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Post-Independence India: A Case of Finance-Led Industrialization? *

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Abstract

This paper examines whether financial intermediaries have played a leading role in influencing India's economic performance. After describing the evolution and functions of the financial sector, we construct a set of vector autoregressive and vector error correction models to evaluate the strength and direction of the links between measures of formal intermediation and various economic aggregates. The results suggest that (i) the financial sector was instrumental not only in promoting aggregate investment and output, but also in the steady shift toward industry that has characterized India's development; (ii) the operative channel was one of debt accumulation rather than improvements in total factor productivity; and (iii) its contributions went beyond the passive support of fiscal policy.

Keywords: finance, India, industrialization, VAR, VECM.

JEL categories: O11, O16, O53, G20

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1. Introduction

The thesis that financial development can influence economic growth and structural change has received strong theoretical underpinnings from general equilibrium analyses that identify two distinct, yet complementary channels.[1] The first, sometimes called the "total factor productivity" (TFP) channel, emphasizes the role of innovative financial technologies in ameliorating the informational asymmetries that hinder the efficient allocation of funds and the monitoring of the resulting projects (Townsend, 1979; Greenwood and Jovanovic, 1990; King and Levine, 1993b). The other channel, which is based on the "debt accumulation" hypothesis of Gurley and Shaw (1955) and formalized more recently by Bencivenga and Smith (1991) and Rousseau (1998), focuses on the spread of organized finance at the expense of self-finance and the former's ability to overcome indivisibilities through the mobilization of otherwise unproductive resources.

Finding a strong empirical link from the financial sector to growth and investment in any individual country is, however, by no means a foregone conclusion. King and Levine (1993a,b), for example, impose homogeneity restrictions on the effects of finance across observations, and find a robust correlation between initial financial conditions and subsequent output growth for a cross-section of more than 80 countries. As such, they do not address differences in these effects across countries or their evolution over time. Cross-country regressions are, moreover, beset by other problems, including sensitivity to the set of conditioning variables and the difficulties of drawing correct inferences when testing for convergence or of interpreting the results when growth paths are not stable.[2] Time series studies of a selection of countries by Jung (1986) and Demetriades and Hussein (1996) yield more

[1] These links were posited as early as 1911 in the writings of Joseph Schumpeter, and were later refined considerably in seminal contributions by Gurley and Shaw (1955), Goldsmith (1969), McKinnon (1973) and Shaw (1973).

[2] For a succinct discussion of these issues, see Arestis and Demetriades (1997).

qualified conclusions: not only do the patterns of causality differ significantly, but also the evidence of a unidirectional link from finance to output is generally weak. On the latter point, Rousseau and Wachtel (1998), using a richer set of financial variables, present more encouraging evidence for the Anglo-American countries prior to the Great Depression. As a group, these contributions highlight the importance of undertaking studies of individual countries using a diverse set of financial variables for specific periods of history to further our understanding of the finance-growth nexus.

This paper pursues the latter approach in the case of India, exploiting the fact that an extensive set of measures of her economic performance is available for a much longer span than that commonly used in studies of sets of countries. Another salient advantage of focusing exclusively on one country is that the econometric findings can be related to the prevailing institutional structure. With its system of industrial and import licensing, which worked in tandem with the directed lending of resources mobilized by the financial sector, some of India's allocative mechanisms have been far removed from the textbook case. In describing the channels through which innovations and institutional changes in India's intermediating sector may have affected economic performance over the past half-century, our story therefore differs from accounts that emphasize the use and generation of information by financial intermediaries. India's financial sector was heavily engaged in mobilizing resources for the public sector, while the quality of lending largely depended on the decisions of other agencies. Thus, our analysis of India's financial system can be viewed primarily as a case study of the "debt accumulation" hypothesis.

We explore the channels through which the financial sector played an enabling role in India's economic development using vector autoregressive (VAR) and vector error correction (VECM) models.[3] The evidence strongly supports our hypothesis that investment, aggregate output and

[3] Bhattacharya (1995) applies a similar approach to estimating a money demand function for India over a similar time period.

structural change (as measured by the share of the secondary sector in NDP) were "finance-enabled", as opposed to being driven by public spending. We must emphasize, however, that we do not address the question of whether India's economic performance would have been better under more market-oriented policies. Rather, we emphasize the consequences of the government's success in greatly increasing the size of the formal financial sector over the post-Independence period.

In Section 2, we sketch the relevant features of India's financial and economic development since 1951, paying attention to the economic strategy that has been pursued and to the institutional setting and climate in which the financial sector has emerged in its present form. We also present some evidence on the course of TFP in organized manufacturing and on the efficiency of aggregate investment. Section 3 describes the financial and real sector variables that we use in the empirical analysis. Section 4 identifies long-run relationships among these indicators and uses these findings to build VAR and VECM models that reveal patterns of statistical causality and trace the dynamic responses of the economy to financial shocks. Our conclusions are drawn together in Section 5.

2. The financial sector since Independence

The belief in the efficacy of state ownership and planning that held sway in India's governments until a decade ago[4] underpinned the aim of establishing control over the "commanding heights" of the economy, with agriculture and residual parts of the secondary and tertiary sectors remaining in private hands. In such an economic system, the functions performed by financial institutions in pure market economies, as identified and analyzed in the theoretical literature, are largely the preserve of other agencies. First, pooling resources to overcome indivisibilities in investment (McKinnon, 1973; Freeman, 1986) can be accomplished perfectly well by collecting taxes, and then turning over the

[4] For a thoughtful account of India's macroeconomic history for much of the post-Independence period, see Joshi and Little (1994).

proceeds to the planning commission and certain spending ministries. The same applies to redirecting savings away from safe, liquid placements yielding low expected returns toward risky, illiquid ones that promise high expected returns (Bencivenga and Smith, 1991). Second, the task of acquiring information about promising projects, which financial intermediaries can attempt to acquire by sampling to ascertain the climate for high returns (Greenwood and Jovanovic, 1990), or by inducing investors to reveal privately held knowledge (Boyd and Prescott, 1986), lies in the planning and licensing agencies' bailiwick. This is not to claim that the latter have performed these tasks well, but rather to point out that the direct influence of India's financial sector over the so-called TFP channel was probably rather limited. In fact, the best-known series of TFP in the organized manufacturing sector, namely, Ahluwalia's (1991), which covers the period 1959-60 to 1985-86, suggests, if anything, a downward drift (see Fig. 1). For the economy as a whole, the only available lengthy series that may reflect the influence of financial intermediaries is the incremental output-capital ratio (IOCR). As can be seen from Fig. 2, this indicator fluctuates widely, but without apparent drift. On this evidence, therefore, one should look elsewhere for the ways in which the mobilization and allocation of savings affected India's growth.

