

The Differential Effects of Financial Development on India's Industrial Performance

Nitin GUPTA

The Arndt-Corden Department of Economics
Crawford School of Economics and Government
The Australian National University
Email: nitin.gupta@anu.edu.au

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Abstract

The paper aims to investigate the differential impact of increased financial development on industrial output, across state and industry categories. Using an unbalanced panel of 15 Indian states, 22 industries at the 2-digit level, and an 11-year period spanning 1992-2002, the paper's most novel contribution comes from hypothesising and testing for operating channels through which increased financial depth benefits output. It is concluded that financial depth facilitates increased use of contract labour by industries, which in turn mitigates the effects of industrial disputes and increases output. This beneficial impact is uniformly felt across the country, regardless of state-level labour regulations. However, financial depth has failed to directly benefit industries with the greatest need for external financing, i.e. those with moderate and high dependence on external sources of finance. Overall, increased financial depth alleviated the working capital constraints of firms, but not their investment constraints. The negative effects of the latter outweigh the positive effects of the former, and help explain the sharp deceleration of growth across industries categories. Finally, the paper makes the dual case for comprehensive labour reforms and for policies to improve quality of intermediation in Indian financial markets.

Keywords: Trade & Labour Market Interaction, Dispute Resolution, Industrial Policy, Manufacturing, Financial Markets

JEL Codes: F16, J52, L52, L60, O16

1. Introduction

1991 was a watershed year for India and its economy. External forces beyond its control (the first Gulf War and the collapse of the Soviet Union) compounded the problems created by four decades of inward looking economic policies. These problems came to a head with the balance of payments crisis, when India's foreign reserves dropped to levels worth only two weeks of imports. Having to approach the IMF for emergency loans, and to physically airlift the country's gold reserves to post collateral was an unprecedented national humiliation. More than anything else, it was final proof (if any was needed) that the Nehruvian model of development had failed, and that fundamental structural reforms were inevitable. It was against this dismal backdrop that the newly-elected government of P.V. Narasimha Rao initiated the necessary reforms. Significant as they were in turning away from the legacy of planned economic development, these reforms were nevertheless comparatively limited in scope and staggered over time, and reflected an immediate priority of addressing the balance of payments crisis. The limited nature of the reforms notwithstanding, they generated both great apprehensions and expectations. It is not hard to recall the common refrain in the early 1990s that large business houses, long the embodiment of inefficient business practices, would be unable to survive in the new competitive environment and therefore be swept away. On the other hand, reforms were perceived as the panacea to cure the country's economic ills and propel it into the 21st century. A review of the economic performance as it stood a decade after reforms paints a sobering picture.

Industrial output had stagnated by 1997, after experiencing initial spurts of fast growth immediately following the reforms. Table 1 below highlights the variability in this performance. Overall economic growth increased from only 1.3% in 1991-92 to over 7% in each of the three years 1994-96, before collapsing to 4.8% in 1997-98; this was followed by a something of a muted recovery in the end of the decade. Industrial performance was even more variable: the sector went from a contraction of 0.6% in 1991-92 to double digit growth in 1994 and 1995, before slowing down to 4.3% in 1997 and 3.7% in 1998. While it may be argued that the high growth rates in the early years of the decade are highly surprising due to the low base in 1991, the later drop is nevertheless noteworthy, and warrants investigation.

Table 1: Indian Economy: Some Indicators

	1991- 92	1992- 93	1993- 94	1994- 95	1995- 96	1996- 97	1997- 98	1998- 99	1999- 00	2000- 01	2001- 02	2002- 03
GDP Growth	1.3	5.1	5.9	7.3	7.3	7.8	4.8	6.5	6.1	4.4	5.8	4.0
Industrial Growth	-0.6	4	5.2	10.2	11.6	7.1	4.3	3.7	4.8	6.5	3.6	6.6
Agricultural Growth	-1.85	6.22	4.1	5.1	-1.1	10.1	-2.8	6.9	-0.10	-0.40	6.5	-8.0

GDP is at factor cost

At 1993-94 prices

Source: Planning Commission of India

The aim of this paper is to examine the interactions between the Credit Policy of October 1997, industrial disputes, and industries' dependence on external finance; and investigate the impact of these interactions on industrial performance in India. The primary focus of the analysis is whether the impact of increased financial depth on industrial output is conditional upon differences in state and industrial characteristics. A secondary goal is to determine the *relative importance* of labour conflict and dependence on external finance as operating channels through which benefits of financial development flow. The use of Credit Policy

itself represents a significant departure from the conventional explanations of post-reforms industrial performance. Almost all empirical work on Indian industries hitherto evaluates the impact of different elements of the 1991 reforms (specifically, trade liberalisation and industrial delicensing), with the underlying focus being one of a “before-and-after” nature. But the Credit Policy, which was the first major policy by the Reserve Bank of India after gaining independent control of the monetary policy, and had the stated aim of providing a fresh impetus to the flagging industrial sector, has received no attention whatsoever in the empirical literature.

The paper makes important contributions in the areas of industrial finance, labour market regulations, and how state-industry interactions affect industrial performance. Four main conclusions arise. First, the increased use of contract labour as an operating channel is validated – financial depth improves industrial output by fostering increased use of contract labour, which mitigates the effects of industrial disputes. Financial depth also impacts output by facilitating imports in industries most likely to be dependent on imported inputs. Collectively, both these effects represent indirect positive impacts of financial depth. Second, industries that stood to gain the most from increased financial depth, i.e. those with the greatest dependence on external sources of finance, have in fact fared the worst; financial depth thus failed to yield the expected direct benefit of facilitating capital accumulation. Third, to the extent that paying for wages and imports represent working capital needs of firms, increased financial depth alleviated the working capital constraints but not investment capital constraints. The context of poor overall industrial growth validates the greater importance of investment constraints relative to that of working capital constraints, and that policy efforts to improve industrial growth should focus more on alleviating the former. Finally, the results make a conclusive case for comprehensive labour reforms. A patchwork of pro-business amendments to labour laws can at best augment the benefits of financial depth, but they can neither take the place of systematic labour reforms, nor are their effects strong enough to overcome the negative impacts when financial reforms prove ineffective.

The plan of the paper is as follows: Section 2 presents a brief historical perspective; Section 3 summarises the relevant literature; Section 4 describes the key gaps in the literature and the intended contributions of this paper. Section 5 gives the methodological framework, including explanations of data variables (including modifications) and their sources. Section 6 gives the results, while Section 7 concludes, along with a brief overall discussion and policy prescriptions.

2. A brief historical perspective

Since early 1950s, Indian industrial policies were guided by ideas of self-reliance on one hand, and balanced and equitable industrial development on the other. At the time of Independence, not only was the industrial base low, but the country lacked the ability to manufacture capital goods needed to kick-start the industrial resurgence. Addressing both problems simultaneously created a “chicken-and-egg” conundrum for policy-makers. The thinking underlying this self-reliance philosophy, itself a direct legacy of the Indian freedom struggle, glorified the idea of independence in every level of the industrial value chain. According to this thinking, importing capital goods would take care of the problem of low industrial growth, but would in the process create new dependence on foreign countries,

something that policy-makers sought to avoid.¹ An import substitution strategy was adopted to promote domestic production of capital goods, while tariffs were kept at high enough levels to make capital imports economically infeasible. Industrial licensing resulted from the stated goals of industrial development, which was both balanced (removed regional disparities) and equitable (protection for labour and new industrial undertakings). The licensing system was intended, among other things, to prevent concentration of industrial activity in specific regions, and prevent situations where large industrial setups were able to stifle smaller and/or newer industrial enterprises. However, the system of industrial licensing came to be grossly abused over time, primarily by large business houses (Datt and Sundharam, 1993), and eventually became synonymous with the corruption and stagnation that afflicted the Indian economy and society in general. Finally, the financial sector was made totally subservient to the Government in the latter's quest for planned development. In fact, government dominance of the financial sector was seen as an essential prerequisite in securing funding for development goals.

The government achieved control of the financial sector by gaining explicit control of both the Reserve Bank of India (RBI) and private commercial banks. Gradual control of the Reserve Bank was made possible by the provisions of the Reserve Bank of India Act, 1934, which authorised the Bank to give credit to the government, payable no later than 3 months from the date of advance. However, as Rakesh Mohan (2006) states,

This tool for short-term financing became a permanent source of funds for the Government through the automatic creation of *ad hoc* Treasury Bills whenever Government's balances with the RBI fell below the minimum stipulated balance.

He further adds that in addition to this automatic monetisation, the RBI created additional *ad hoc* securities to meet the Government's financing needs as and when they arose. This created a big moral hazard problem. Unchecked expansion of fiscal deficit, financed by a ready recourse to monetisation meant that the government could go on accumulating debt with the RBI, which it had neither the intention nor the ability to repay. Automatic monetisation led to the loss of control over monetary policy and created conditions for all other problems in the sector.

The nationalisation of India's large banks in 1969 was ostensibly intended to strike a blow against the legacy of colonial banking, perceived to be biased in favour of large capitalist enterprise and against rural areas and 'the common man'. In reality, however, this government takeover of the banking system removed practically all accountability and eventually created severe financial repression.² Key features of this repressed financial system were the pre-emption of bank resources, directed credit, and administered interest rates.³ Indian banks faced two reserve ratios - the Cash Reserve Ratio and the Statutory

¹ Perhaps it was felt that importing capital goods so soon after independence would tantamount to taking short-cuts that could cripple the nascent industrial sector. Conversely, the discipline of creating the capital base from the ground up, using indigenous efforts and resources, would provide a strong foundation for sustainable industrial growth.

² See Joshi and Little (1996) for an excellent discussion of the Indian financial system prior to 1991, key aspects of which are reproduced here.

