested that the important role of financial distress in the economic fluctuations and in the propagation of recessions deserves further attention. Specifically, what are the mechanisms of financial distress under market imperfections over the actual business cycle? Future researches on financial-driven business cycle modelling are much sought for.

Appendices

1. Granger-causality tests

Vector autoregression models allow for the convenient testing of Granger-causality between variables to indicate whether lags of x contain information useful for predicting y (Hendry and Doornick, 1999). In Table 5, we report the p -values of the Granger-causality tests of the VECM under the null hypothesis that there is no causality. The dependent variables are listed at the top of each column, and the explanatory variables are listed on the left-hand side of each row. Using the 5 percent significance level as a benchmark, the first sub-sample results in the upper panel of the table suggest that credit and the inflation rate Granger-cause the failure rate and the birth rate, with the latter Granger-causing the failure rate in the pre-1980 period. The results for the post-1980 period is shown in the lower panel of the table, suggesting that the interest rate predict the failure rate as do the birth rate, while credit, the inflation rate and profits Granger-cause the birth rate. These results may indicate that monetary policy was not working effectively through the interest rate in the pre-1980 period. This may be attributable to two reasons: first, the oil price shock in the mid-1970s produced a large, adverse impact upon the UK economy; second, credit controls on loan allocations were one of the main instruments of macroeconomic adjustment, so that the banking system was not as efficient in channelling funds to the corporate sector as had been expected. However in the post-1980 period, when large-scale privatisation was carried out and government controls were reduced, the interest rate became the more reliant instrument in macroeconomic adjustment, so that monetary policy came to play an increasingly effective part in the real economy.

Table 5. Granger-causality test (p-value)

	FRATE ^a	BSR	BR	NSL	INFL	IP
Pre-1980 period						
FRATE	-	0.065	0.678	0.013	0.320	0.079
BSR	0.267	-	0.385	0.111	0.118	0.068
BR	0.008	0.274	-	0.007	0.046	0.0009
NSL	0.031	0.007	0.018	-	0.029	0.013
INFL	0.054	0.041	0.051	0.728	-	0.041
IP	0.729	0.826	0.579	0.807	0.069	-
Post-1980 period						
FRATE	-	0.012	0.111	0.126	0.170	0.0006
BSR	0.006	-	0.128	0.029	0.036	0.002
BR	0.016	0.411	-	0.466	0.639	0.305
NSL	0.378	0.087	0.017	-	0.0001	0.040
INFL	0.305	0.065	0.034	0.187	-	0.00001
IP	0.052	0.829	0.059	0.069	0.023	-

^a: The dependent variables are listed at the top of each column, and the explanatory variables are listed on the left-hand side of each row.

Variable description: FRATE: business failure rate; BSR: base rate; BR: company birth; NSL: national lending to corporate sector; INFL: inflation rate; IP: corporate gross profits.

The general message to be taken from the Granger-causality tests confirms that the basic model chosen is sensible and that the splitting of the whole period into two sub-sample periods seems to capture the changes in the real economy and the financial sector in different regimes.

2. Data definitions and sources

FRATE*	: business failure rate = total number of liquidations/total number of registrations in the UK (Source: Companies House, DTI)
BR	: company birth rate = total number of new registrations/total number of registrations in the UK (Source: Companies House, DTI)
BSR	: commercial banks' base rate (Source: Bank of England)
NSL	: national sterling lending to corporate sector (Source: Bank of England)
IP	: corporate gross profits used as a proxy for output, as the corporate output data is not available. (Source: Datastream)
INFL	: inflation rate (Source: Datastream)

All the data have been seasonally adjusted using X12ARIMA. BSR, NSL and IP have been deflated by the GDP deflator based on 1995 constant price.

* Business failures analysed in this study are compulsory liquidation winding-up orders made by the courts, and creditors' voluntary liquidations registered at Companies House in England, Wales and Scotland. Business failures are here used with a narrow definition in the following two aspects. 'Liquidation' is an insolvency procedure, which applies to companies and partnerships. However, 'business' can refer to a sole trader (as opposed to company). Liquidation is a formal process carried out either as a compulsory winding-up by the court or creditors'/creditors' voluntary liquidations. However, companies can fail without going into liquidation. They can cease trading and then apply to be dissolved.