What, then, was the role of the financial sector? Ideally, in such a framework, to ratify and support the allocative decisions taken by other state agencies. In practice, of course, India's financial institutions enjoyed some influence over the allocation of loanable funds; for agriculture and the small-scale sector comprised a large part of the economy. There was also the task of mobilizing finance for government undertakings in general, a task rendered all the more important by the need to use seigniorage to supplement tax revenues and the rather meager surpluses of public sector enterprises. Since the economy was far from completely monetized in the early 1950s, the government was presented with a once-and-for-all opportunity to combine seigniorage with such mobilization. Exploiting it would amount to using the so-called debt accumulation channel, as elucidated by Gurley and Shaw (1955).

Turning to the institutions themselves, the Reserve Bank of India (RBI) enjoyed little independence until 1997 and was constitutionally obliged to supply the government with credit upon demand. It has used the instruments at its disposal -- primarily the cash reserve (CRR) and statutory liquidity (SLR) ratios -- to control inflation and to facilitate the government's influence over credit allocations, the SLR stipulating the proportion of deposits that banks must hold in the form of government and other approved securities. Public development banks, a number of which were established and consolidated between 1955 and 1985, have had a statutory claim on loanable funds from commercial banks at controlled interest rates, which were often negative in real terms. Since commercial banks tapped households for funds, this kept deposit rates low. In an important move, the government further extended its control over credit by nationalizing the commercial banks in 1969 and the insurance companies in 1972.

Given the pent-up demand for deposit banking, the forced spread of branch offices into rural areas following nationalization was a form of financial development that mobilized private savings to serve the government's purposes. The number of rural and semi-urban branches rose fourfold between 1969 and 1981, and then almost doubled again to reach 46, 000 in 1995 (RBI, 1998, Table 1). In 1981, deposits therein were about twice the level of outstanding credit to rural borrowers (Binswanger and Khandker, 1995, p. 240). For branches in all locations, the said ratio rose from about 1.5 in 1981 to 1.8 in 1995 (RBI, 1995, Table 4). In this connection, Demetriades and Luintel (1997) find not only that the population density of bank branches is cointegrated with the ratio of bank deposits to nominal GDP, but also that it plays an important role in the dynamic behavior of that measure of financial deepening.

In the light of this account, and anticipating the principal result of our econometric analysis, we offer the following sketch of a mechanism in which finance played an enabling role in India's development. At the first stage, the government decides to step up investment, but without corresponding increases in taxation, thereby bringing the RBI into play. At the second stage, the RBI must, by law, grant the government the credit it desires, and so monetize the shortfall. This introduces the third stage, in which the CRR and SLR play a central role in clawing back and allocating the resulting increase in high powered money.[5] At the fourth stage, these transactions manifest themselves in the assets of the banking system and other variables used in the econometric analysis. At the final stage, the investment pays off in the form of additional NDP, despite various inefficiencies in the allocation of funds among competing projects.

Before we proceed to the formal analysis, it is important to note that the organized financial sector has coexisted with a network of informal moneylending, which, despite the government's efforts to supplant it, continues to be important, especially in rural areas. The exact size of the informal sector is hard to estimate, yet Acharya and Madhur (1983) present evidence that monetary stringency may have affected the volume of credit similarly in both sectors. For this reason, we believe that our focus on the formal sector, which is forced on us by the availability of data, might still capture relationships between real activity and truer measures of financial intermediation.

3. Measures of financial and macroeconomic development

The measures of financial development that we use in the study are the domestic assets of deposit money banks (DMBDA), total domestic credit excluding credit to money banks (DCRED), and credit allocated to the private sector (PSCR), all expressed in per capita terms at 1981 prices.[6] DMBDA reflects the size and possibly the sophistication of India's most important formal

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[5] The CRR rose from 5% in the 1970s to its legal limit of 15% in 1991, with an additional, incremental requirement of 10% in 1991. The SLR rose from 25% in 1970 to 38.5% in 1991. At the margin, therefore, the government mopped up 63.5% of banking deposits in 1991 (Joshi and Little, 1996).

[6] These aggregates are from the December 1997 release of *International Financial Statistics*, using the deflator for the new NDP series from the Government of India's *National Accounts Statistics*.

intermediaries. The broader measure DCRED captures the throughput of the financial system generally and includes the lending activities of non-deposit money banks, insurance companies, development banks and credit cooperatives. Both DMBDA and DCRED measure the volume of credit allocated by the formal financial sector, but are flawed measures of efficiency in that they do not reflect how the sectoral distribution of loans affected the returns to investment. For example, large loans by banks that channel savings to the public sector appear as balance sheet assets and account for a significant part of the DMBDA aggregate, yet the public sector allocations may arise from primitive financial technologies that prevent funds from reaching the most promising projects. We cannot adequately address this potential problem with our broad financial measures, but we do examine the PSCR variable, which excludes credit granted to the public sector.

We also examine whether these measures of financial development are simply proxies for real per capita government expenditure (GOV).[7] One might expect GOV to behave similarly to the above measures if the banking sector has served primarily as an instrument of fiscal policy.[8] On the other hand, evidence that GOV affects output differently from other financial aggregates would support the contention that banks did more than just passively supply the public sector's financial needs. Since public investment is a large component of total investment and government expenditure, we can best assess the role of consumption expenditure in inducing investment by removing the investment component from GOV, thereby yielding the series GOVC.

Turning to the real sector, we use the new series for real per capita net domestic product (NDP)

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[7] GOV is the sum of government final consumption expenditure, public sector gross fixed capital formation and the change in the stocks held by the public sector. These data were taken from the 1997 edition of the EPW's *National Accounts Statistics of India*.

[8] Contemporaneous cross-correlations for GOV of 0.772 with DMBDA, 0.758 with DCRED, and 0.815 with PSCR (all data in real, per capita, log levels) are indicative of considerable co-movement among these quantities.

from the Government of India's *National Accounts Statistics* and two other measures of general economic performance. First, in view of the discussion in Section 2 on the probable importance of a debt-accumulation channel, we include real per capita gross domestic fixed investment (IFS line 93E). Secondly, our interest in the impact of finance on the pace of industrialization, interpreted as structural change, leads us to consider models that include the share of NDP attributable to the secondary sector, which comprises manufacturing, construction, electricity, gas and water supply. This ratio measures the key intersectoral shift in output that occurred.