³ Other problems plaguing the Indian financial sector arose from a lax regulatory regime for banks, lack of competition in the sector, and political interference. The lax regulatory regime meant that banks faced virtually no accountability in their operations. Interference was made possible by the pre-emption of resources discussed above. This inefficiency and political interference were the deeply entrenched legacies of over two decades of nationalised banking.

Liquidity Ratio.⁴ Banks were also required to direct a significant part of their lending to 'priority' sectors at concessional rates of interest. Even without stipulation of these specific concessional rates, virtually *all* interest rates on deposits and lending were set by the government (through the RBI). By 1991, the two cash ratios and directed lending collectively accounted for *over 90%* of banks' lending, all of which was determined by exogenous factors that banks had no control over. Therefore, significant as its direct financing of the budget deficit was, the RBI also channelled resources from the banking sector towards the government, thus crowding out better investments. Most significantly, banks were left with a very small fraction of assets over which they did have discretion, and these were allocated on a preferential basis to the large industrial houses that dominated the pre-reform industrial landscape. The control wielded by large business houses over the licensing process virtually secured their survival and formed the basis of their credit worthiness with banks. Absence of a competitive banking environment crippled the banks' ability to judge credit worthiness or manage portfolio risks, and when interest rate deregulation in 1993 finally heralded the transition towards a more market-driven environment, banks found themselves woefully inadequate in performing these fundamental tasks. They responded by limiting the lending to all but the safest borrowers, so even though liquidity increased, lending was cut back. This unexpected outcome was in stark contrast to the explicit goals of increasing financial depth and of making banks more responsive to the industrial sector. This information asymmetry has been blamed for both the perceived ineffectiveness of banking reforms up till 1997, and for the slowdown of the industrial sector (Gupta, 1998).

The key insight of the above discussion is that financial reforms up till 1997 only focussed on the banking sector but left intact government's control over the central bank (through automatic monetisation). An agreement reached in 1994 to phase this out over a 3-year period ended automatic monetisation of government deficit in April 1997, finally giving the Reserve Bank some semblance of independence for the first time in over six decades. Henceforth, the government would have to raise finance from the financial markets at market-determined rates.⁵ No longer needing to act as the Government's banker on demand, the RBI could finally get on with the task of implementing monetary policy and of supervising the financial sector. It is in this context that the real significance of the Credit Policy of October 1997 becomes apparent: it was the first major policy announcement from an *independent* central bank.⁶ According to the then RBI Governor, the policy had the stated aim of providing a fresh impetus to the industrial sector, which had been plagued by banks' reluctance to lend to any but safe projects. Determining if the industrial sector did actually get the desired impetus is therefore a worthy goal. To quote Gupta (1998),

the 1997-98 busy season credit policy of the RBI provided: (i) for increasing money supply growth; (ii) flow of credit and (iii) steps to carry forward the financial sector reform. It is to be debated whether these three measures can help revive industrial growth.

⁴ The Cash Reserve Ratio (CRR) stipulated the proportion of deposits that banks were obliged to hold as cash with the RBI, while the Statutory Lending Ratio (SLR) stipulated the proportion of deposits to be held as approved government securities. The interest rates on both cash balances and government securities were far lower than those possible through commercial lending.

⁵ See Mohan (2006) and Reddy (2008) for details.

⁶ Or at least a Central Bank enjoying its greatest level of autonomy since Indian independence.

1998 onwards: After the Credit Policy

To further underscore the importance of the Credit Policy, we need to check if resource mobilisation actually improved after its implementation. The table on net resources mobilised by mutual funds is very instructive in this context. Since reforms, mutual funds as an investment vehicle have become increasingly important in the overall financial sector, helping to draw in money from private investors. The performance of the mutual fund industry is also a good barometer for investor confidence and the effectiveness of economic policies. Three important insights can be derived from the table 2 below. First, the years 1995 to 1998 were a very lean period for mutual funds as a whole. The negative net resource mobilisation in 1995 and 1996 followed the boom of 1994 and the scams thereafter (Gupta, 1998). This was despite the industrial growth for 1995-96 being the highest up to that point since 1991 (in fact, at 11.6%, the industrial growth for 1995-96 was the highest in that decade, as seen in Table 1). The high real interest rates prevailing in 1995 and 1996 also sucked out investment funds, as investors opted for high yielding public sector assets. Gupta (1998) further underscores the importance of the importance of the capital market for the real economy by stating that by 1997-98, “it was not so much debt money but scarcity of equity capital that is standing in the way of a recovery of the industrial sector and of infrastructure projects”.⁷

Table 2: Net Resources Mobilised by Mutual Funds

							(Rs. Crores)
Year	UTI *	Bank-sponsored MFs	FI-sponsored MFs	Private sector MFs	Sub-total of non-UTI MFs	(1)/(5)	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1990-91	4553	2352	604	–	2956	154%	7508
1991-92	8685	2140	427	–	2567	338%	11253
1992-93	11057	1204	760	–	1964	563%	13021
1993-94	9297	148	239	1560	1947	478%	11243
1994-95	8611	765	576	1322	2663	323%	11275
1995-96	-6314	113	235	133	481		-5833
1996-97	-3043	6	137	864	1007		-2037
1997-98	2875	237	203	749	1189	242%	4064
1998-99	170	-88	547	2067	2526	7%	2695
1999-00	4548	336	295	16937	17568	26%	22117
2000-01	322	248	1273	9292	10813	3%	11135
2001-02	-7284	863	407	16134	17404		10120
2002-03	-9434	1033	862	12122	14017		4583

* For Unit Trust of India (UTI), data are gross values (with premium) of net sales under all domestic schemes.

Source: Handbook of Statistics on Indian Economy, Reserve Bank of India; columns 5-7 are author's own calculations.

Second, the credit policy aimed to boost the private financial sector (to further increase competition and also to channel funds to the industrial sector). Column 6 in the table provides evidence of the growing importance of the private sector institutions relative to the public sector Unit Trust of India (the government owned provider of mutual funds services, which

⁷ It must be stressed that increased mobilisation by the mutual funds industry does not mean increased lending by the banks for industrial development, but does reflect the overall increase in investible funds in the economy. The increasing importance of equity markets also signals evolving maturity of the financial system (Fitzgerald, 2006). While the overall performance of the mutual funds sector had more to do with wider political and economic conditions, rather than with a specific credit policy, other facts can be considered a direct consequence of these policies.

earlier dominated the market). In 1997, resource mobilisation by the UTI was almost 3.5 times that by the consolidated private sector (in the early 1990s, the UTI was about 6 times the consolidated competition in terms of resource mobilisation). But this fell to just 7% in 1998 and only 3% in 2000. But this is not the whole story.

Finally, the private sector did not just draw investor funds away from the UTI, but was able to mobilise significantly more new resources. Between 1997 and 1998, resource mobilisation by private-sectors MFs increased almost 3 times, while by 1999, resources increased by almost 8 times, relative to their 1998 value. The consistent change in pattern between 1997 and 1998 lends itself to the assertion that the Credit Policy of 1997 did in fact play a very important role in mobilising resources in the economy, a significant chunk of which would have gone towards the industrial sector. Given that the new Credit Policy of October 1997 was seen as a corrective measure reflecting “learning from past mistakes”, and given the objective of giving a fresh impetus to the industrial sector, the results presented above validates the importance of the policy. For the purposes of this paper, the terms “Credit Policy”, “financial depth/deepening”, and “financial development” will be used interchangeably insofar as they are explanatory variables.

3. Literature Review

The literature review brings together two important strands of literature: the finance-growth nexus, and the empirical relationship between employment and industrial output/growth. Both these strands appear to be mutually exclusive in the literature, with the joint treatment of labour and capital as explanations of output/growth being limited to standard production function estimation (including estimation of total factor productivity).

Financial reforms⁸ and growth – Empirical results

A healthy financial sector plays a crucial role in fostering growth by mobilising savings across the economy and channelling them into enterprise investment. Sans this mobilisation, these resources would remain unutilised or unproductive, and hence, wasted. Finding a strong causal link from financial development to economic/industrial growth is an important concern for policy-makers, and a justification for much policy effort. The overall literature dealing with the finance-growth nexus is too vast to even contemplate summarising here, nor would it serve the main purpose of this study. It would suffice to simply illustrate the key strands of this literature and the themes/conclusions therein, as they apply to the present study. As a broad generalisation, a large part of the literature employs cross-country studies to assess *the impact of financial or capital account liberalisations on economic growth, and the operative channels through which the purported benefits of these measures flow. Moreover, efficacy of these policies and operating channels is conditional on cross-country heterogeneties.* Implicit is the notion that financial liberalisation is itself a very broad term, and can encompass several dimensions (either exclusively, but usually in some combination⁹). Even though technically different, the financial sector and capital accounts are closely related, given that international funds flows generated by open capital accounts directly enter the wider financial sector of a country. For the purposes of this literature survey, studies using *capital account and financial liberalisations will be clubbed together, to distinguish both*

⁸ For the purposes of this paper, the terms reforms and liberalization are used interchangeably.

⁹ See Thierry (2008), Johnson (2008), and Demirguc-Kunt and Levine (1996) for alternative specifications of financial liberalization indices, based on various sub-indices and arrays of indicators from financial, credit, and securities markets.

from trade liberalisation. Also, for the purposes of this study, the more important issue is the operative channel through which the benefits of financial liberalisation flow, rather than the specific types of liberalisations themselves.

