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# *Wages, unions, and labour productivity: evidence from Indian cotton mills*[1]

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Clark and Wolcott attribute the low productivity of Indian cotton textile workers to their preference for low work effort, and suggest that unions resisted an increase in work intensity. This article argues that low wages were due to surplus labour in agriculture. Low wages allowed the persistence of managerial inefficiencies and resulted in low productivity and work effort. It uses firm-level data from all the textile producing regions in India to examine the relationship between unions and labour productivity. The findings show that fewer workers were employed per machine in the unionized mills in Bombay and Ahmedabad, compared to the mills in less unionized regions. These findings suggest that unionization increased wages and compelled managers to raise productivity

Why are there large differences in labour productivity across countries? Standard economic theory emphasizes cross-country differences in capital employed per worker. In a well-known paper, Clark compared labour productivity in cotton mills in different parts of the world in the early twentieth century and argued that although capital inputs were comparable, there were great differences in labour productivity. Clark suggests that labour productivity differences determined wage differentials across countries.[2] Developed countries such as the US and Britain had high labour productivity, which resulted in high wages, while poor countries such as India and Japan had low productivity and low wages. Clark goes on to argue that cultural factors may well explain the differences in work effort.[3] Wolcott and Clark extend this argument to explain the divergent trajectory of wages and productivity between Japan and India in the subsequent period.[4] They claim that Japanese workers increased their work effort over time and consequently earned higher wages. On the other hand, work norms in the Bombay cotton mill industry remained static. Wolcott and Clark argue that India's lower efficiency was due to worker resistance to higher effort. Wolcott attributes worker resistance to unionization of cotton mill workers and lifelong employment contracts. According to this view, a labour force of young female workers gave Japanese industry a

[1] This article is dedicated to the memory of Raj Chandavarkar to whom I owe many discussions and the encouragement to revisit the history of cotton mills in India. I thank V. Bhaskar, Steve Broadberry, Greg Clark, Nick Crafts, Santhi Hejeebu, Morris D. Morris, Peter Lindert, Jeff Williamson, and Gavin Wright; the participants of the Business History Conference in Lowell, the World Congress in Cliometrics in Venice, and seminars at the London School of Economics, and the Universities of Iowa, Davis, Warwick, York, Jerusalem, Boston, and Southern Illinois for comments; and three anonymous referees for valuable suggestions. I am grateful to the staff at the Bombay Millowners' Association and the Cotton Mills Federation in Bombay for giving me access to their archives and to the ESRC grant R.ECAA 0039 for financial support. The errors are mine alone.

[2] Clark, 'Why isn't the whole world developed?'.

[3] See also Clark, *Farewell to alms*, pp. 353–65.

[4] Wolcott and Clark, 'Why nations fail'.

decisive advantage in pushing through organizational change that increased labour productivity.[5]

This article takes a critical look at the arguments of Clark and Wolcott and offers alternative explanations. While the observed correlation between wages and labour productivity across countries is clear, the direction of causality is more difficult to understand. Did low wages in industry result from low effort, as Clark argues, or did low wages lead to low effort? In this article it is argued that in India in the early twentieth century, the wage rate was determined in agriculture, which employed an overwhelming share of the workforce. In this labour surplus economy, where the marginal product of labour in agriculture was close to zero, the industrial wage was low, as the Lewis model predicts.[6] Low wages in the cotton mills created little incentive for managers to bring about productivity-enhancing changes. Low labour productivity in cotton mills was a consequence of low wages.

A second question concerns the relation between worker militancy and labour productivity. Did labour unions resist increases in productivity? This article uses a new data set of cotton mills from all regions in India. Unionization and worker militancy differed greatly across the regions. This article also uses the regional variation in unionization to test whether the militant workers in the cotton mills in Bombay were less productive, finding that regions with higher wages had higher labour productivity. These were also regions where the workers were unionized. The presence of unions did not lead to lower productivity. On the contrary, by raising wages the unions contributed to raising labour productivity in the region. This reinforces the argument that the causality may go from wages to productivity.

The article is organized as follows: section I re-examines the arguments of Clark and Wolcott. Section II presents a simple model of wage–effort trade-off. Section III discusses the organization of the industry and the factors that may explain high labour use per machine. Section IV looks at the relationship between unionization and wages. Section V presents an empirical analysis of firm-level data to quantify labour use in different regions. The indicator of labour use employed here is the total number of workers employed daily. Section VI analyses the evidence for workers' preferences related to wage and effort, and the role of institutional factors in determining the level of effort. Section VII concludes.