4. Selection and estimation of VAR and VECM systems

In this section, we develop reduced forms for evaluating the strength and direction of timing relationships between individual macroeconomic indicators and measures of financial development. Because the RBI has actively manipulated reserves and currency to effect short-term macroeconomic outcomes, and researchers such as McKinnon (1973) have stressed the complementarities between narrowly-defined money and capital accumulation in developing economies, we include real M1 in the baseline specification.[9] This isolates the role of medium and long-term lending in a set of credit aggregates that were influenced by short-term fluctuations in the specie base in the early years of the sample as well as the increasingly potent effects of monetary policy as the demand for checking transactions expanded rapidly after 1970. The resulting series of tri-variate VAR systems are the focus of our empirical investigation.

4.1. Stationarity and cointegration properties

To determine the appropriate framework for investigating long-run relationships and statistical

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[9] An alternative measure, the monetary base (M0), which might have some attractions in the absence of an extensive network of deposit banks, is not available over the full period of our study. In any case, our interest in the *effects* of monetary policy rather than its stance suggests that M1 is appropriate for inclusion in the conditioning set.

causality in our tri-variate systems, we first evaluate the stationarity properties of each series with Augmented Dickey-Fuller (ADF) and Phillips-Perron (1988) tests. The trending nature of the series suggests the inclusion of both a constant and trend in the test specifications, and we apply the log transformation prior to testing. Since the trajectories of the financial variables show a shift in slope in 1974, we also run the ADF tests in these cases, allowing for a single break in that year.[10] The null hypothesis of a unit root cannot be rejected for any of our macroeconomic and financial development indicators in levels for all of the tests, and the null is rejected for first differences. We therefore choose to treat all series as I(1) (i.e., as difference stationary) in our VAR models.

It is important to ensure that the statistics which we compute for causality testing in our VARs conform to standard distributions. Here, Sims, Stock and Watson (1990) have shown that Wald tests for block exclusion in tri-variate systems with a single cointegrating relationship are asymptotically distributed as chi-square and thus valid for Granger-causal inference.[11] We thus compute a series of Johansen (1991) tests to evaluate the cointegration properties of each system and determine the number of cointegrating relationships. The results indicate that our data conform to the above case for all eleven of the systems that we consider, and so we proceed to work with VARs in levels.[12] The cointegrated nature of our systems also encourages us to use VECMs to estimate the speeds with which the variables in each system adjust to deviations from their long-run equilibrium relationships.

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[10] The ADF tests use three lags of the data based on the Akaike and Schwartz criteria. The log transformation renders the deterministic components in our data more nearly linear. Since the trend breaks in 1974 are clear, we choose Perron's (1989) test rather than a data-determined alternative.

[11] Toda and Phillips (1993) show that the asymptotic distributions of block exclusion tests in higher dimensional systems are non-standard. In the absence of cointegration, the non-stationary variables in a VAR are normally differenced.

[12] We use nested likelihood ratio tests to determine the appropriate lag order for the tests. The Johansen specifications include an unrestricted intercept to allow for drift in the non-stationary relationships. It is assumed that the drift in the cointegrating vector cancels with the drift in the short-run model to form a combined intercept. The full set of results is available from the authors.

4.2. Dynamics in the cointegrated systems

We begin the analysis of dynamics in the cointegrated systems with a series of tests for Granger non-causality in VARs that take the form

$$
\begin{aligned}
x_{1,t} &= a_{1,0} + \sum_{i=1}^{k} a_{1,i}\, x_{1,t-i} + \sum_{i=1}^{k} b_{1,i}\, x_{2,t-i} + \sum_{i=1}^{k} c_{1,i}\, x_{3,t-i} + u_{1,t} \\
x_{2,t} &= a_{2,0} + \sum_{i=1}^{k} a_{2,i}\, x_{1,t-i} + \sum_{i=1}^{k} b_{2,i}\, x_{2,t-i} + \sum_{i=1}^{k} c_{2,i}\, x_{3,t-i} + u_{2,t} \\
x_{3,t} &= a_{3,0} + \sum_{i=1}^{k} a_{3,i}\, x_{1,t-i} + \sum_{i=1}^{k} b_{3,i}\, x_{2,t-i} + \sum_{i=1}^{k} c_{3,i}\, x_{3,t-i} + u_{3,t}
\end{aligned}
\qquad \text{(1a,b,c)}
$$

where x_1 is a macroeconomic indicator, x_2 is narrow money, x_3 is a measure of financial development, and k is the lag length. To provide information on the direction of the causal effects, we report the algebraic sum of the regression coefficients on, respectively, each of the k lags of x_1, x_2 and x_3, and the significance level of the F-statistic for the restriction that corresponds to Granger non-causality, namely that

$$
\hat{l}_{j,i} = \hat{l}_{j,i+1} = \ldots = \hat{l}_{j,k} = 0; \qquad l = a, b, c; \quad j = 1, 2, 3. \qquad (2)
$$

We next compute the cumulative responses of the macroeconomic indicators to single, one percent shocks in the orthogonalized innovations to M1 and the financial development measures. These impulse response functions order the variables according to their relative exogeneity, with the financial variable placed first, M1 second, and the macroeconomic indicator last.

The finding of cointegration in a given system reflects a tendency for the macroeconomic, monetary and financial aggregates to move together. The signs on each element in the cointegrating vector indicate the directions of attractions that maintain long-run stationarity in each system, yet offer no information about the speeds with which the variables adjust to deviations from their common stochastic trend. We address this issue by estimating the error correction representation of each system.