Regardless of how the specific liberalisation policies are implemented, a common theme underlying these is the aim of fostering financial sector development by reducing what McKinnon (1973) and Shaw (1973) have called ‘financial repression’. King and Levine (1993) were the first to empirically validate the long run relationship between various measures of growth and financial development. While they do not, conspicuously, attempt to explain growth in terms of specific financial policies or reforms, their work did inspire a significant body of literature attempting to do so (see Levine and Zervos (1998), Rousseau and Wachtel (2000), and Roubini and Xala-i-Martin, (1992)). Another strand of literature validates the impact of cross-country heterogeneities on whatever effects financial liberalisation may have on growth. Heterogeneities such as institutional quality,¹⁰ contract enforceability, and protection of property rights (Bekaert et al. (2005), Levine et al. (2000), Klein and Olivei (1999), La Porta et al. (1997, 1998), Acemoglu and Johnson (2007)); competitive environment and extent of entry barriers (Gupta and Yuan, 2009); and the quality of the overall financial sector (including supervision and regulation) (Thierry (2008), Johnson (2008), Love (2003), Tornell et al. (2003)). At a more disaggregated level, financial liberalisation is found to have a more beneficial effect on industries with higher dependence on external finance than those with relatively lower dependence (Rajan and Zingales (1998), Laeven (2003), Gupta and Yuan (2009)).

As varied as the types of policies are the operating channels through which financial policies affect growth. King and Levine (KL, 1993) attribute the growth effects of financial development to *higher capital accumulation* and more efficient use of that capital. Jayaratne and Strahan (JS, 1996) find that deregulation of intrastate branch restrictions fosters growth through *improved efficiency of lending*, rather than through increased volume of lending. Rosseau and Wachtel (RW, 2000) identify four channels through which equity market development affects growth, two of which are access to permanent capital for large, indivisible projects; and provision of *better information about investment quality*. Beck et al. (2000) find little evidence of long-run links between financial intermediary development and capital accumulation, but, in a similar vein to KL, identify *total factor productivity* (TFP) growth as the primary driver. Bell and Rousseau (BR, 2001) conclude that India’s post-independence growth is indeed finance-led, but this is due to *debt accumulation* rather than TFP growth. Unlike other studies, BR also conclude that the financial sector increasingly favoured the industrial sector, which in turn drove economic growth. Access to funds and capital accumulation would both be hampered by financial constraints, but liberalisation eases these by *reducing the costs of external finance*, yielding a disproportionate benefit for industries with a greater dependence on such funds (Gupta and Yuan (2009)).

Search for flexibility by industrial firms – increasing informalisation of Indian labour

The economic reforms initiated in 1991 were both comprehensive and broad-based, encompassing removal of entry/expansion barriers, trade and FDI liberalisation, and reduction of small scale industry (SSI) restrictions. These have greatly expanded the competitive pressure on firms, requiring them to become increasingly flexible and responsive in order to survive, let alone grow. On the other hand, rigid and archaic labour regulatory

¹⁰ Institutions themselves are a broad term, comprising the efficiency/effectiveness of the legal system, accounting standards, corruption, etc.

laws (governing factory employment) have greatly curtailed firms' responsiveness to competitive conditions. The issue of labour reforms have been completely bypassed, despite the otherwise expansive scope of reforms. The Industrial Disputes Act of 1976 made it mandatory for factories with more than 300 workers to obtain state government permission before retrenching workers. A further amendment to the Act in 1982 reduced this number to 100, in addition to other requirements. Subcontracting (of final and intermediate products) and increased use of contract labour are two ways in which firms have tried to gain flexibility and circumvent the regulatory restrictions posed by this dichotomous situation. The broader issue of the employment in industries has an extant literature, typically involving the effects of economic or trade reforms on employment and labour demand (Bhalotra (1998, 2002), Roy (2004), Goldar (2004), Mazumdar (2006)), or on employment elasticities (Bhandari and Heshmati (2005), Mazumdar and Sarkar (2004)). Some other strands of this literature include examination of the employment-productivity link (Nordhaus, 2005), and the relative effects of reforms on employment and earnings in (un)organised manufacturing sectors (Banga (2005), Sharma (2009), Ghose (2000), Mazumder (2006)). Bhattacharjea (2006) and Sharma (2006) contain excellent surveys of empirical literature relating to manufacturing employment in India. Several of these papers (along with Nagaraj, 2004) have highlighted the trend of declining formal employment in the organised sector since initiation of the 1991 reforms, and the shift of labour towards the unorganised manufacturing sector and the increasing use of informal contract labour in the organised manufacturing sector.

One of the goals of this present study is to empirically test a hypothesised channel through which increased use of contract labour affects the manufacturing sector. The importance of this trend cannot be overstated. Since contract labour is by definition not unionised, increased use of contract labour undermines the ability of unionised labour to mount credible industrial action and/or cause other disruptions. Organised unions are understandably concerned about this trend, since it represents a direct threat to their influence and bargaining position relative to that of employers (Sharma (2006), Kumar (1999)). Any evidence to prove the mitigating effects of contract labour w.r.t. industrial disputes will hopefully represent a meaningful contribution to the wider debate on industrial policy. The empirical attention on the issue of contract labour is relatively recent and rare due to the paucity of reliable long-term data on contract labour employment.¹¹ Sen et al (2010) and Rajeev (2009) are probably the only two empirical papers¹² involving contract labour in the Indian context. Sen et al. develop and test a theoretical model in which labour institutions and trade openness affects firms' relative demand for contract and regular workers. Their study uses a panel dataset spanning a seven-year period 1998-2005. Rajeev (2009) uses industry-level data for a three-year period (1998-2001) to analyse the contribution of various types of workers (contract/regular workers and supervisors) to industrial output. There is an obvious conundrum about how to empirically test the increasing importance of contract labour. Given the absence of data, direct testing cannot be done for periods earlier than 1998. Any inferences that can be made must be done so indirectly; the indirectness itself should not diminish the importance of the results. The present study represents an effort in that direction.

¹¹ The Annual Survey of Industries did not begin publishing data on contract labour use (disaggregated by state x industry) until 1998. For studies using datasets extending earlier than 1998, it is therefore not possible to conduct empirical tests using contract labour as a variable. While contract labour has become increasingly important in Indian manufacturing since the mid-1980s, any inferences about contract labour and its effects can only be derived indirectly.

¹² To the best of my knowledge.

4. Literature gaps and contributions of this paper

The current work is closely related to two papers: Aghion et al. (ABRZ, 2008) and Rajan and Zingales (RZ, 1998), both of which make important contributions to the explanations of disaggregated industrial performance and economic growth. This section briefly highlights the key contributions of these papers, and relates them to the present analysis.

ABRZ investigate the impact of industrial delicensing of 1991 on output of the registered manufacturing sector in India, and whether this impact varies across Indian states with different labour market regulations. A relevant feature of this work is the explicit recognition given to the importance of India's federal structure for industrial outcomes, i.e. how the effectiveness of national-level policies is ultimately dependent on actions and policies by state government. While an understanding of this federal structure is 'bread and butter' for Indian policy makers, the attention given to it in empirical work is relatively recent (also see Besley & Burgess (2004), Soo (2008), Hasan et al (2007)). The second key element of ABRZ's work is their use of 3-digit industrial classification data. This paper instead uses industrial data at the 2-digit level ABRZ's use of more disaggregated data is perfectly consistent with their research goal - whether the effects of a national-level policy are conditioned by differential labour regulations across states. The use of 3-digit data, however, prevents any meaningful extensions of the analysis to how industrial characteristics have differential impacts on outcomes of national policies. After all, explanations about state-industry data should not just be limited to variations in state-characteristics, but should logically be extended to industrial variations as well. As an illustrative example, using broadly divergent industrial categories such as Food Products, Textiles, and Motor Vehicles would yield far more meaningful insights than those of more disaggregated industries such as Grain Mill Products and Knitted & Crocheted Fabrics. Disaggregated industries within the same broad groups would have highly similar factor intensities, technological constraints, and financial requirements, etc., and comparisons based on them would neither be very informative nor instructive. More importantly, such a strategy allows an investigation of how increased financial development impacts performance across industrial categories. The industrial categorisation used in this paper is borrowed from Rajan and Zingales (RZ, 1998).

RZ's work is based on their calculation of the dependencies on external sources of finance for different industries. Almost all industries need external financing for investments and operations, but data on this is usually neither available nor reliable. They posit that a strategy of using reported financial variables as explanatory variables will be plagued by simultaneity and endogeneity problems.¹³ RZ calculate this variable for U.S. firms to isolate an industry's demand for external capital i.e., as an indicator of how much industries would like to borrow *if* they had access to a perfect capital market with perfectly elastic supply of funds, as they assume the U.S. capital market to be. The identification problem does not exist in such a market. They further assume that technological dependencies carry over to comparable industries in other countries as well. For example, if investments in the motor vehicles industry have higher sunk costs and a longer gestation period (before cash flows are harvested) than in the tobacco industry, then these relative differences will be maintain across

¹³ Reported credit off-take statistics are equilibrium values, with actual lending being a result of credit availability and rationing, and regulatory constraints. This was the case in India before 1991, when government *diktat* determined over 90% of bank lending through reserve requirements and directed lending. And even without that, banks would prefer to lend to industries which they deem as having the best growth prospects, which makes lending decisions themselves endogenous.

regions/countries. This variable forms an integral part of my paper by allowing a meaningful categorization of the industries in my sample.¹⁴

The external dependence variable is important due to two related reasons. First, external finance is needed for purely capital investment purposes, or in the words of RZ, “the amount of desired investment that cannot be financed through internal cash flows generated by the same business”. The formula¹⁵ for this dependence itself reflects this information for its correct interpretation. *External finance is therefore needed for very specific expenditures: accumulation of capital inputs, to the exclusion of other types of inputs (labour) or other types of expenses (working capital – to finance operations and sales)*. Second, the differences in dependencies on external finance themselves arise due to *technological*, rather than other reasons. As RZ state, “to the extent that the initial project scale, the gestation period, the cash harvest period, and the requirement for continuing investment differ substantially between industries, this is indeed plausible”. Rather than just saying that some industries need more funds than do others, the external financing variable conveys information on *why* these differences *may* arise; industries with greater external dependence are also *more likely* to have the above-mentioned characteristics. But this correlation is probable, not conclusive or definite.¹⁶ Thus this variable allows for the *isolation of relevant time-invariant industry characteristics*, which otherwise would have been absorbed into industry fixed effects. This subtle point is critical for correct interpretation of subsequent empirical results, and thus needs to be highlighted.