## I

In 1910, British cotton mills used 3.8 plain looms per worker, New England mills 8.0, Japanese mills 1.6, and Indian mills 1.9.[7] While these differences can be explained in terms of factor prices, it was not the case that capital productivity was higher in the poor countries. In the 1920s, if we normalize output per spindle-hour in Britain at 100, then output per spindle-hour in the US was 105, in Japan 115, and in India 99.[8] Indian mills employed more workers per machine, but did not have higher capital productivity. A spinner in Bombay attended 180–200 mules compared to 500–600 in Britain. A weaver in Bombay operated two looms, while

[5] Wolcott, 'Perils of lifetime employment', pp. 302–24.
[6] Lewis, 'Economic development', pp. 139–91.
[7] Clark, 'Why isn't the whole world developed?'.
[8] Ibid.

a weaver in Britain was responsible for 4–5 looms.[9] The work rate per hour of Indian doffers was one-sixth that of their US counterparts and one-quarter that of their British counterparts.[10] Other estimates put the productivity of labour in Indian mills at less than half of their British counterparts.[11] Clark claims that worker quality in terms of stature and education cannot explain differences in efficiency across countries. He attributes low labour productivity to a low level of effort that reflects preferences or cultural differences.[12] Consequently, low productivity is a determinant of low wages.

Clark sees low labour productivity as a determinant of low wages. However, this view is inconsistent with a competitive labour market, where textile workers made up only a small fraction of the total workforce. In India the entire industrial workforce was less than 10 per cent of the total labour force, and cotton textiles had an even smaller share. Thus the wages of cotton textile workers were not determined by the level of labour productivity in cotton textiles, but mainly by the general level of wages in the economy. If textile workers were substantially more productive, this would mainly be reflected in higher profits, with only a small effect on wages.

The Indian economy in the early twentieth century had all the characteristics of a labour surplus economy, where the marginal product of labour in agriculture was close to zero. The Lewis model of a dual economy suggests that surplus labour in the traditional sector keeps wages low in the modern sector. Over 75 per cent of the workforce in India was employed in agriculture, producing just over 50 per cent of the national output.[13] A disaggregated picture of non-agricultural employment shows that only 10 per cent worked in industry, 1 per cent in transport, and just over 5 per cent in commerce.[14] The rural–urban wage gap led to migration. The wage rate in agriculture was close to subsistence level, due to the low marginal product of labour. The urban wage was a mark-up on this outside option and was therefore constrained to remain close to that level as long as there was surplus labour in agriculture. This is true not only of wages in the industrial sector, but also in other non-agricultural sectors, such as transport and trade.[15]

Wages in Indian agriculture stagnated over the next few decades. Yield per acre stagnated between 1890 and 1916 and declined thereafter until 1946.[16] The Japanese economy shows a different picture. Labour productivity in agriculture doubled during the period 1885–1915, and the increase in agricultural output accounted for 40 per cent of the rise in national income, paving the way for industrial growth.[17] Rising productivity in agriculture increased wages. The rural–urban wage gap was small before 1910 and increased thereafter as the capital

[9] Rutnagur, 'Bombay industries', p. 323.
[10] Clark, *Farewell to alms*, p. 359.
[11] *Indian Textile Journal* (hereafter ITJ), various issues.
[12] Clark, 'Why isn't the whole world developed?'.
[13] Sivasubramoniam, *National income of India*, pp. 33–4, 377.
[14] Ibid., pp. 33–4, 377.
[15] The low productivity of labour in other urban activities in India, such as the railways, as shown in Clark, *Farewell to alms*, can also be explained in terms of low wages in a labour surplus economy, where the traditional sector employs an overwhelming share of the workforce and the transport sector employs only 1%. So the wage in all sectors is determined by the wage in agriculture.
[16] Blyn, *Agricultural trends in India*, pp. 316–17.
[17] Johnston, 'Agricultural productivity'.

 

Table 1. *(a) Changes in real wages: Japan and India (b) Changes in wages and cost of capital: Japan and India*

*(a) Changes in real wages: Japan and India*

| | *Japan* | *India* |
|---|---|---|
| 1903–7 | 100 | 100 |
| 1908–12 | 116 | 108 |
| 1913–17 | 116 | 102 |
| 1918–22 | 181 | 119 |
| 1923–7 | 239 | 160 |
| 1928–32 | 295 | 205 |

*(b) Changes in wages and cost of capital: Japan and India*

| | *Japan* | | | *India* | | |
|---|---|---|---|---|---|---|
| *Years* | *Capital goods price index* | *Money wage index for cotton spinners* | *Relative price of capital–labour* | *Textile machinery price index* | *Money wage index in cotton mills* | *Relative price of capital–labour* |
| 1903–7 | 100.0 | 100.0 | 1.00 | 100.0 | 100.0 | 1.00 |
| 1908–12 | 103.7 | 125.6 | 0.83 | 106.2 | 112.5 | 0.94 |
| 1913–17 | 131.8 | 148.8 | 0.89 | 196.3 | 130.7 | 1.50 |
| 1918–22 | 258.74 | 429.8 | 0.60 | 336.6 | 219.5 | 1.53 |
| 1923–7 | 232.0 | 525.1 | 0.44 | 242.1 | 252.3 | 0.94 |
| 1928–32 | 174.8 | 465.1 | 0.38 | 204.9 | 265.19 | 0.77 |