Normally if a company is in the process of either compulsory liquidation winding-up orders or creditors' voluntary liquidations, the liquidation process cannot be stopped in the normal case; any employees will be dismissed and the assets and premises secured, and the manager will lose control of the company's business, assets and property. When the winding-up (the legal proceedings) is complete, the company will usually be dissolved 3 months later. It then ceases to exist. We, therefore, refer to 'liquidations' as business failures in a more strict sense in this paper.

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Figure 3. Responses of failure rates and birth rates to monetary and non-policy shocks

Responses to one S.D. innovation

Impulse responses of failure rates

Impulse responses of birth rates

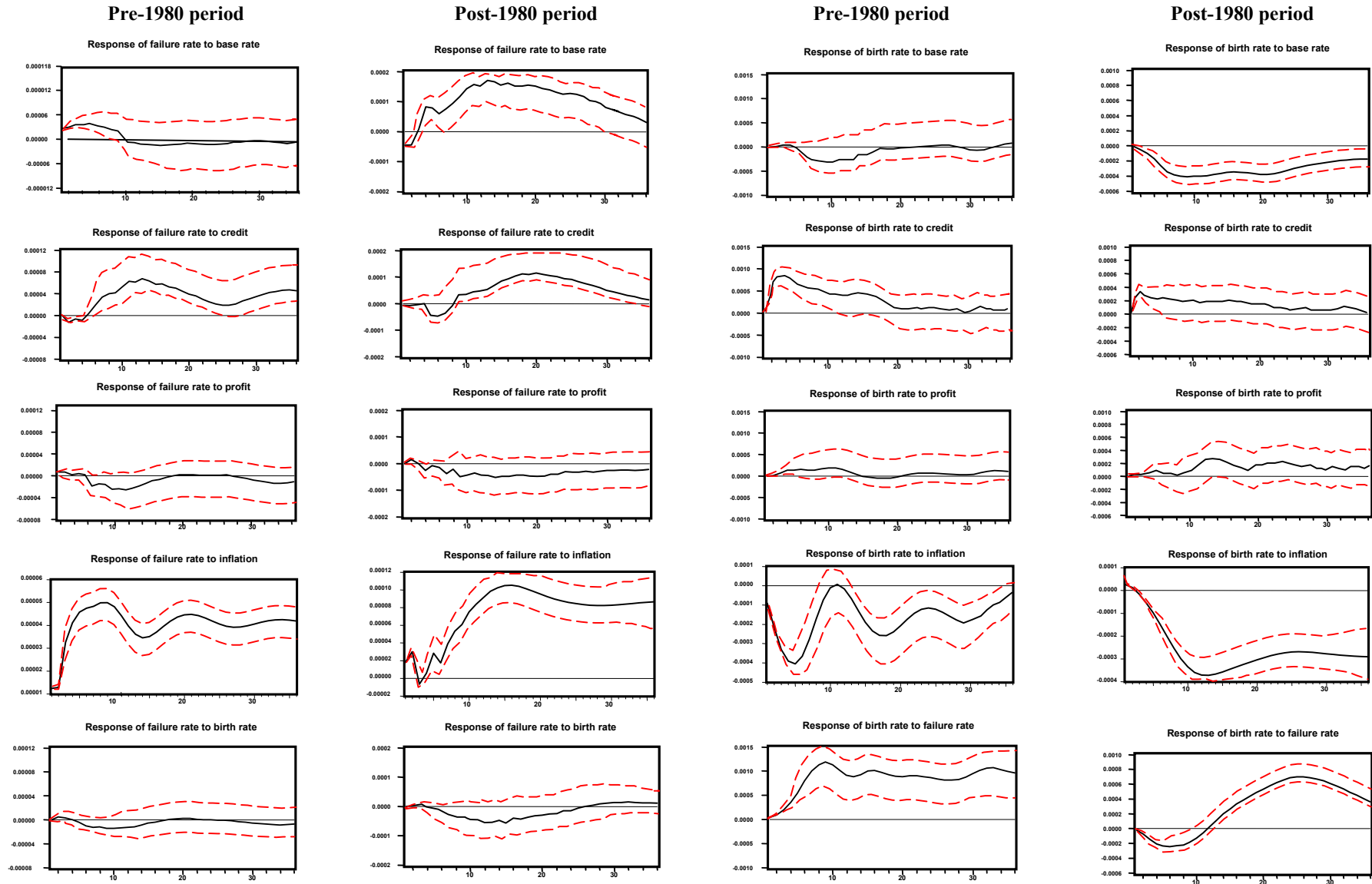


Figure 4. Responses to failure rate shocks

Responses to one S.D. innovation