Research Goals and contributions of this paper

The paper examines the interactions between the Credit Policy of October 1997, industrial disputes, and industries' dependence on external finance; and investigates the impact of these interactions on industrial outcomes in India. As an additional robustness check, the differential effects of tariff reductions on output are also evaluated. The primary interest of this paper is to study how increased depth in a country's financial sector affects industrial output, and whether these outcomes are dependent on state labour relations and industrial characteristics. A secondary goal is to determine the *relative importance* of labour conflict and dependence on external finance as operating channels through which benefits of financial development flow. This paper makes three novel contributions by addressing existing gaps in the literature.

Almost all empirical work on Indian industries hitherto evaluates the impact of different elements of the 1991 reforms (specifically, trade liberalisation and industrial delicensing), with the underlying focus being one of a “before-and-after” nature. Financial reforms – first initiated in 1993 and arguably the most complex of all reform initiatives attempted – have received little attention. The first contribution is the *shift in focus away from the 1991 reforms* as the defining drivers of India's industrial performance. As was discussed earlier, The Credit Policy of 1997 represented one of the most important financial policy developments in the post-reform period, but its complete absence in empirical literature is conspicuous. This is despite the fact that the industrial slow-down in the second half of 1990s was attributed in

¹⁴ See the section on Data for the modifications made to this variable for this purposes of this study.

¹⁵ Dependence on external finance is calculated as: $(\text{capital expenditure} - \text{cash flow from operations}) / (\text{capital expenditure})$.

¹⁶ The confluence of these two points means that industries with a greater technological dependence on external finance will also be those with inadequate organic cash flows for financing the increased capital investment. To put it simply, the greater the state of embodied technology and the greater the risk/uncertainty inherent in the production process, the less the ability to meet the associated expenses from internal cash flows.

large part to improperly implemented financial reforms, and that the Credit Policy aimed explicitly at providing a fresh impetus to the industrial sector. This shift of focus – facilitated by a totally post-reform time-frame adopted for this paper – will be inevitable as time progresses and other important policies get implemented.

Second, the joint treatment of capital and labour as explanations of output rely only on actual levels of inputs,¹⁷ but no attention is given to how these inputs themselves get constrained by other exogenous factors. These constraints¹⁸ effectively reduce the inputs available for the production process and are the focus of the empirical analysis in this paper. Also, the presence of these constraints and their relative strengths may force firms to alter the capital-labour ratios away from their efficient levels. *An attempt is made here to show that the removal of a constraint through a policy can act as an operating channel through which that policy can benefit industrial output.* Two primary operating channels are hypothesised and tested in this paper. Moreover, the identification of these constraints is based on well-accepted stylised facts, which lends credibility to hypotheses themselves. The first operating channel identified is that financial development helps alleviate the constraint of industrial disputes¹⁹ by promoting *increased use of contract labour*. Industrial disputes are synonymous with an effective reduction of labour input available for the production process. Firms increasingly resort to the use of contract labour to mitigate the effects of these disputes. The second operating channel identified is that financial development will *facilitate capital accumulation*, and therefore industrial growth, by reducing the credit constraints for firms. Since information asymmetry problems were blamed for reduced lending and for aggravating the credit constraint, empirical validation of this channel will allow inferences about the impact of increased financial depth on quality of intermediation. Furthermore, the strategy not only allows testing the relative importance of the different operating channels, but also allows us to say something about the relative importance of labour and financial policies generally for the industrial sector.

The relationship between financial development and growth has very *important policy implications*, the lack of conclusive evidence in the literature notwithstanding. Although “the direction of causality has remained unresolved in both theory and empirics”, it can be safely generalised that “higher per capita income is associated with more advanced financial structures, i.e. move from bank towards non-bank financial intermediaries, and from both of these towards stock markets” (Fitzgerald, 2006). The obvious implication is that financial sector development affects some factors and gets affected by others, and efforts to successfully develop/liberalise the financial sector must first identify these interactions. Countries wanting to extract maximum ‘real’ benefits from their financial sectors should strengthen their institutional, legal, and regulatory frameworks before (or at least along with) financial sector liberalisation. They should also clearly identify and strengthen the channels through which expected benefits will flow. A shortfall in either of these dimensions may not just result in failure of the liberalisation policies, but will also compromise their accurate ex-post evaluation. The third novel contribution of this paper is that it expands the institutional

¹⁷ These measures can include basic labour and capital measures, or refinements based on human capital measures of labour and perpetual inventory-based measures of capital, amongst others.

¹⁸ A high impact of mandays lost due to work stoppages (labour conflict) will reduce the amount of labour effectively available to the production process; while a higher dependence on external finance will, in presence of credit constraints, generally result in lower capital accumulation.

¹⁹ Reduction of labour disputes is the same thing as increase in effective labour input available to the production process.

imperative to cover labour regulations as well, since it is widely acknowledged²⁰ that restrictive and archaic labour laws continue to constrain industrial performance despite two decades of liberalisation.

5. Methodology

The basic methodology for this paper is borrowed from Aghion et al. (2008), and is based on the least-squares dummy variable (LSDV) regression. Such a strategy is suitable when there are a large number of fixed effects that need accounting for, a fact that is certainly relevant in the present case. Equation (1) given below is used for econometric estimation.

$$y_{i,s,t} = \alpha_{i,s} + \eta_{i,t} + \beta_{s,t} + \theta(d_t)(dispute_{s,t}) + \gamma(d_t)(exdep_{i,t}) + \phi tariff_{i,t} + \varepsilon_{i,s,t} \quad (1)$$

where $y_{i,s,t}$ is the log of 2-digit industry-state real output; d_t is the time dummy representing the new Credit Policy, taking a value of zero for the years 1992-97 and one for the years 1998-2002; $\alpha_{i,s}$, $\eta_{i,t}$, and $\beta_{s,t}$ are respectively the industry-state, industry-time, and state-time interactions. As in Aghion et al. (2008), α controls for unobserved time-invariant determinants of state-industry performance (e.g., location, natural endowments, cultural history, etc); η controls for industry-specific time effects (e.g., technological innovation); and β control for state-specific time effects (e.g. macro shocks, change of state government or laws, social unrest, etc); $exdep_{i,t}$ is the categorical variable for industrial dependence on external finance; and $tariff$ represents log of industry tariff aggregated at the two-digit industry level. $Dispute_{s,t}$ is a consolidated state-wise variable for industrial dispute. Additional notes on variables and data sources are given in the data appendix.

6. Results

The data variables used in this paper allows a fairly wide-ranging analysis. The results section is organised as a series of successive hypotheses and questions, along with their respective results.

The operating channels through increased financial depth affects industrial output

This section looks at the effects of financial deepening on industrial output, and how this is affected by industrial disputes and industries' technology-driven demand for external finance. The primary hypothesis here is that increased financial depth will positively increase industrial output. It will do so by alleviating constraints on both labour and capital inputs. The secondary hypothesis explores the labour operating channel: financial depth is associated with increased use of contract labour by industries, which reduces the effects of industrial disputes.

As discussed earlier in the literature review, exogenous constraints on labour and capital inputs effectively limit their availability for the production process and thus depress output. Specific policies can be implemented to improve production output, but the operating channels through which this happens involves targeting the constraints themselves rather than output. In the present context of state-industrial output in India, both labour and capital inputs are subject to debilitating constraints. The labour input is constrained by industrial disputes, which are magnified by rigid labour laws in both their duration and disruptiveness. Capital

²⁰ See the literature on Indian labour.

inputs are constrained in some industries because the required higher levels of investments cannot be funded through internal cash flows, while firms are unable to raise the required funds from external source to finance these investments. To the extent that increased financial depth (through the Credit Policy) reduces the effects of industrial disputes and benefits the most financially-constrained industries, both these effects can be interpreted as operating channels through which increased financial depth benefits industrial output.

The key results on the overall effects of increased financial depth are in the table 4, with the first part (columns 1-3) having results for output. Results for gross value added (GVA) and gross fixed capital formation (GFCF) are in columns (4)-(5) and (6)-(7), respectively.