This is obtained by reparameterizing the levels VAR in equation (1) so as to explicitly embed the stationary combination, which is the scalar product of the data in period *t*-1 and the cointegrating vector, in an otherwise standard VAR in *k*-1 first differences:

$$\Delta x_{1,t} = \mu_1 + \sum_{i=1}^{k-1}\gamma_{1,i}\,\Delta x_{1,t-i} + \sum_{i=1}^{k-1}\zeta_{1,i}\,\Delta x_{2,t-i} + \sum_{i=1}^{k-1}\theta_{1,i}\,\Delta x_{3,t-i} + \alpha_1\,(\beta_1 x_{1,t-1} + \beta_2 x_{2,t-1} + \beta_3 x_{3,t-1})$$

$$\Delta x_{2,t} = \mu_2 + \sum_{i=1}^{k-1}\gamma_{2,i}\,\Delta x_{1,t-i} + \sum_{i=1}^{k-1}\zeta_{2,i}\,\Delta x_{2,t-i} + \sum_{i=1}^{k-1}\theta_{2,i}\,\Delta x_{3,t-i} + \alpha_2\,(\beta_1 x_{1,t-1} + \beta_2 x_{2,t-1} + \beta_3 x_{3,t-1})$$

$$\Delta x_{3,t} = \mu_3 + \sum_{i=1}^{k-1}\gamma_{3,i}\,\Delta x_{1,t-i} + \sum_{i=1}^{k-1}\zeta_{3,i}\,\Delta x_{2,t-i} + \sum_{i=1}^{k-1}\theta_{3,i}\,\Delta x_{3,t-i} + \alpha_3\,(\beta_1 x_{1,t-1} + \beta_2 x_{2,t-1} + \beta_3 x_{3,t-1})$$

(3a,b,c)

with the x_i defined as in (1). The β_i are the elements of the cointegrating vector, and are used to build the stationary linear combination, or error correction term (ECT), which reflects the temporal status of the long-run relationship in the system. The ECT enters the model at a single lag. Since we do not impose restrictions on the speed of adjustment coefficients α_i and each equation in the system includes the same lagged variables on the right-hand side, equation-by-equation OLS is efficient for the estimation.

The sign and size of the estimated coefficient on the ECT in each equation reflect the direction and speed of adjustments in the dependent variable to temporary deviations from the long-run relationship summarized by the cointegrating vector. For example, a negative and significant coefficient on the ECT in equation (3a) would imply a positive response of the macroeconomic indicator to fluctuations that depress the value of the stationary combination. A negative loading on the financial variable in the cointegrating vector would identify increases in the quantity of finance as a possible source of such depressions, and would be consistent with a leading role for the financial variable in determining the long-run path of the macroeconomic aggregate. An insignificant ECT in equation (3c), on the other hand, would indicate the absence of any long-run adjustment of the financial measure to movements among the system's variables, including those initiated by increases in indicators of economic performance.[13]

Table 1 summarizes our findings for systems that include gross domestic fixed investment (INV) as the macroeconomic indicator. The VARs in the left-hand panel indicate that the financial variables lead investment, with Granger non-causality tests for equation (1a) that reject the null hypothesis at the 5% level or less. A lack of joint significance for lags of investment in the financial equations (1c) also suggests that the link is unidirectional. The impulse responses for the investment equations presented in Fig. 3 are large and persistent.[14]

For example, a 1% change in the orthogonalized error component attributable to innovations in DCRED is related to changes in INV of more than 1.1% after six years.[15] The error correction terms in the VECM models (right-hand panel of Table 1) are negative and significant at the 1% level in the

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[13] The low dimensionality of our systems permits inferences of this type about long-run "causality". These inferences are in most cases stronger than those based on the concept of weak exogeneity that Hall and Milne (1994), among others, have used effectively in higher dimensional contexts. For example, an insignificant adjustment coefficient α_i in equation (3c) is consistent with weak exogeneity of the financial variable (i.e., the equation for the financial variable does not contain information about the long-run parameters β); but this concept does not shed any light on the sources of perturbations that generate adjustments in the real side quantities.

[14] The plots in Fig. 3 depict the percentage changes in investment that result over a ten-year horizon from a 1% change in the orthogonalized innovation to each financial indicator. The financial variable is placed first, M1 second, and investment third. The impulse response function for an innovation in M1 was generated from the system that includes DMBDA as the financial variable. Using Monte Carlo integration, the thick solid lines plot the mean impulse responses that result from 5000 random draws from the posterior distribution of the coefficients in each system. The dotted lines are one-standard error bands. The same computations and analogous placement assumptions underlie the impulse responses that appear in Figs. 4-5 below.

[15] We note that the validity of our Granger tests, in light of the Sims, Stock and Watson result, does not depend upon stability of the underlying VAR. Nevertheless, the tendency of the impulse responses for this system and most others to decay gradually is consistent with stability. Since formal stability tests in relatively small samples such as ours are difficult to interpret and our primary interest lies in the sign and direction of statistical causation, we do not report such results here.

investment equations (3a). This suggests that reductions in the value of the stationary combination, including those generated by increases in finance (recall that the loadings on the financial development variables in the cointegrating vectors are negative), induce upward "corrections" in investment. In addition, only one of the three ECTs is significant at the 10% level or better in the finance equations (3c). Overall, these findings support the notion that increases in the throughput and possibly the efficiency of the financial sector have allowed productive projects to be undertaken that might otherwise have remained on the shelf.

That the financial variables are not mere proxies for government consumption (public investment being an important component of both total public spending and total investment) is established by the fact that GOVC does not Granger-cause INV. The Granger test and the impulse response function in the lower panel of Fig. 3 do indicate, however, a link in the reverse direction, on which we comment shortly. In addition, there is no evidence from the VECM that INV responds to perturbations in this system's long-run stationarity, though there is strong evidence that GOVC responds to such perturbations. These results suggest that, for all the regulation and repression of the financial system, at least some of the funds allocated by intermediaries to the financing of projects promoted the formation of long-lived (and perhaps productive) capital more effectively than did aggregate public consumption, although an unswerving Keynesian might argue otherwise. We are not, of course, claiming that financial repression was not damaging to India's development: Demetriades and Luintel (1997) conclude that the costs of such repression were indeed high, with the chain of effects running from repression to financial depth and thence to aggregate output.

Table 2 presents findings for systems that include NDP. The VARs again indicate statistical causality at the 5% level or less for all financial variables in the output equations with no evidence of feedback from output to additional finance. In these systems, however, the key linkages appear to lie in the short-run dynamics. Only the system with DCRED indicates a significant response of output to deviations from the long-run cointegrating relationship, and borderline at the 10% level at that. GOV does not quite Granger-cause NDP at the 5% level; here, too, NDP is unresponsive to deviations in the ECT in equation (3a) of the corresponding VECM. On the other hand, NDP does Granger-cause GOV, as one would expect if there is a high elasticity of expenditure with respect to tax collections, and the latter, in turn, are fairly elastic with respect to output.

The impulse responses shown in Fig. 4 confirm these conclusions in that there is neither a large nor a persistent response of NDP to innovations attributable to GOV, while two of the financial variables generate responses to NDP that become significantly positive after several years. Impulses in NDP also produce an initially sharp rise in government expenditure that then gradually decays.[16] This is consistent with the earlier finding that GOVC responds to fluctuations in INV with some delay (see Fig. 3) before slowly falling off.