*Sources:* Real wage indices have been calculated from Otsuka, Ranis, and Saxonhouse, *Comparative technology-choice*, tab. 5.1, p. 68 (for Japan), and Bagchi, *Private investment*, p. 122 (for India).

intensive sector paid higher wages.[18] Output per worker in cotton textiles increased by 180 per cent between 1907 and 1935.[19]

GDP per capita rose faster in Japan relative to India. In 1870, GDP per capita in Japan was just over 35 per cent more than that of India. By 1913 Japan had twice the per capita income of India and by 1950 three times as much. Per capita GDP grew by 0.54 per cent per annum in India during 1870–1913, about one-third of Japan's growth rate of 1.48 per cent per annum. The corresponding growth rates in India and Japan during 1913–50 were –0.22 per cent and 0.89 per cent respectively.[20] Money wages in Japanese cotton mills increased four times between 1903–7 and 1918–22, while real wages doubled. In Indian cotton mills, money wages doubled during the same period and real wages rose by less than 20 per cent (see table 1a). As wages increased in Japan, sectors producing tradable goods, such as cotton textiles, were compelled to increase labour productivity to stay competitive. On the other hand, the Indian economy stagnated and wages did not rise much until the First World War. The cotton mill entrepreneur faced little pressure to increase productivity.

Table 1b shows the trends in the relative cost of capital and labour in the two countries. In India, the relative price of capital goods increased, whereas in Japan

[18] C. Mosk, 'Japan, industrialisation and economic growth', *EH.Net Encyclopaedia*, R. Whaples, ed. (19 Jan. 2004). URL http://eh.net/encyclopedia/article/mosk.japan.final.

[19] Clark, *Farewell to alms*, p. 347.

[20] Maddison, *World economy*, pp. 264–5; Sivasubramoniam, *National income of India*, p. 33.

the relative price of capital goods declined continuously, creating the momentum for technological change. An Indian worker produced 0.75 pounds of yarn per hour in 1890–4, and this remained static at 0.73 in 1915–19. In Japan, yarn per worker more than doubled, from 0.80 to 1.91 in the same years.[21] As cultural preferences are slow to change, it is difficult to explain the dramatic change in Japan in terms of sudden changes in effort leading to a rise in wages.[22] Wage-driven productivity growth is a more plausible explanation.

Wright discusses the identification problem in the context of the relationship between wages and labour productivity. He argues that if exogenous shocks lead to rise in real wages, then wage increases must be the cause of productivity increases. This was true in the 1920s in the US when prices fell and flows of immigration declined and therefore productivity growth was the response of employers to higher labour costs.[23] Huberman argues that cotton mills in Lancashire in the mid-nineteenth century standardized piece rates and forced the inefficient firms to raise productivity with a given technology. If firms had lower wages, workers would reduce their effort and lower their output.[24] In the Indian context, the First World War constituted such an exogenous shock to wages. As imports were cut off, local production filled the gap and the rising demand for labour increased wages.

There are two possible scenarios. First, if cultural preferences determine low effort and low wages, then exogenous shocks to wages will not raise labour productivity. On the other hand, if it reflects inefficiency rather than workers' preferences, then an exogenous shock that increases wages will cause a rise in labour productivity. In the second case, it can be argued that wages determine productivity. In order to understand why firms operated at a sub-optimal level and what prompted them to become more efficient, the next section sets out a simple model of the wage–effort trade-off.

## II

Let $e$ denote effort, and let us measure effort so that one unit of effort results in one unit of output. Let $p$ denote the price of output, $k$ the capital requirement per worker, and $r$ the interest rate. Let $w$ denote the wage per unit of effort, so that the profits of the firm per worker can be written as

$$\pi = ep - w - rk \tag{1}$$

Turning to the representative worker, let us assume that the utility of the worker, $U(w, e)$, increases with wage, but decreases with effort. Figure 1a shows the typical indifference curve of the worker IC, corresponding to a given utility level. Let us now consider what effort choice would be a *Pareto efficient* arrangement, given the preferences of the worker and the production technology. To do this, we can graph the iso-profit curves of the firm. These are straight lines with slope $p$. An efficient arrangement corresponds to a point of tangency between the worker's indifference curve and the iso-profit curve IP. Thus $e^*$ is the efficient choice of effort in this context.

[21] Wolcott and Clark, 'Why nations fail'.
[22] Mass and Lazonick, 'British cotton industry'.
[23] Wright, 'Productivity growth'.
[24] Huberman, 'Piece rates reconsidered'.