Table 4: Effects of Financial Depth

	Log Output			Log GVA		Log GFCF	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Financial Depth Dummy (FDD)	-0.26 (0.38)		-0.196 (0.348)	-1.61 (0.37)*		0.13 (0.59)	
Log Tariff	-0.56 (0.17)*	-0.38 (0.23)***	-0.907 (0.30)*	0.54 (0.20)*	-0.50 (0.26)***	-0.56 (0.48)	0.76 (0.47)
FDD * Log Tariff		-0.27 (0.06)*			-0.09 (0.11)		-0.008 (0.17)
Mandays	-4.67 (0.50)*	-3.59 (0.44) *		-4.69 (0.60)*	-3.82 (0.54)*	-5.52 (0.62)*	-4.51 (0.69)*
FDD * Mandays	1.50 (0.48)*	1.30 (0.36) *		1.43 (0.45)*	1.4 (0.35)*	0.64 (0.48)	0.47 (0.53)
Industrial Dispute (Strong Pro-Emp * Mandays)		-3.60 (0.66)*			-3.09 (0.66)*		-2.02 (1.36)
Industrial Dispute (Pro-Emp * Mandays)		-3.46 (0.83)*			-2.48 (1.1)**		-3.77 (1.49)**
Industrial Dispute (Pro-Worker * Mandays)		-3.10 (0.71)*			-1.78 (0.89)**		-1.42 (1.40)
Industrial Dispute (Strong Pro-Worker * Mandays)		-5.10 (1.45)*			-5.74 (1.7)*		-3.16 (1.73)***
FDD * Industrial Dispute (Strong Pro-Emp)		-0.34 (0.43)			-0.19 (0.44)		0.55 (0.78)
FDD * Industrial Dispute (Pro-Emp)		-0.33 (0.55)			-0.22 (0.66)		1.24 (0.91)
FDD * Industrial Dispute (Pro-Worker)		-0.80 (0.49)			-1.85 (0.65)*		-0.98 (0.99)
FDD * Industrial Dispute (Strong Pro-Worker)		0.45 (0.50)			-0.15 (0.59)		1.71 (0.72)**
FDD * Negative External Dependence	-0.43 (0.23)**		0.07 (0.49)	0.82 (0.26)*	0.14 (0.23)	0.86 (0.40)**	0.34 (0.47)
FDD * Moderate External Dependence	-0.43 (0.18)**		-0.25 (0.12)**	0.30 (0.15)**	0.18 (0.19)	-0.41 (0.57)	-0.24 (0.32)
FDD * High External Dependence	-1.06 (0.23)*		-0.83 (0.29)*	0.29 (0.29)	-0.60 (0.30)**	-0.41 (0.55)	0.08 (0.55)
Observations	3119	3119	3119	3090	3090	3027	3027
R-sq	0.96	0.97	0.97	0.93	0.95	0.86	0.86

It was hypothesised that increased financial depth will drive output by alleviating the constraints on both labour and capital, i.e. industrial disputes and financial constraints of industries. The operating channel through which financial depth alleviates constraints on labour input is considered here. India's federal structure yields an *a priori* expectation that this result will not be the same across the country, and will depend on regional differences in institutions and. 2 aspects of this issue are tested below: first, do industrial disputes have the

same effect across states, or are industrial disputes more disruptive in states with more pro-worker labour laws? Second, if financial depth does in fact have an improving effect, then are these effects uniform across the country? The coefficient for *mandays* shows the effect of industrial disputes on output in states with neutral labour regulations.^{21,22} The results conclusively show that work stoppages due to industrial disputes have the expected negative impact on output in these states. However, this negative effect mitigates after 1997 in states with neutral regulations: coefficients for both *mandays* and *mandays-FDD interaction* are significant at 1% level.

The results obtained can be compared to those of Aghion et al. (ABRZ, 2008), discussed earlier in the literature review. They primarily investigated how the effects of delicensing reforms (a national level policy) depended on variations in state labour regulations. This goal itself reflects a dynamic focus, where effects of a policy are evaluated over time (before and after delicensing) in the presence of variations in state-level amendments to the IDA. My own results are broader in scope, incorporating both static and dynamic effects of state-level labour regulations. The *static effects* arise from how labour disputes (work stoppages) affect industrial outcomes across the country, in the absence of any mitigating national policy. The *dynamic effects* arise from how these interaction effects change over time, after implementation of a national level policy (Credit Policy). A comparison with the results of ABRZ is therefore appropriate in the latter case, i.e. of the dynamic effects. The results for the static case are quite revealing. Relative to states with neutral labour laws, states with pro-worker regulations should see a more pronounced negative effect of disputes on output, while pro-employer states should have a smaller impact. This is indeed the case with pro-worker and strong pro-worker states. West Bengal (arguably the most left-leaning state in the country, and the only one in the sample with a labour regulation score of 4) experienced the worst effects of disputes (-5.10). For states with more pro-business labour laws, on the other hand, coefficients for industrial disputes in strong pro-worker (-3.60) and pro-worker (-3.46) states are also negative at 1% level of significance. This result is most unexpected, and seems to suggest that pro-employer amendments to the Industrial Disputes Act (IDA) will aggravate the effects of industrial disputes. The magnitudes in the *strong pro-employer*, *pro-employer* and *pro-worker* cases are comparable, suggesting that *any* amendments to the IDA, regardless of direction, will make things worse, while leaving the Act unchanged will have the least disruptive effect.

A plausible explanation for this result can be conjectured, in spite of these counter-intuitive results. The labour regulation measure of Aghion et al (2008) is based on *any* amendments to the IDA, across time and states, without explicitly specifying what these amendments are. It is quite possible that the cumulative measure represents a patchwork of amendments across states, devoid of any consistent pattern, or their actual effect may be different from the intended one. I do not believe that this reduces the value of the labour regulation measure itself, since the actual classification of states based on this measure is quite reasonable.²³ For states with pro-employer amendments as a whole, these amendments may have in some perverse way increased the sensitivity of output to industrial disputes. At the very least, the

²¹ In equation form, the static effect of *mandays* is shown through the expanded form $mandays(1+Strong\ Pro-Emp + Pro-Emp + Pro_Worker + Strong\ Pro-Worker)$. The coefficient for the sole variable *mandays* then represents the case when all other categorical variables are equal to zero, which corresponds to states with *Neutral* labour regulations.

²² Neutral labour regulations mean that states have either not implemented any amendments to the Industrial Disputes Act, and that cumulative effects of successive amendments cancel each other out.

²³ See the Literature Review section.

results caution against one-off amendments to the IDA, as these might have unintended consequences, and support the case for comprehensive, systematic labour reforms across the country.

To see how the effects of industrial disputes have changed over time and across states, I look at the effect of financial deepening (Credit Policy) on the consolidated industrial disputes variable. The *FDD*mandays* interaction showed that industrial disputes were less disruptive in labour-neutral states after financial deepening. The *FDD*Industrial Dispute* interactions extends this result to different state categories, relative to labour-neutral states. Columns (2) and (3) show the results of interactions for alternate regression specifications. All the interaction coefficients are statistically insignificant, which means that increased financial depth is associated with reduced effect of industrial action on output. Most importantly, this reduction is uniform across the country, with the benefit in labour-neutral states being no different from that in states with pro-employer or pro-labour leanings. Correctly interpreted, this is a very important result that validates and reinforces the main result of ABRZ. In ABRZ, the labour regulation measure has variation in it, so the results have the interpretation that states which implement pre-business labour laws gain more from reforms than do states that do not. However, my labour regulation measure shows no such variation, i.e. over the time period of this study, there have been no amendments to the IDA. So whatever improvement there has been in effects of industrial disputes must be attributable to something other than proactive pro-business policies of states. Unlike in ABRZ, my results allow no conclusions about the efficacy of pro-business labour regulations for industrial outcomes. But that is not a problem and is perfectly consistent with Aghion et al. Their conclusions are based on presence of data variation, while my conclusions are based on absence of it. Industrial disputes affect different states differently, but the Credit Policy has not had a *differential* impact on how these effects have changed across states. To better capitalise on the opportunities presented by national-level reforms, states will still need to go in for business-friendly labour reforms.

So while the effects of industrial disputes has reduced over time, it remains to be shown that main operating channel for this alleviation of the labour constraint is the increased use of contract labour, with the latter being made possible by increased financial depth after 1997. It is a well known fact that the wide ranging economic reforms implemented since 1991 notwithstanding, labour reforms have remained totally neglected by the process. No labour reform policies of any significance have been implemented (either at state or national level) since 1991 and certainly none that could be used to explain the reduced effect of industrial disputes on industrial output. In terms of the empirical results, it must be noted that the *FDD*Mandays* interaction shows the reduced effect of industrial disputes in labour-neutral states, which have not had any (net) changes to the IDA since 1947. So at least for these states, we observe a phenomenon wherein industrial disputes have become less important, and yet this cannot be explained by changes in labour policies, since there have been none. Explanation must be sought elsewhere. There is also wide acknowledgement that since 1982, firms have increasingly resorted to the use of contract labour with the explicit intent of pre-empting the incidences of industrial strikes. In fact, the systematic shift towards contract labour has been widely attributed to the effects of the textile industry strike of 1982.²⁴ This issue of rigid labour laws in India was discussed at length in the literature review section. Given these two stylised facts, it appears reasonable to conclude that *increased use of*

²⁴ This was when large scale strikes organised by a labour leader, Datta Samant, virtually crippled the textile industry of Mumbai, with several of these mills being forced to permanently close down. The textile strikes of 1982 remain amongst the starkest examples of the disruptive potential of industrial disputes.

contract labour has benefitted Indian industry by mitigating the effects of industrial disputes. To show that this increased contract labour (i.e., increased employment) could itself result from increased financial depth, attention is drawn to the work of Hubbard (1998), who suggested treating labour and capital (fixed investment) inputs in similar ways in terms of their financing requirements. Specifically, Hubbard states that “to the extent that labour is a quasi-fixed factor or there is a lag between labour input and production, firms may need to raise external financing to finance the labour input”. These conditions are certainly plausible in the Indian context. Increased financial depth after 1997 would increase access to funds for Indian industries, thereby allowing them to finance the labour input, i.e. increase employment, of which contract labour would be an important component. The primary caveat that needs to be stressed here is that in the absence of any reliable long-term data on contract labour use, existence of this final link can only be inferred rather than conclusively tested. Nevertheless, this link is an extremely plausible one, and to the best of my knowledge, no other satisfactory explanation of the finance-employment operating channel has been forwarded thus far.

Differential effects of financial depth across industries

The previous section showed the effects of financial depth on industrial disputes and output, across states, and thus validated the first hypothesised operating channel for financial depth, i.e., increased contract labour mitigating the effects of industrial disputes. This section is concerned with the effects of financial depth on output, across industry categories. The aim in this section is to investigate the operating channel through which financial depth will directly benefit industrial output by removing constraints on capital accumulation. The *a priori* expectation is that industries with very high external dependence (>1) were the most credit-constrained prior to financial deregulation, and will stand to gain the most from better access to financing. The results are quite informative. Column (1) in Table 4 shows that industries with high external dependence have fared worse after implementation of the new Credit Policy; the coefficient of the *FDD*High External Dependence* interaction is highly negative. The result holds true even after controlling for the disaggregated effect of industrial disputes (see column 3).