An appropriate measure of industrialization and structural change is SEC/NDP, the results for which are set out in Table 3 and Fig. 5. DMBDA and PSCR Granger-cause the secondary sector's share at the 10% and 5% levels, respectively, which suggests that the financial sector also influenced the pace of India's shift from an economy based primarily on agriculture and natural resource extraction to one based more on industry.[17] The VECMs are consistent with a leading role for all three financial variables, but here the relationship is bidirectional for DMBDA and PSCR. The latter result suggests that the shift in the sectoral composition of output may have generated long-run changes in the demand for financial resources and services that induced an increase in the quantity of credit.

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[16] It is still interesting to note that none of the macroeconomic indicators generate even roughly similar responses among the financial variables.

[17] The primary sector, which includes agriculture, forestry and logging, fishing, mining and quarrying, saw its share in NDP decline fairly steadily from 58.3% in 1951 to 32.4% in 1995, with an annual average decline of 0.58% (Government of India, *National Accounts Statistics*).

Controls on India's financial system have been somewhat liberalized from the second half of the 1980s onwards, and this may have increased the potency of the channels through which growth was finance-led. At the same time, a rapid expansion in new stock market issues may have reduced the degree to which corporations relied on the banking sector. These structural changes raise questions about the extent to which our results are influenced by events in the last decade of the series. To explore this possibility, we estimated the VARs from 1951 to 1985 only. The results, which are not reported here, indicate that our qualitative findings are robust to this change in the sample period.[18]

Thus far, we have concentrated on the debt-accumulation channel. In view of the discussion in Section 2, the ideal would be to test for the presence of a TFP channel as an alternative. The best that can be done is to employ Ahluwalia's (1991) rather short series as a component of our tri-variate VARs.[19] That this series measures the performance of organized manufacturing is not a serious limitation in view of the fact that the licensing and financial system was designed to shape and further the development of that sector. In an important sense, therefore, Ahluwalia's series is a reflection of how well this allocative system actually worked. Our tests found no evidence that the financial aggregates had a significant effect upon the course of TFP in organized manufacturing, nor was there a link in the other direction.

5. Conclusions

On the evidence presented here, the activities of the financial sector have had an important

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[18] Specifically, the leading roles of PSCR in investment and DMBDA in SEC/NDP fell to the 10% level of significance. The role of total domestic credit in SEC/NDP was stronger in the shortened sample. Johansen tests continue to identify a single long-run relationship in each system.

[19] Although caution must be exercised in evaluating the stationarity properties of these systems, which include only 27 annual observations from 1960 to 1986, we note that ADF tests with a time trend are unable to reject the unit root hypothesis for this TFP measure. In addition, Johansen tests for systems that include TFP, M1 and either DMBDA, DCRED, or PSCR suggest that the systems are cointegrated with a single cointegrating relationship.

impact on India's post-Independence economic performance. First, the expansion of the financial sector has played an enabling role in promoting capital accumulation. Consistent with this enabling role, increases in key financial aggregates have preceded increases in both investment and aggregate output. Secondly, these aggregates appear to have led the shift in output toward industry. On the other hand, we uncover no evidence that the expansion of the financial sector had any influence on total factor productivity in organized manufacturing, which, given the nature of India's licensing and allocative system, is where one would expect to find its influence on allocative efficiency most clearly at work. In this respect, therefore, the evidence is consistent with Gurley and Shaw's (1955) "debt accumulation hypothesis".

Given the need to raise revenues through seigniorage and the incomplete monetization of the economy in earlier decades, it is tempting to think of India's financial system as having been a mere instrument of fiscal policy. So viewed, the nationalization of the banks in 1969 and of insurance in 1972 could be regarded as essential to this instrument's efficiency in mobilizing resources. On the expenditure side, however, our econometric results decisively reject the hypothesis that movements in the level of government spending preceded those in investment and output, in contrast to movements in the financial aggregates. This suggests that, in the Indian case, one may speak of finance-enabling development.

The main conclusion that we draw from our results is that financial development can promote economic growth and structural change even in an environment in which both industrial investment and financial activities are highly regulated. In doing so, we have not attempted the difficult task of estimating the effects that the financial system might have had on India's development had her governments chosen a more market-oriented strategy in general. Where policies towards the financial sector itself are concerned, for example, Demetriades and Luintel (1997) conclude that the costs of financial repression in terms of foregone aggregate output were substantial, a finding which is not necessarily at odds with ours. For India, at least, it appears that a particular form of financial development, whatever its flaws, has played an important role in the industrialization process.

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Table 1
Error correction and VAR estimates for systems with gross domestic fixed investment, M1, and a measure of financial development[a]

Financial Measure	Levels VAR Granger Tests					Error Correction Model		
K=3	Eq.	INV	M1	FIN	R^2	Eq.	ECT	R^2
DMBDA	1a	0.678	0.043	0.185	0.990	3a	-0.306	0.535
(1, -0.233, -0.534)		(0.000)	(0.086)	(0.013)			(0.001)	
	1b	-0.104	0.901	0.110	0.950	3b	-0.027	0.248
		(0.443)	(0.000)	(0.613)			(0.793)	
	1c	-0.104	-0.138	1.098	0.994	3c	-0.097	0.131
		(0.577)	(0.553)	(0.000)			(0.375)	
DCRED	1a	0.670	0.083	0.204	0.990	3a	-0.334	0.502
(1, -0.291, -0.616)		(0.000)	(0.117)	(0.040)			(0.006)	
	1b	-0.136	0.901	0.151	0.952	3b	-0.007	0.280
		(0.162)	(0.000)	(0.402)			(0.953)	
	1c	-0.020	-0.041	1.012	0.993	3c	-0.051	0.149
		(0.504)	(0.993)	(0.000)			(0.691)	
PSCR	1a	0.620	0.109	0.186	0.990	3a	-0.345	0.490
(1, -0.443, -0.437)		(0.000)	(0.075)	(0.046)			(0.002)	
	1b	-0.086	0.959	0.074	0.949	3b	0.004	0.252
		(0.662)	(0.000)	(0.798)			(0.970)	
	1c	-0.176	-0.197	1.130	0.995	3c	-0.214	0.273
		(0.256)	(0.284)	(0.000)			(0.087)	
GOVC	1a	0.953	0.179	-0.065	0.988	3a	-0.051	0.324
(1, -0.420, -0.954)		(0.000)	(0.083)	(0.537)			(0.705)	
	1b	0.021	0.990	0.008	0.952	3b	-0.004	0.303
		(0.287)	(0.000)	(0.389)			(0.973)	
	1c	0.479	-0.056	0.448	0.979	3c	0.471	0.361
		(0.024)	(0.091)	(0.012)			(0.004)	

[a] The systems include gross domestic fixed investment (INV), narrow money (M1) and a financial development indicator or GOVC listed at the left, all in real per capita log levels. Estimates of the normalized cointegrating vectors appear beneath the acronyms for the financial variables. The equation numbers correspond to those in the text, with (a), (b) and (c) employing investment, M1 and the financial measure as the respective dependent variables. The left panel reports the sum of the regression coefficients on INV, M1 and the financial variable in levels VARs with the significance level of the F-test for Granger non-causality in parentheses. The right panel reports the coefficient on the error correction term (ECT) in each equation with significance levels in parentheses. Each panel also reports the R^2 statistics. The VARs use three (K) lags of each variable and the reparameterized VECMs use two (K-1) lags in first differences.