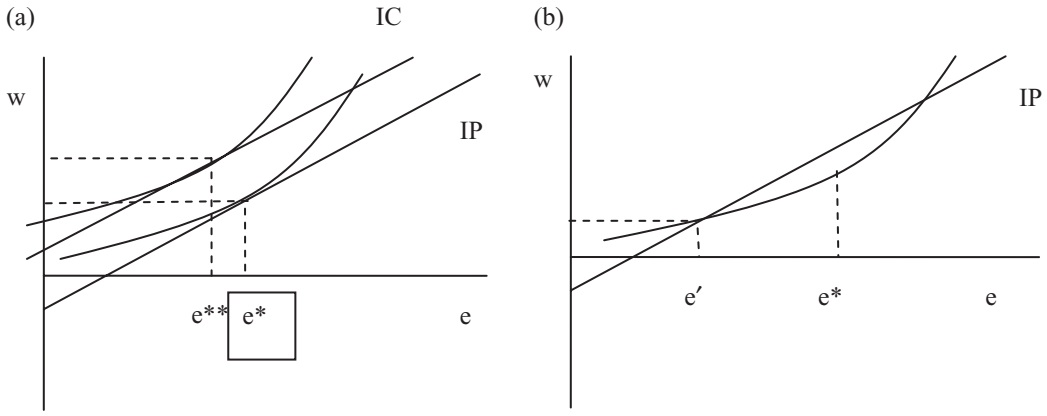


Figure 1. *(a, b) Wage–effort trade off*

There can be many Pareto efficient arrangements, with different distribution of the gains between the firm and the worker. Now suppose that the bargaining power of workers increases, due to unionization. With efficient bargaining, this implies a move to a new efficient point, e**, on a higher worker indifference curve. If income and leisure are both normal goods, as we would expect, then we will have higher wages and lower effort, so that e** < e*. Thus if the initial outcome and final outcomes are both efficient, unionization will be accompanied by a fall in productivity.

Let us now consider the case where existing effort arrangements are inefficiently low, and are at a level *e*' that is less than *e**. This is indicated in figure 1b. Since this is Pareto inefficient, there is a way to make both the worker and the firm better off. This involves an increase in worker effort towards *e**, where the worker is compensated for this by an increase in wage. Here unionization can lead to a more efficient outcome.

Wolcott and Clark argue that low effort reflected workers' preferences, so that arrangements were Pareto efficient.[25] In terms of the analysis presented here, actual effort–wage choices were in fact close to the point *e**, so that it did not make economic sense to increase effort. Clark argues that the failure to raise effort levels in a cotton mill in Madras where automatic looms were introduced is suggestive of worker preference for low effort.[26] According to this view, unions therefore have a detrimental effect on labour productivity.

The second scenario is that actual arrangements were Pareto inefficient; *e*' is well below *e**. so that both workers and firms could be made better off by wage–productivity agreements, where the worker agreed to raise work effort in exchange for higher wages. For this explanation to hold, there must be a reason why the two parties failed to make a Pareto-improving trade. This could be a failure of initiative, possibly based on a lack of information. For two parties to make such an improvement, one of them must recognize the potential for mutual gain, and has to initiate the improvement. The specific institutional structure of management

[25] Clark, 'Why isn't the whole world developed?'; Wolcott and Clark, 'Why nations fail'.
[26] Clark, *Farewell to alms*, pp. 362–5.

 

Table 2. *Social origins of managers in Bombay cotton mills*

| | *Technical personnel* | | *Directors 1925* | | |
|---|---|---|---|---|---|
| | *1895* | *1925* | *Merchants* | *Technical background* | *Lawyers* |
| Parsi | 112 | 201 | 30 | 9 | 10 |
| Hindu | 21 | 67 | 74 | 0 | 3 |
| Muslim | 5 | 6 | 19 | 0 | 0 |
| Jewish | 3 | 11 | 6 | 0 | 0 |
| European | 104 | 113 | 20 | 2 | 2 |

*Source:* Rutnagur, 'Bombay industries', pp. 251–3.

may have created inefficiencies in the system. Unions in this context may play an important role in moving to a more efficient arrangement.

Consider an exogenous shock, such as the First World War. Wages rose due to the demand shock, but when demand fell, as it did after the war, the unions resisted wage cuts. The only way the firms could stay profitable was to raise labour productivity. Therefore unionized firms with higher wages could achieve higher labour efficiency. In order to understand whether this indeed was the case in Bombay cotton mills, the econometric analysis in this article compares firms in Bombay city (hereafter Bombay) with firms in less unionized regions in section V. Sections III and IV discuss the organization and institutional structure of cotton mills in India.

## III

The cotton textile industry was mainly an import-substituting activity, competing with imports from Lancashire. The first cotton mills were set up in Bombay. Initially the main output was yarn for the domestic handloom industry and for export to the Chinese market. Over time, spinning mills bought their own looms and began producing cloth. While Bombay concentrated on producing low-quality yarn, Ahmedabad specialized in higher-quality yarn and cloth and competed with imports from Britain. During the war, the substitution of imports gained momentum and the trend continued after the war. One problem faced by the industry was that each firm produced a variety of output and therefore could not get the benefits from specialization.