Relative to industries with a low dependence on external finance, industries with negative and moderate dependencies also appear to have fared worse after 1997, but the significance of these coefficients is sensitive to regression specifications. Columns (4), and (5) are alternate versions of columns (1), and (3), but with *Log Gross Value Added* as dependent variable. The results for high dependence industries are less conclusive, with the relevant coefficient being insignificant or negative. In terms of GVA, financial depth appears to have helped industries with moderate dependence on external finance (0.30), but again this result is inconclusive, as is the result for negative dependence industries. At best, industries with high external dependence have fared no better than industries with low dependence, and at worst, they have definitely fared worse.

Most importantly, The *FDD*Mandays* interaction is included to isolate the direct effect of financial depth (capital constraints) from its indirect effect (contract labour). The *mandays* variable here shows the general impact of industrial disputes on output, whereas the *FDD*Mandays* interaction shows how this effect has changed due to increased financial depth. A comparison of the *FDD*Mandays* interaction and the interaction of *FDD* with various industry categories shows the relative importance of the direct and indirect operating channels: across all the specifications discussed above, the *indirect channel* has a greater impact in terms of magnitude, and this effect is *consistently positive*. For output as the

dependent variable, the *direct channel* has a lesser impact in terms of magnitude (than does the indirect channel), but more tellingly, this impact is *either negative or insignificant*. Increased financial depth did not benefit output by facilitating capital formation in any industry category. But while the operation of the indirect channel is more impactful than the operation of the direct channel, it is still not enough to cure the afflictions of the manufacturing sector. This is evident from the average growth rates of various industries. The table below shows that average growth for all industry categories has fallen after implementation of the Credit Policy, but the absolute reduction in growth rates is most pronounced for moderate and high-dependence industries (-5.7% and -7.3%, respectively). These are the industries most likely to have the greatest need for continuing investment (as assumed by Rajan and Zingales, 1998).

Table 5: Average Growth Rates by Industry Category

Category	92-02	92-97	98-02	Difference
Low	8.8%	10.3%	6.9%	-3.4%
Negative	4.6%	6.0%	3.0%	-3.0%
Moderate	6.5%	9.1%	3.4%	-5.7%
High	10.1%	13.4%	6.1%	-7.3%

Based on Author's own calculations

As a further robustness check, the above regressions specifications are replicated, with gross fixed capital formation (GFCF) as the dependent variable.²⁵ This is to further check that increased financial depth has actually not had a significant impact on capital formation. Column (6) in Table 4 isolates the direct and indirect operating channels discussed above. Industrial disputes still have a negative effect on new capital formation (coeff. value -5.52), but this effect has not changed significantly after 1997 (0.64). So we cannot say that increased use of contract labour due to financial deepening has also caused increased investment. The logical justification for such a link would be that reduced threat of industrial disputes makes firms more confident about committing to new investments; stated differently, fewer disruptions to work due to industrial disputes justifies the increased expense and effort of new investments. Increased financial depth has also had little direct impact: the only industries where increased financial depth is associated with positive capital accumulation are those with no need for external finance in the first place. This is very counter-intuitive, but it is reasonable to conclude that increased capital accumulation in these industries is independent of national-level financial policies. Moderate and high dependence industries have not had any appreciable gains in capital accumulation, relative to industries with low dependence on external finance. Perhaps this helps further explain the poor growth results shown in the table 5 above. Overall, neither the direct nor indirect channel operates through which increased financial depth drives capital formation.

Given the rejection of the second hypothesised operating channel, the next thing to test is whether the *static and dynamic effects of industrial disputes differ across industry categories*. This disaggregation will provide insights on whether contract labour can be more readily absorbed in certain types of industries, and whether this operating channel benefits some industries more relative to others. Both these issues represent extensions of the preceding results. Columns (1) and (2) in Table 6 show the disaggregated effects of industrial disputes across states and industry categories. The interpretation of the *Mandays* coefficient is now

²⁵ The *GFCF* variable was preferred over *capital* as dependent variable, since the former represents *new* capital formation in a particular year. For *capital*, past accumulation represents the greatest share in the overall variable, but this is exogenous to the analysis, so using capital as dependent variable would be rather meaningless.

changed, and reflects the effects of work stoppages on industries with low external dependence in labour neutral-states. The coefficients on only the industrial disputes (*labour regulation*mandays*) shows this effect across states for industries with low dependence, while coefficients on industry categories (*external dependence*mandays*) shows the effect of work stoppages in different industries located only in labour-neutral states. Other coefficients can be combined in different combinations to derive the differential effect across states and industries. Two illustrative examples are discussed here. First, regardless of where the industries are located, work stoppages have a negative but indistinguishable effect on industries with both low and negative external dependence. This is evident from the negative coefficient of *mandays* and statistically insignificant coefficient of *NEDM*. Moreover, work stoppages have an even more disruptive effect in moderate and high dependence industries, with the effect in the former exceeding that in latter in both magnitude and degree of significance (coefficient values of -1.17 vs. -1.03, and -1.08 vs. -0.69, respectively, across the two specifications). This overall pattern of impact across industry categories is consistent with expectations. A more surprising result arises when we consider Gross Value Added (column (6)), which is probably a better indicator of how well an industry is doing. Here, work stoppages have an additional negative effect only in industries with moderate external dependence, but the effect in high dependence industries is indistinguishable from that in low/moderate dependence industries. Why work stoppages adversely affect output but not value added in high dependence relative to low dependence industries is not clear. The second example relates to relative effects across states, i.e., no matter what industry category, work stoppages have greatest impact on output in West Bengal (strong pro-worker), followed by other pro-labour and pro-employer states. The effects across pro-labour and (strong) pro-worker states are comparable with each other, but exceed those in labour-neutral states. However, unlike in the case of output, work stoppages have a greater effect on value-added in pro-worker states than in pro-employer states, but this latter effect is still more negative than in labour-neutral states. This spatial pattern is exactly consistent with the result from the previous section. Overall we can say that work stoppages have a more negative effect on output in moderate dependence industries in West Bengal than on negative dependence industries in Andhra Pradesh.

A final extension of results in this section relates to how financial depth has affected industrial disputes across industry categories. This is important in identifying how the indirect channel plays out across industries with different dependencies on external finance (see above). Columns (3) and (4) in table 6 show this result for output as dependent variable, while columns (6) and (7) show the corresponding results for GVA. The *mandays* coefficient here has the interpretation of effect of work stoppages on output in the control industry, i.e. industries with low external dependence (column (3)) and moderate external dependence (4). The *FDD*mandays* interaction shows how this effect of work stoppages changes for the control industry after implementation of the Credit Policy. The other interaction terms are appropriately interpreted as the above-mentioned effects on other industry category. The only difference between columns (3) and (4) arises from the specification of the control industry category. What stands out here is that the coefficients of the interactions involving moderate external dependence industries (Column 3) and low dependence industries (4) are of exactly the same magnitude but of opposite signs. This same pattern is observed in Columns (6) and (7), where low and high dependence industries are used as controls. This shows that the basic results are robust to whichever industry group is chosen as the control, and the cross effects for other industries will change accordingly.

The results for both output and GVA clearly show the negative effect of industrial disputes on output, with incrementally greater impacts on moderate and high dependence industries, respectively. In other words, the effect of disputes on output is indistinguishable between low and negative dependence industries, but disruptions to industries with moderate dependence on external finance are greater than for low dependence industries, while disruptions to high dependence industries are greater still. This is perfectly consistent with *a priori* expectations. In terms of the effects of financial deepening – for output, financial depth has alleviated industrial disputes across all industry categories, but here the largest effects are for low and high dependence industries (the effect on the latter is statistically indistinguishable from the former). The situation has also improved for the negative and moderate dependence industries, but these improvements are less compared to that for the low dependence industries (coefficients of -1.51 and -0.73, respectively, against the coefficient of 1.67 for low dependence industries). For GVA as dependent variable, again the industries with negative external dependence industries have gained the least from financial deepening, while the gains for the other 3 industry categories are indistinguishable from each other. These results further reinforce those from the state-level analysis, in that *financial deepening has benefited industries through the indirect operating channel of alleviating industrial disputes. Furthermore, industries with negative dependence on external finance have experienced the smallest gains.*

The general non-existence of the indirect labour channel (discussed above) for capital formation is further reinforced in columns (9) and (10) of table 6. These show the effects of industrial disputes on capital formation, disaggregated across industry categories. Industrial disputes are more disruptive for all industry groups, but more so for moderate dependence industries than for others (coeff. value -1.23). In context of the earlier results, the improvements in the labour disputes situation has not helped increased capital formation in any industry group – all the FDD*interactions are statistically insignificant in columns (9) and (10).