Table 2
Error correction and VAR estimates for systems with net domestic product, M1, and a measure of financial development[a]

Financial Measure	Levels VAR Granger Tests					Error Correction Model		
K=2	Eq.	NDP	M1	FIN	R^2	Eq.	ECT	R^2
DMBDA	1a	0.764	0.026	0.059	0.979	3a	-0.149	0.240
(1, -0.563, -0.094)		(0.000)	(0.025)	(0.034)			(0.288)	
	1b	0.784	0.437	-0.037	0.957	3b	0.869	0.350
		(0.005)	(0.000)	(0.619)			(0.000)	
	1c	0.086	-0.224	1.032	0.994	3c	0.178	0.085
		(0.382)	(0.245)	(0.000)			(0.498)	
DCRED	1a	0.633	0.074	0.090	0.980	3a	-0.263	0.265
(1, -0.511, -0.124)		(0.001)	(0.016)	(0.015)			(0.098)	
	1b	0.909	0.410	-0.072	0.957	3b	1.002	0.360
		(0.004)	(0.001)	(0.460)			(0.000)	
	1c	-0.035	-0.055	1.011	0.993	3c	-0.028	0.089
		(0.457)	(0.929)	(0.000)			(0.922)	
PSCR	1a	0.798	0.053	0.035	0.979	3a	-0.158	0.281
(1, -0.552, -0.085)		(0.000)	(0.019)	(0.034)			(0.264)	
	1b	0.901	0.400	-0.054	0.958	3b	0.934	0.371
		(0.001)	(0.000)	(0.334)			(0.000)	
	1c	0.083	-0.287	1.031	0.994	3c	0.090	0.107
		(0.198)	(0.057)	(0.000)			(0.767)	
GOV	1a	0.999	-0.004	0.001	0.979	3a	-0.010	0.287
(1, -0.612, -0.105)		(0.000)	(0.028)	(0.057)			(0.902)	
	1b	1.025	0.376	-0.120	0.966	3b	0.478	0.348
		(0.000)	(0.000)	(0.010)			(0.002)	
	1c	0.418	-0.244	0.887	0.979	3c	-0.204	0.142
		(0.026)	(0.543)	(0.000)			(0.346)	

[a] See note for Table 1. The VARs use two (K) lags of the real per capita log of each variable and the reparameterized VECMs use one (K-1) lagged first difference.

Table 3
Error correction and VAR estimates for systems with the ratio of secondary sector product to net domestic product, M1, and a measure of financial development[a]

Financial Measure	Levels VAR Granger Tests					Error Correction Model		
K=3	Eq.	S/NDP	M1	FIN	R^2	Eq.	ECT	R^2
DMBDA (1, 0.328, -0.271)	1a	0.526 (0.002)	-0.162 (0.299)	0.122 (0.073)	0.945	3a	-0.519 (0.001)	0.363
	1b	-0.532 (0.032)	0.759 (0.000)	0.189 (0.057)	0.959	3b	-0.414 (0.051)	0.348
	1c	-0.392 (0.265)	-0.254 (0.268)	1.139 (0.000)	0.994	3c	-0.436 (0.058)	0.194
DCRED (1, 0.346, -0.331)	1a	0.488 (0.004)	-0.186 (0.243)	0.156 (0.139)	0.940	3a	-0.568 (0.003)	0.306
	1b	-0.646 (0.016)	0.707 (0.000)	0.259 (0.050)	0.959	3b	-0.577 (0.023)	0.380
	1c	-0.119 (0.644)	-0.105 (0.917)	1.042 (0.000)	0.993	3c	-0.195 (0.471)	0.122
PSCR (1, 0.280, -0.227)	1a	0.472 (0.005)	-0.104 (0.419)	0.108 (0.026)	0.947	3a	-0.512 (0.000)	0.414
	1b	-0.553 (0.069)	0.862 (0.000)	0.151 (0.106)	0.957	3b	-0.289 (0.164)	0.330
	1c	-0.496 (0.186)	-0.344 (0.040)	1.154 (0.000)	0.995	3c	0.686 (0.003)	0.339

[a] See note for Table 1. The VARs use three (K) lags of each variable in log levels and the reparameterized VECMs use two (K-1) lags in first differences.

Fig. 1. Index of total factor productivity in manufacturing, 1960-1986.