However, costs were low as labour was cheap and the raw material was available locally. The industry had a special management structure, whereby a managing agent raised capital and managed the financial side of the business. Production was left in the hands of technical supervisors and labour supervisors, known as jobbers. The agents mostly came from the merchant class and had little technical training. The majority of the agency directors were Indians, who had made money in the cotton and opium trade and moved into industry as profits in trade began to decline.[27] Table 2 shows the background of the directors and of technical staff in Bombay. The managing agents relied initially on the men from Lancashire for the technical side of production. Over the years, Indian technicians filled this impor-

[27] Vicziany, 'Cotton trade'.

tant gap. However, these technicians knew little about the labour market, which was left to the jobber, who was locally recruited.

The process of hiring workers was complicated. India had abundant labour, but mainly concentrated in agricultural activity. The textile industry had to draw its labour from the rural hinterland. This task was assigned to the jobbers, who typically came from the same social background as the workers and used their rural connections to recruit workers for the textile mills. The demand for labour fluctuated due to fluctuations in demand in the product market. About one-fifth of the labour in Bombay cotton mills was employed on a daily basis.[28] The jobbers were given the responsibility of maintaining an adequate labour supply to suit the level of demand as well as the task of worker supervision and maintaining factory discipline. The system allowed quick reductions in employment if the need arose.

The choice of technique was influenced by factor prices. Although the ring was better suited to unskilled labour, the Indian cotton mill industry adopted the mule.[29] Capital was expensive and the mule was relatively cheap in the early period. The cost of setting up a cotton mill was higher in India than in Britain, due to the cost of transporting machinery from Britain and the higher cost of power.[30] Tasks became more labour-intensive per unit of capital and entrepreneurs did little to introduce productivity-enhancing changes. Machines were often operated at a speed higher than the recommended level without introducing cotton of the appropriate quality.[31] It was estimated that a ringsider in India had to deal with nine times as many breakages per 100 spindles as his US counterpart.[33] This increased the number of workers needed to tend to a spindle. One survey estimated that in the 1930s, for every worker employed, two casual workers were available.[33]

Each mill produced a great variety of products and the mule allowed greater flexibility in operation.[34] Once a mill was set up, the machinery was operated for as long as possible. The lower rate of scrapping and replacement of machinery delayed the rate of adoption of rings in older mills. Consequently mules persisted in Bombay, the centre of early development, longer than elsewhere. The mule in India was appropriate for using locally grown short staple cotton.[35] The industry in Japan, on the other hand, switched to the ring at an early stage. Japan imported raw cotton and introduced a technological innovation by mixing short and long staple cotton.[36] Mass and Lazonick attribute an important role to tariffs in the case of the Japanese industry. It fostered development of *appropriate* technology that made Japanese firms competitive.[37] India, on the other hand, pursued free trade until the interwar period under the colonial government. The effective rate protection in

[28] Chandavarkar, *Origins*, p. 82.

[29] The ring vs. mule debate in the context in the British cotton mills focused on the question of entrepreneurial rationality in persisting with the old technology. Did British entrepreneurs make the right choice of technology given the factor endowments or was there an organizational failure?

[30] Buchanan, *Development*, p. 207. Clark, *Farewell to alms*, finds the cost of shipping to the US to be 25% of the value of the machinery.

[31] BMOA, *Annual report* (1928).

[32] Chandavarkar, *Origins*, p. 284.

[33] Ibid., p. 296.

[34] Ibid., p. 341.

[35] Saxonhouse and Wright, 'New evidence'.

[36] Otsuka et al., *Comparative technology-choice*, pp. 55–7.

[37] Mass and Lazonick, 'British cotton industry'.

 

spinning in Japan on the eve of the First World War was 120 per cent and in India zero.[38] An alternative view has emphasized the lack of technical knowledge of the managing agents and the presence of British technical personnel as the cause of India's failure to switch to ring spinning.[39] Mixing of cotton was not adopted in India due to the lack of incentives and also due to the managers' lack of technical knowledge.[40] The Tariff Board in 1927 saw high labour use per machine as an organizational problem:

> We cannot too strongly emphasise that no increase in outturn per operative can be reasonably expected unless they are provided with proper raw material. There undoubtedly exists a tendency in India to spin higher counts of yarn from cotton than the quality of cotton warrants. This reduces production, is injurious to quality and increases the work of the operative in both spinning and weaving by the large number of breakages.[41]

## IV

In the first decades of the twentieth century, labour in the cotton mills was still unorganized. Resistance to low wages and working conditions was sporadic and lacked centralized organization. Industrial action in Bombay and Ahmedabad was mainly against wage cuts. Spontaneous protests by textile workers in Bombay had been a part of the industry from its beginning. The early protests started in one mill and spread to others. The wave of strikes in 1900–1 came in response to wage cuts in 20 mills, resulting in 20,000 workers going on strike for 10 days.[42] By the mid-1920s these protests were coordinated by the trade unions.