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Table 6: Effects of Mandays Lost

	Log Output				Log GVA			Log GFCF		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Financial Depth Dummy (FDD)	0.15 (0.17)	-0.76 (0.24) *	-0.66 (0.33)**		-0.30 (0.23)	-0.65 (0.26)**			-0.96 (0.53)***	-1.47 (0.45)*
Log Tariff	-0.0003 (0.21)	-0.78 (0.14) *	0.70 (0.35)**		0.45 (0.19)**	.031 (0.36)		0.76 (0.48)	-0.37 (0.79)	0.06 (0.62)
FDD * Log Tariff								-0.002 (0.11)		
Mandays	-2.38 (0.71)*	-3.37 (0.51) *	-4.55 (0.52)*	-5.33 (0.47)*	-3.43 (0.62)*	-4.49 (0.58)*	-5.84 (0.51)*	-4.82 (0.79)*	-5.74 (0.70)*	-6.98 (0.99)*
FDD * Mandays		1.15 (0.25) *	1.67 (0.46)*	0.93 (0.35)*	1.06 (0.28)*	1.49 (0.45)*	1.57 (0.54)*	0.74 (0.41)***	0.82 (0.56)	0.70 (0.73)
Industrial Dispute (Strong Pro-Emp * Mandays)	-3.66 (0.71)*	-3.43 (0.66) *			-2.99 (0.67)*			-2.13 (1.25)***		
Industrial Dispute (Pro-Emp * Mandays)	-3.55 (0.86)*	-3.11 (0.80) *			-2.46 (1.04)**			-3.80 (1.38)*		
Industrial Dispute (Pro-Worker * Mandays)	-3.82 (0.85)*	-3.74 (0.69) *			-3.24 (0.89)*			-2.20 (1.35)		
Industrial Dispute (Strong Pro-Worker * Mandays)	-5.17 (1.65)*	-4.75 (1.50) *			-5.68 (1.68)*			-2.25 (1.69)		
Low External Dependence * Mandays (LEDM)	--- X ---	--- X ---	--- X ---	0.78 (0.28)*	--- X ---	--- X ---	1.34 (0.64)**	--- X ---	--- X ---	1.23 (0.70)***
Negative External Dependence * Mandays (NEDM)	-1.09 (0.44)	0.07 (0.43)	0.35 (0.44)	1.13 (0.37)*	-0.24 (0.51)	-0.10 (0.60)	1.23 (0.71)***	0.75 (0.72)	0.92 (0.73)	2.16 (0.93)**
Moderate External Dependence * Mandays (MEDM)	-1.17 (0.38)*	-1.08 (0.33) *	-0.78 (0.28)*	--- X ---	-1.51 (0.46)*	-1.18 (0.42)*	0.16 (0.67)	-1.24 (0.63)***	-1.23 (0.70)***	--- X ---
High External Dependence * Mandays (HEDM)	-1.03 (0.53)***	-0.69 (0.41) ***	-0.92 (0.52)***	-0.14 (0.46)	-0.48 (0.51)	-1.34 (0.64)**	--- X ---	0.79 (0.73)	0.49 (0.85)	1.73 (1.03)***
FDD * LEDM			--- X ---	0.73 (0.30)**		--- X ---	-0.07 (0.58)		--- X ---	-0.12 (0.67)
FDD * NEDM			-1.51 (0.48)*	-0.77 (0.36)**		-1.04 (0.54)***	-1.12 (0.58)		-1.26 (0.90)	-1.14 (1.01)
FDD * MEDM			-0.73 (0.30)**	--- X ---		-0.80 (0.34)**	-0.87 (0.56)		-0.12 (0.67)	--- X ---
FDD * HEDM			-0.62 (0.51)	0.11 (0.43)		0.07 (0.58)	--- X ---		-0.10 (0.88)	0.01 (1.04)
Observations	3119	3119	3119	3119	3090	3090	3090	3027	3027	3027
R-sq	0.96	0.97	0.95	0.95	0.93	0.93	0.93	0.89	0.89	0.89

Industrial disputes and tariff reductions as indirect channels

The analysis so far has only looked at the differential effects of a national level policy across state and industry categories. While the research goals of this paper are primarily concerned with the operating channels for financial deepening, the analysis would be incomplete without a treatment of tariff reductions. Doing so will provide a context for earlier analysis but is also an important issue in its own right. As mentioned earlier, financial repression, along with licensing restrictions and high tariffs formed a troika of constraints plaguing the Indian industrial sector, and concerted policy action on trade reforms (tariff reductions) preceded any serious action on the financial front. Attempting to explain industrial performance solely in terms of financial liberalisation, to the exclusion of tariff reductions, will miss a vital element of the overall macroeconomic action, and could bias the results by erroneously attributing the effects of tariff reductions to financial policies.

This section hypothesises and tests a link between financial development and tariff reductions, and how their interaction affects industrial outcomes. Specifically it tests *whether tariffs reductions have a generally positive impact on output, and whether financial development has enhanced these benefits across industries with different financing needs*. Such a strategy is important for several reasons. First, this would represent an alternative indirect operating channel through which financial development could benefit industries. The results of section 1) showed that the overall effects of tariff reductions on output were inconclusive (and perhaps even negative). This is clearly unreasonable, and inconsistent with general consensus regarding the positive effects of tariff reductions on output. Tariff reductions will theoretically benefit those industries that depend most on imported inputs, but are constrained by high tariffs. Reductions in import costs would then increase imports of intermediate inputs. This would also help isolate the effects of tariff reductions on import-dependent industries from the effects of financial development on financially-constrained ones. While a more preferred approach would be to directly test this effect, lack of reliable data on import intensities at the 2-digit level prevents this. The lack of data notwithstanding, it may be the case that industries requiring imported inputs face financial constraints independent of those associated with high tariff costs.²⁶ Increased financial depth should theoretically help alleviate some of these constraints, and facilitate imports of intermediate inputs. Second, empirical validation of this operating channel would control for both the indirect labour and direct capital operating channels, results for which was conclusively established above. Failure to do so could bias the results. Most importantly, empirical testing of all these alternative operating channels will help form a comprehensive commentary on just how financial development provides a stimulus for the industrial sector, and where it falls short. The policy implications of such an exercise are immense.

Results for the disaggregated effects of tariff reductions are in the table 7 below. The results for state-level variations are exactly consistent with the relevant results above, and are not shown for reasons of brevity.

²⁶ This may be because imported inputs may be both technologically superior and more costly relative to domestically produced alternatives. Their desirability due to superior embodied technology and price tag would then represent a benefit-cost trade-off for firms.

Table 7: Effects of Tariff Reductions

	<u>Log Output</u>		<u>Log GFCF</u>	
	(1)	(2)	(3)	(4)
Financial Depth Dummy (FDD)	-0.31 (0.35)		-0.77 (0.46)***	
Log Tariff		-0.81 (0.36)**		2.32 (0.20)*
FDD * Log Tariff		-0.26 (0.10)**		0.20 (0.19)

Mandays		-3.59 (0.44)*		-4.51 (0.69)*
FDD * Mandays		1.30 (0.36)*		0.47 (0.53)

Negative External Dependence *	0.05	0.25	1.64	-0.41
Tariffs (NEDT)	(0.48)	(0.36)	(0.56)*	(0.52)
Moderate External Dependence *	-1.06	-0.11	1.87	-0.005
Tariffs (MEDT)	(0.39)*	(0.20)	(0.77)**	(0.47)
High External Dependence *	-0.76	<i>dropped</i>	<i>dropped</i>	<i>dropped</i>
Tariffs (HEDT)	(0.46)***			

FDD * NEDT	0.02 (0.06)	0.05 (0.11)	0.05 (0.14)	-0.08 (0.16)
FDD * MEDT	-0.19 (0.09)**	-0.14 (0.05)**	0.37 (0.17)**	-0.12 (0.10)
FDD * HEDT	-0.46 (0.11)*	-0.39 (0.08)*	-0.31 (0.10)*	-0.13 (0.11)

Observations

R-sq

Columns (1) and (2) show alternative specifications of the effects of tariff reductions on output, while columns (3) and (4) show the same for GFCF as dependent variable. Results for gross value added are similar to those for output, and are excluded here. Column (1) only focuses on how financial development has augmented the effects of tariff reductions, with high dependence industries as the control variable, but ignores the direct channel effect of financial development. The coefficient of *ltariff* (-0.81) is significant at 5% level, which shows that tariff reductions had a positive impact on output in low dependence industries prior to 1998. The negative coefficient on *FDD*ltariff* interaction (-0.26) implies that these industries experienced additional gains after implementation of the Credit Policy. Tariff reductions did not have any statistically significant impact on industries with negative or moderate external dependence before financial deepening, and no additional benefit for negative dependence industries after deepening. Both moderate and high dependence industries had increased gains from tariff reductions after 1997, with high dependence industries expectedly gaining the most relative to all other groups (-0.39). This improvement is almost 2.5 times than for moderate dependence industries and 1.5 times than for low dependence industries. Column (2) explicitly controls for the direct effect of financial development by including the *FDD* dummy. Relative to industries with low external dependence, negative dependence industries did not gain from tariff reductions, either before or after 1998. Before 1998, tariff reductions yielded greater benefits for industries with moderate dependence than for high dependence ones (-1.06 vs -0.76). But this pattern reversed with increased financial development, with incremental gains for high dependence industries being more than twice those for moderate dependence industries (-0.46 vs -0.19). These results clearly indicate the possibility that *industries with high external dependence*

needed imports that were themselves costlier, and this placed additional financial constraints on these industries. However, increased access to finance (from financial depth) has served to greatly alleviate these constraints; this is conclusive evidence for the second indirect operating channel for financial development, i.e. by facilitating increased imports of needed intermediate inputs. The negative but statistically insignificant coefficient on *FDD* (-0.31) shows that for all industry categories as a whole, increased financial depth has been neither beneficial nor detrimental.