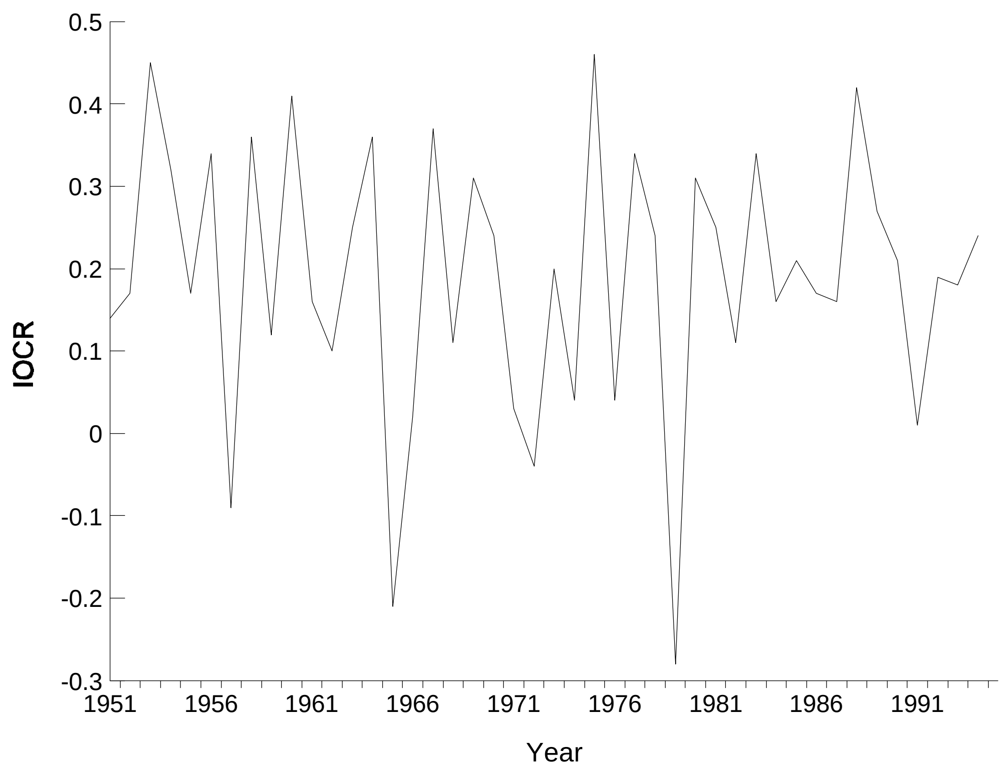

Fig. 2. Incremental output-capital ratio, 1951-1995.

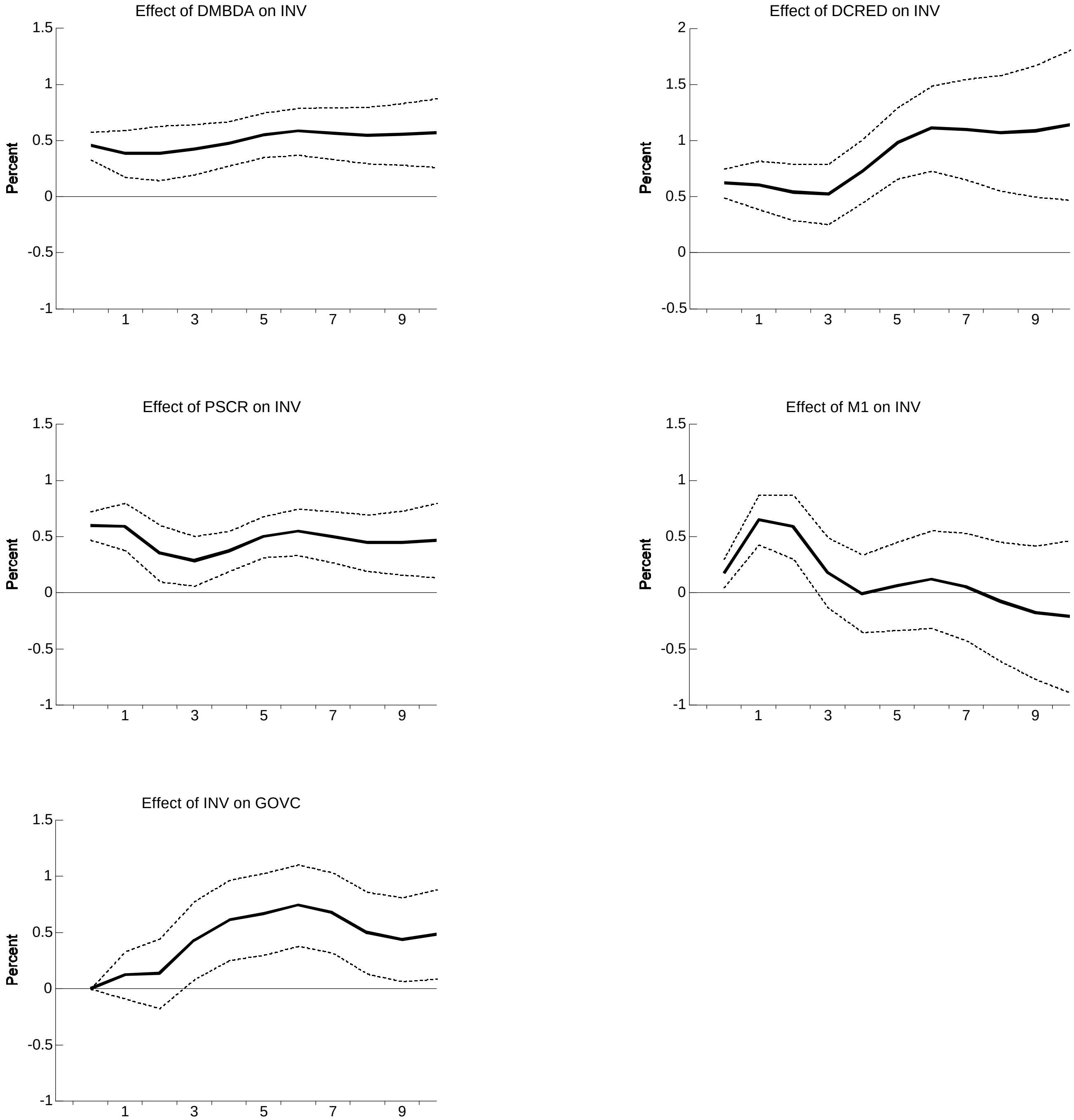

Fig. 3. Selected responses from systems with domestic fixed investment to 1% innovations.