Wages rose during the war in response to increased demand. While money wages in Bombay, Ahmedabad, and Calcutta[43] had been comparable before 1914, wages rose sharply in Bombay and Ahmedabad thereafter (see figure 2). The average wage in Bombay was 20 per cent higher than the average wage in Ahmedabad on the eve of the First World War. During the war, cotton mills paid a war bonus of 10 per cent from 1917 to be followed by a 'dear food allowance' of 15 per cent from 1918.[44] Between 1914 and 1921, wages rose by 87 per cent in Bombay and by 122 per cent in Ahmedabad.[45] Table 3 shows a comparison of wages in the two cities and the rest of Bombay Presidency in 1929. Clearly the difference in wages between Bombay and Ahmedabad was marginal, but these amounts were higher than those paid to workers in other textile producing regions.

When demand conditions changed at the end of the war, the response of the majority of firms was to reduce wages. It was when firms tried to cut wages that resistance erupted on the shop floor. As early as 1900, a commentator wrote: 'The

[38] Otsuka et al., *Comparative technology-choice*, p. 70.
[39] Kiyokawa, 'Technical adaptations'.
[40] Ibid.
[41] BMOA, *Annual report* (1928).
[42] Morris, *Emergence*, pp. 178–9.
[43] Calcutta was the other major industrial centre, although the main industry there was jute rather than cotton.
[44] Kooiman, *Bombay textile labour*, pp. 51–2.
[45] Bombay Labour Office, *Report on enquiry* (1923).

 

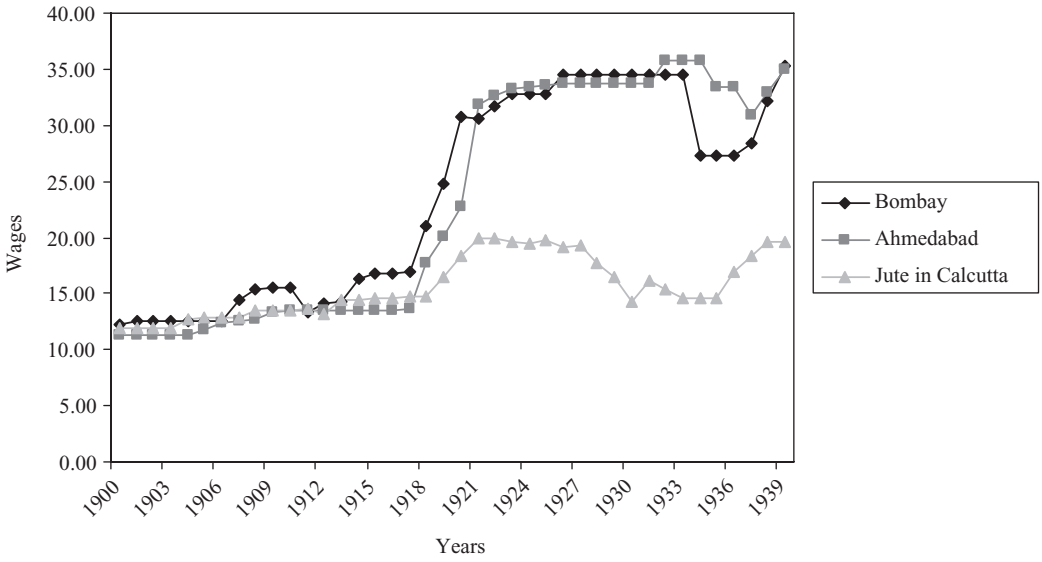


Figure 2. *Money wage in the cotton textiles industry*

Table 3. *Wage differential in Bombay Presidency, 1929 (daily average earning in rupees)*

| | *Bombay* | *Ahmedabad* | *Sholapur* | *Baroda* | *Others* |
|---|---|---|---|---|---|
| Men | 1.45 | 1.39 | 1.00 | 1.03 | 1.00 |
| Women | 0.78 | 0.80 | 0.40 | 0.57 | 0.54 |
| All workers | 1.26 | 1.24 | 0.80 | 0.95 | 0.87 |

*Source:* Pearse, *Cotton industry*, p. 109.

principal reason why people go on strike is that of wage reduction. In the cotton mill industry, mill agents have thought that the reduction in wages is the first remedy against hard times'.[46]

The first strike action that affected the entire industry in Bombay occurred in December of 1918 and involved 125,000 workers.[47] In 1919, 150,000 workers went on strike for 12 days, followed by a general strike in 1920 that lasted for a month.[48] The disputes continued into the 1920s in response to cuts in wartime payments. By this stage, trade unions had established a strong presence in the industry. A strike in 1925 lasted several weeks. As several cotton mills in Bombay sought to introduce a higher workload, the trade unions organized industrial action in 1928 that lasted over six months. The year 1929 saw further industrial action by the communist-led union, but this was opposed by the moderates and did not have the same effect as the strike in the previous year.[49]

[46] *ITJ* (Feb. 1900).
[47] Buchanan, *Development*, p. 427.
[48] Bombay Labour Office, *Report on enquiry* (1926).
[49] Morris, *Emergence*, pp. 181–4.