Concluding Remarks and Policy Implications

The analysis thus far has been quite comprehensive, covering a range of issues. This section summarises the key results, and offers additional insights and possible explanations for the observed results. The primary focus of this paper relates to the effects of a financial policy implemented at the national level on industrial outcomes at state level. To this end, an effort has been made to identify not just the effects of the financial policy, but more importantly, *how* these effects flow. Capital and labour are both inputs for the production process, and constraints on these are constraints on final output. How increased financial depth interacts with both inputs determines their relative impact on output constraints. Finally, how are these effects conditioned by variations in industrial characteristics and state-level regulatory provisions? The paper makes 4 main contributions: It links finance and labour demand through contract labour, as an operating channel. Increased finance has led to increased employment. To the extent that this reflects increased contract labour, increased financial access has reduced effects of industrial disputes; it also brings both capital and labour into the same framework (through the effective constraints on these). The only other framework for doing so is a standard production framework, which uses actual input values; It establishes the relative importance of operating channels in terms of actual output results; and finally, the paper extends results of ABRZ beyond India's federal structure, to industrial characteristics. A consistent result is that financial depth has failed to benefit industries with the greatest need for dependence on external finance. Hence the paper makes significant contributions in the areas of industrial finance, labour market regulations, and the interaction of state and industry effects across the policy spectrum.

The paper also presents evidence that increased financial depth mainly benefits industrial output *indirectly*, by reducing the effects of industrial disputes and by facilitating imports in industries that are likely to be most dependent on imported inputs. Increased financial depth did not, however, yield the expected *direct* benefit, i.e. of facilitating capital accumulation. This suggests that increased financial depth alleviates working capital constraints of firms but not investment capital constraints. Positive indirect effect but ineffective direct impact, contribute to an overall situation of poor industrial growth. The stylised pattern of falling industrial growth rates (at all levels of aggregation) provides context for these results. Increased financial depth cannot take the place of systematic labour reforms or trade policy, but can at best augment the good effects that will flow from reforms in these areas. This clearly makes an empirical case for comprehensive labour reforms, which must be treated as important in their own right and not made subservient to financial reforms. To have a real significant effect, financial policy will have to focus on *how* it can directly benefit industries, and where it might be currently falling short.

In terms of capital accumulation, industries needing finance to grow may face two types of constraints. First, it may be that the markets are narrow and there is little availability of finance to begin with. Alternatively, the primary constraint may arise from the quality of intermediation, with banks' inability to assess credit worthiness of borrowers making the

former more risk averse, and making them unwilling to lend to all but the safest 'bets'. The quality of intermediation²⁷ is closely linked to the issue of information – borrowers not having enough credit history or length of operation to convey to banks, and banks not having information to assess credit worthiness through other means. Indian industries have faced both types of constraints at different stages (pre- and post-reforms). Before the 1991 reforms, Indian capital markets were very narrow, and after reforms (and especially after entry of foreign banks), capital markets improved a lot, but banks became more risk averse in their lending. This risk aversion of banks was the defining characteristic of the early post-reform years (up till 1997), and represented the main constraint for firms.

The results clearly show that improved financial depth after 1997 has not resulted in expected increase in capital accumulation. The remaining plausible cause must be associated with the intermediation. Just as lack of financial depth is the hallmark of a weak, repressed financial system, effective intermediation and channelling of resources to the most productive uses characterise a healthy, vibrant financial system. Therefore, in addition to highlighting the need for comprehensive labour reforms, these results also identify a pressing priority for financial policy-makers: that of ensuring that increased financial depth is accompanied by better quality of intermediation, so that firms (especially newer ones) can get access to much-needed financing. The basic dichotomous dilemma facing financial policy-makers can be articulated thus: one on hand, if reforms lead to the rise of new firms, they will by default not have the long history of operations needed to establish their credit worthiness with banks. This can be done only with time, and probably studies using later data may validate this point. On the other hand, it can be argued that a sign of a developed, mature financial environment is the reduced dependence on banks as primary source of financing, with capital markets playing an increasingly important role. So if firms are not being able to access the capital markets, it needs to be investigated whether a deeper problem is at play.

²⁷ As discussed in the literature review, quality of intermediation is one of the operating channels investigated in many cross-country studies.

Data Appendix: Explanations and Sources

The comprehensive dataset, including output, value-added, employment, and capital is an unbalanced panel of 22 industries at the 2-digit level of the National Industries Classification (NIC), 15 major states of India, and an 11 year time span covering the years 1992-2002. The unbalanced panel is due to the fact that data for some industries is not available for all the years, while some industries are not active in all the states. The unbalanced panel is preferred over the balanced option because the latter effectively involves ‘throwing away’ some observations which, despite absence of their full series, nevertheless contain important information. The 15 states account for about 95% of India’s population. The industry-level data is for the registered manufacturing sector in India, which overall represents about 58-67% of total manufacturing (Unel, 2003).

Output and Gross Value-Added: the log of real output and gross value-added, disaggregated at 2-digit industry-state level, is obtained from the Annual Survey of Industries. The deflator used is wholesale price index (WPI), obtained from the Reserve Bank of India (RBI) website.

Dependence on External Finance: this is a categorical variable, taken from Rajan and Zingales (RZ, 1998). The ISIC industrial classification used by RZ is highly similar to the NIC classification used for this study, resulting in a one-to-one concordance in most cases. In the few cases where an industry in the NIC classification corresponds to more than one industry in RZ, a weighted average is taken²⁸. Industries are categorized from 1 to 4 according to the following criteria²⁹:

- Low but positive dependence (between 0 and 0.4) = 1
- Negative dependence (i.e. excess internal cash flows) = 2
- Moderate dependence (0.4 to 1) = 3
- High dependence (>1) = 4

Tariffs: data on log tariffs (aggregated at 2-digit level of the NIC classification) is obtained from Topalova (2004). I did not have access to the actual data, so the tariff series were inferred from the industry-wise graphs contained in Topalova’s paper. The tariff series I created may have minor errors due to this (around 1-2% points), but this is not a problem, since the *relative rankings* in tariffs across industries are still maintained.

Industrial Disputes: this is a consolidated measure for industrial disputes across states, obtained by interacting *mandays lost due to industrial disputes* with the *state labour regulation* measure first developed by Besley and Burgess (BB, 2004), and extended by Aghion et al. (ABRZ, 2008). The State labour regulation measure of BB is based on amendments to the Industrial Disputes Act of 1947 (IDA), which sets out the broad procedures to resolve industrial disputes³⁰. BB and ABRZ code each amendment as either

²⁸ For example, Rubber and Plastics are classified as different industries in ISIC but in the same 2-digit group in NIC. The consolidated dependence value used for this study is a weighted average of the two, with the weights being determined from the combined output for the two industries. Incidentally, Rubber and Plastics have very different dependencies (0.23 and 1.14, respectively), so a weighted average might distort the results somewhat; this is an important but unavoidable weakness that needs to be acknowledged.

²⁹ A full mapping of industry codes between RZ and this paper, and the categories assigned to industries are available from the author upon request.

³⁰ Consistent with India’s federal structure, the Indian Constitution puts industrial relations within the joint jurisdiction of the Central and state governments, and gives the latter authority to make state-level amendments to the main Act. Numerous amendments by states over the years have made the Act highly heterogeneous in its effective impact across states.

pro-employer (-1), pro-worker (+1) or neutral (0), and add these scores over time to get cumulative measure for each state. Negative and positive scores signify employer and worker orientations, respectively, while absolute scores give the extent of this orientation. This measure has been criticized as both erroneous (Hasan et al., 2007) and inadequate (Bhattacharjea, 2006). Hasan et al. highlight the glaring inconsistency in the original measure wherein both Maharashtra and Gujarat are categorized as pro-worker and Kerala as pro-employer, when in fact the opposite scenarios are universally held true. Accordingly, they reverse the signs for these states' scores. The present study also adopts this modification. Finally, the last amendment to the IDA by any state was in 1989, while my dataset starts in 1992. Therefore, unlike in ABRZ,³¹ the labour regulation measure in my dataset does not show any variation. The only way I can isolate the effects of this variable from other (unobserved) state fixed effects is by treating it like a categorical variable. The final cumulative scores and associated categories are: Strongly Pro-Employer (-2), Pro-Employer (-1), Neutral (0), Pro-Worker (+1) and Strongly Pro-Worker (+4).

A final modification involves interacting the labour regulations categorical variable with state-level data on *mandays lost due to industrial disputes*. The basic idea is that both these variables are incomplete in themselves, but their interaction will provide a more accurate picture of the labour relations/unrest across states. For example, *the same number of mandays lost will have a less disruptive effect in Andhra Pradesh (the most pro-employer state) than in West Bengal (the most pro-worker state)*. Also, the state data on mandays lost is divided by employment in the associated state-industry. This unusual strategy is useful for two reasons: first, it increases the variation from state level to state-industry level,³² and second, it gives some indication of relative importance of labour unrest for different industries in a given state. Consider, for example, two industries (A & B) within a same state, with employment in A being larger than in B. The *mandays lost* variable will be the same for both industries. So the ratio ((mandays lost/employment_A) will be less than the ratio ((mandays lost/employment_B), which means that labour unrest will have a smaller *proportional* impact on larger industries, and vice versa, *ceteris paribus*. Data on *mandays lost* is obtained from multiple issues of the *Handbook of Industrial Policy and Statistics*.

Adopting the amendments of Hasan et al. (2007) gives a categorization of states which, to anyone familiar with Indian states, will be considered perfectly reasonable:

Strong Pro-Employer: *Andhra Pradesh, Maharashtra, Tamil Nadu*

Pro-Employer: *Gujarat, Karnataka, Rajasthan*

Neutral: *Assam, Bihar, Haryana, Madhya Pradesh, Punjab, Uttar Pradesh*

Pro-Worker: *Kerala, Orissa*

Strong Pro-Worker: *West Bengal*

³¹ The dataset by Aghion et al (2008) spans the years 1980-1997, so the labour regulation measure in their data has intra-state variation in it.

³² Without this modification, the consolidated *dispute* term would involve the interaction of *labour regulation* (which is time invariant at state level), and *mandays lost* (which varies across time and states, but is not disaggregated by industry). By dividing the *mandays lost* by industry employment in the relevant state, each data point is different, with the variable having total variability.

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