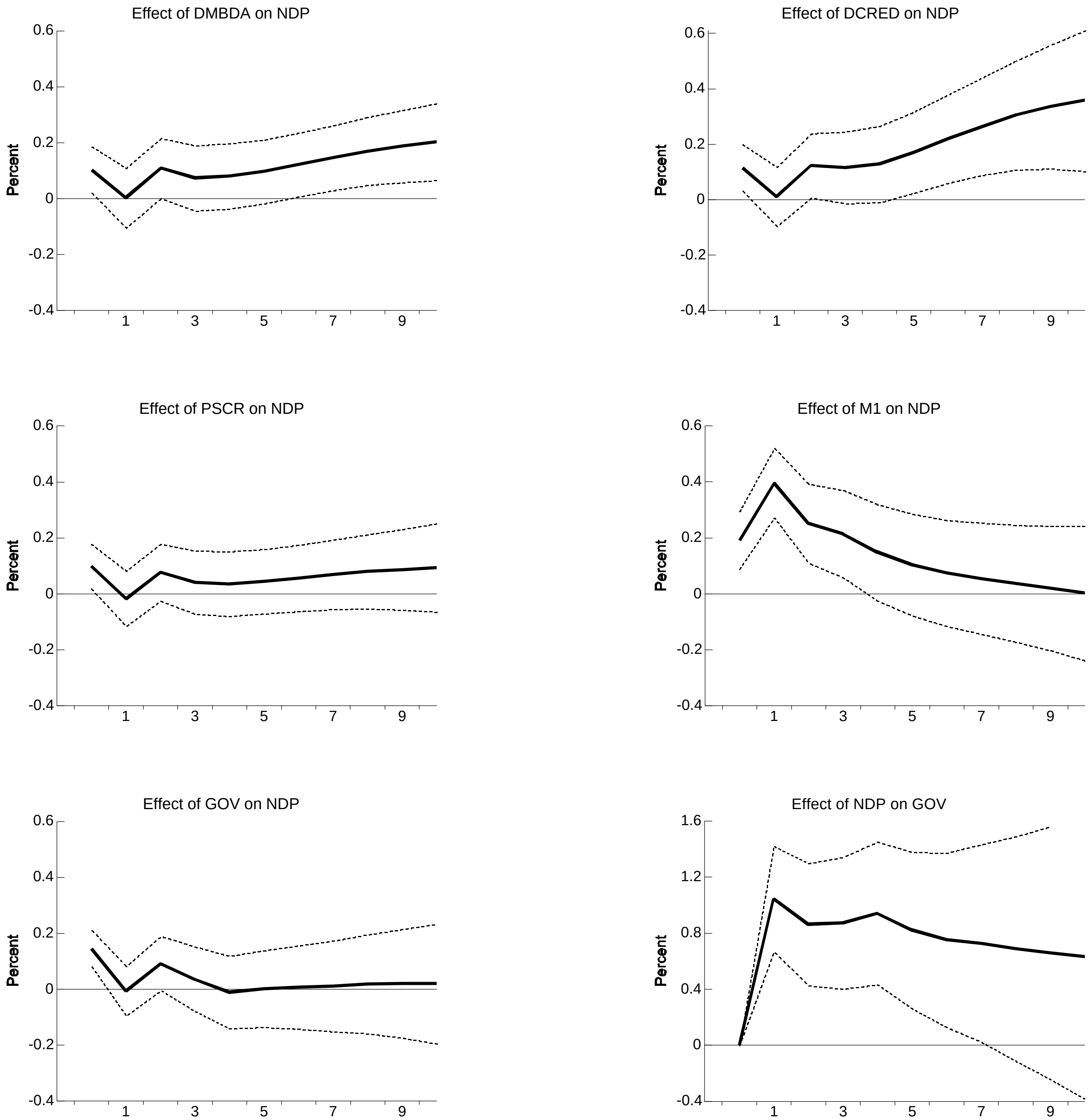

Fig. 4. Selected responses from systems with net domestic product to 1% innovations.

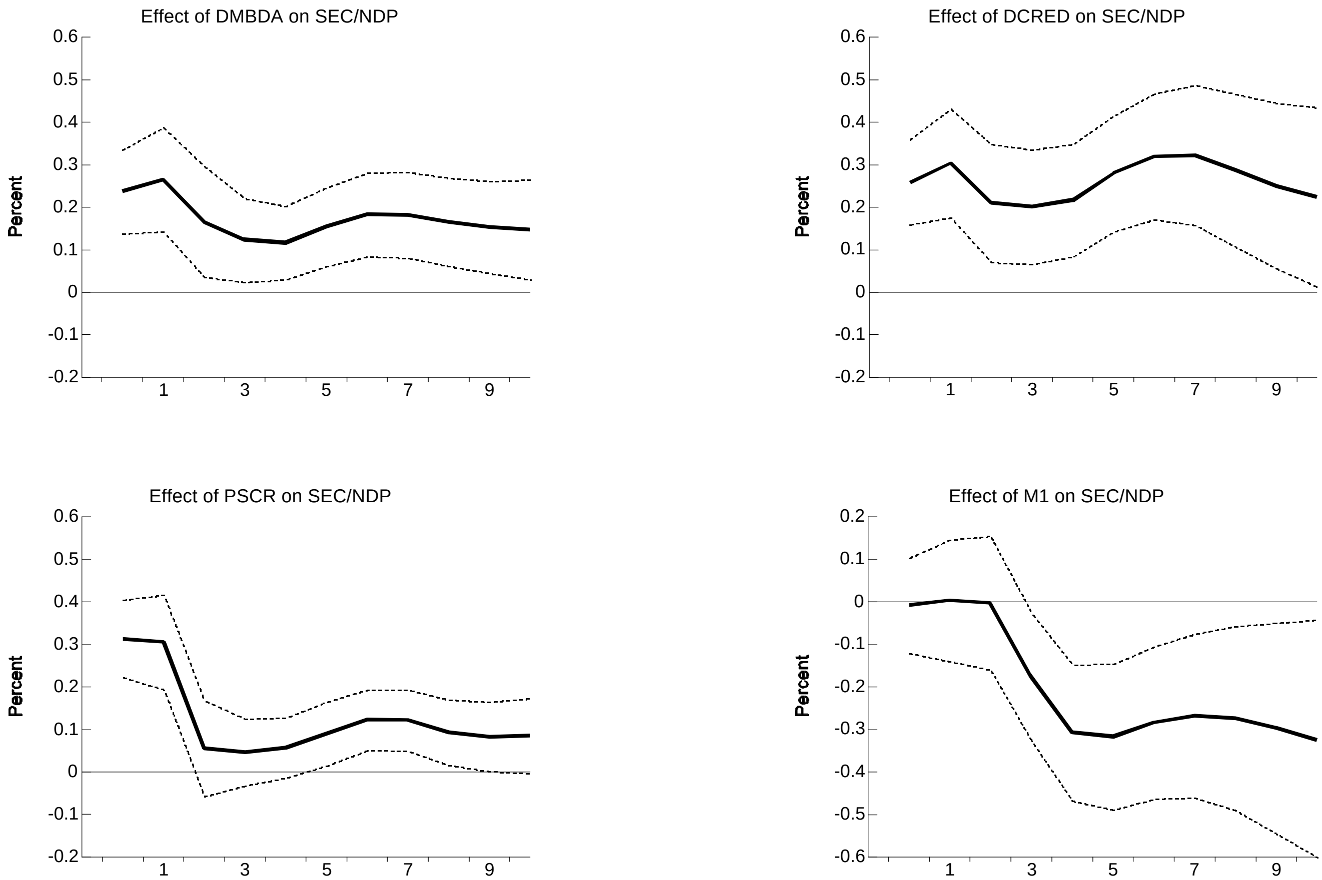

Fig. 5. Responses of SEC/NDP to 1% increases in financial indicators.