Worker resistance to a reduction in wages was not specific to Bombay. Wage cuts in the cotton textile industry in the southern US in the 1920s had led to resistance even among non-unionized workers.[50] Wright argues that once wages have risen due to an exogenous shock, rational employers are willing to take that wage rate as given and increase the productivity of capital and labour.[51] Domenech's work on the non-unionized Catalan cotton textile industry in the late nineteenth century finds that workers resisted wage cuts, as in more unionized countries, and firms adjusted by reducing output and hours of work in the downturn.[52] In the Bombay cotton mills in the interwar years, attempts at wage cuts led to industrial action. On the other hand, reducing total employment proved easier due to the large number of casual workers employed on a daily basis. Aggregate employment declined in the cotton mills in Bombay from the late 1920s.

There were protests against cuts in wages in Ahmedabad too. With Gandhi's involvement, workers in Ahmedabad sought consensual solutions through industrial arbitration. This period coincided with economic nationalism in the anti-imperialist struggle. The principle of arbitration was helped by shared interests between the workers and the capitalists in the boycott of foreign goods.[53] However, sporadic industrial action continued in the early 1920s and not all firms supported the principle of arbitration. In 1923 the industry implemented a wage cut of 15 per cent and for the rest of the decade industrial arbitration dealt with issues such as health, education, and housing rather than wages.[54] In comparison to Bombay, industrial relations in Ahmedabad remained more peaceful.

In Bombay cotton mills, 42.5 per cent of the workers were in trade unions, compared to 29 per cent in Ahmedabad, and only 5 per cent in Sholapur.[55] Textile workers in Delhi did not have a union, and the union in Madras had a relatively low-key presence.[56] The jute labour union in Calcutta, the other major industrial region, did not succeed in involving the workers in a strike in 1929 and represented only 4 per cent of the workforce.

There is no information on the number of strikes and workers involved in textile mills for the whole of India. However, there is a lot of qualitative evidence that shows that Bombay was the centre of industrial action in the cotton textile industry. Table 4 shows the incidence of all industrial disputes across different regions of the Bombay Presidency, where the majority of the textile firms were located. Of the 401 strikes in Bombay accounting for 91 per cent of the working days lost, an overwhelming 79 per cent were in textile mills.[57] Rough calculations show that the number of working days lost account for 12–13 per cent of the total in Bombay.[58]

The effect of unionization on labour productivity has been debated in the context of industrialized economies. Freeman and Medoff argue that unions can

[50] Wright, 'Cheap labour'.
[51] Ibid.
[52] Domenech, 'Labour market adjustment'.
[53] Patel, *Making of industrial relations*, pp. 54–6.
[54] Ibid., pp. 64, 81–4.
[55] Bagchi, *Private investment*, p. 140.
[56] Ibid.
[57] Pearse, *Cotton industry*, p. 95.
[58] The calculations have been based on a nine-year period, 1921–9, and therefore do not correspond exactly to the period covered by tab. 4. The total workers in Bombay have been multiplied by 50 or 52 weeks and have been assumed to work six days a week.

 

Table 4. *Industrial disputes in Bombay presidency: April 1921–June 1929*

| | *No of disputes* | *No. of workers involved* | *No. of working days lost* |
|---|---|---|---|
| Bombay | 401 | 1,077,927 | 49,297,817 |
| Ahmedabad | 221 | 135,200 | 2,605,087 |
| Sholapur | 10 | 39,484 | 1,214,434 |
| Viramgam | 8 | 3,705 | 32,854 |
| Broach | 22 | 8,966 | 85,022 |
| Karachi | 14 | 9,893 | 395,554 |
| Jalgaon | 7 | 4,445 | 56,990 |
| Surat | 12 | 4,840 | 35,254 |
| Poona | 11 | 3,763 | 40,903 |
| Rest | 32 | 21,228 | 181,399 |
| Bombay presidency | 738 | 1,309,511 | 53,949,314 |
| Share of textile mills | 612 | 1,233,170 | 52,450,814 |
| Bombay | n.a. | n.a. | 48,259,737 |
| Ahmedabad | n.a. | n.a. | 2,604,737 |
| Sholapur | n.a. | n.a. | 1,214,434 |

*Source:* Pearse, *Cotton industry*, p. 95; Bagchi, *Private investment*, p. 143.

increase labour productivity by reducing labour turnover and improving managerial practices.[59] The presence of unions can increase productivity by making managers keen to reduce organizational slack.[60] The empirical evidence is mixed. Research using data from US industries shows that unions had a positive effect on labour productivity.[61] The UK evidence is less clear-cut. Recent work suggests that multi-unionism has had a negative effect on productivity in the UK, while in Germany cooperative practice through work councils has had a positive effect on productivity.[62]

How did the presence of unions in Bombay and Ahmedabad affect labour productivity? Wolcott and Clark argue that in the 1920s, when cotton mills were under pressure to increase productivity, worker militancy in Bombay cotton mills prevented organizational change.[63] Wolcott and Clark's analysis does not allow inter-regional comparison. Consequently, their estimation does not identify whether worker resistance prevented increases in labour productivity relative to other regions in India. With the new data set of cotton mills from all regions in India, it is possible to compare Bombay to the rest of India and test empirically whether Bombay mills had lower labour productivity. This makes it possible to identify the effect of workers' militancy on labour productivity in a particular region.[64] The empirical analysis is presented in the next section.

## V

One way to analyse the role of unions is to compare labour productivity across different regions in India. In the absence of firm-level output data, the measure of

[59] Freeman and Medoff, *What do unions do?*, pp. 162–80.
[60] Metcalf, 'Unions and productivity'.
[61] Brown and Medoff, 'Trade unions'; Allen, 'Unionisation'; Clark, 'Unionisation'.
[62] Metcalf, 'Unions and productivity'.
[63] Wolcott and Clark, 'Why nations fail'.
[64] There is some information, although not systematic, on strikes in different cities. This again is at the level of the region and not the firm, and therefore a regional dummy is a good measure.

 

labour productivity used here, as in Wolcott and Clark, is labour use per machine, defined as the number of workers per machine.[65] This captures total factor productivity if machines are the same across cotton mills in all regions.[66] Given that machines were similar and sold by a handful of machinery producers, this is not a bad measure.

If organized labour resistance was important in influencing work norms, Bombay should have had a higher use of labour per machine compared to other regions. On the other hand, if union activity mainly prevented wage cuts and/or higher wages forced employers to initiate productivity increases, one should find that Bombay had higher labour productivity and fewer workers per machine. Secondly, Bombay and Ahmedabad, with similar levels of wages in the 1920s, should show similar levels of labour use. A comparison with Ahmedabad is also of interest as the two regions had different experiences of labour resistance. Did cooperation rather than conflict lead to efficiency gains in Ahmedabad? If labour resistance explains inefficiency then Bombay should have employed more workers per machine relative to Ahmedabad.

Wolcott and Clark used firm-level data from Bombay from the annual reports of the Bombay Millowners' Association (hereafter BMOA). The statistical appendix of the BMOA reports includes firm-level information from other regions in India, which have been put together here with the original data used by Wolcott and Clark. This is the first time such a data set has been analysed. The data used here are at the level of the firm and provide information on the number of workers employed daily in each firm and the machinery used. The latter is available by category (that is, mules, rings, and looms). The data are for the years 1889, 1910, 1917, 1929, and 1933. Firm-level information for 1889 is being used here for the first time, and allows us to go back to the period when worker resistance had yet to make an impact on the industry. It is helpful to consider the year 1910, as it is before the war and is also the year used in Clark's international comparison.[67] The year 1917 reflects a situation of increased output in the industry as a result of the war. The years 1929 and 1933 are of particular interest as these follow a decade of labour strife.

Table 5 shows the use of capital and labour in cotton mills in different regions. Here the focus is on Bombay relative to Ahmedabad and the rest of India. Bombay had the highest concentration of cotton mills in 1889, while Ahmedabad was still marginal. By 1910 both cities had roughly the same number of mills. Ahmedabad had a large share of rings as newer mills were more likely to adopt the ring, while older mills in Bombay with an existing capacity of mules were slow in switching to rings. Ahmedabad also had more looms. The average size of mills in Bombay was larger. By 1917 the changes in Bombay were noticeable. The switch to rings and looms was well underway. There was also an increase in the average size of the mill. Several mills went out of business by 1929 and more disappeared by 1933. For Ahmedabad, on other the other hand, there is evidence of an increase in size as well as new mills being set up.

[65] Wolcott and Clark, 'Why nations fail', pp. 397–423.

[66] Firms all over India imported their equipment from a few British firms. Clark, 'Why isn't the whole world developed?', also finds this to be the case at the international level in 1910.

[67] Clark: 'Why isn't the whole world developed?'.

 

Table 5. *Average capital and labour use in cotton mills*

| | *Bombay* | *Ahmedabad* | *Rest of India* |
|---|---|---|---|
| 1889 | | | |
| Spindles | 29,725 | 22,423 | 26,005 |
| Looms | 252 | 212 | 20 |
| Workers[a] | 996 | 779 | 884 |
| No. of firms | 53 | 7 | 44 |
| 1910 | | | |
| Mules | 11,133 | 1,494 | 7,888 |
| Rings | 23,720 | 18,648 | 20,453 |
| Loom | 296 | 305 | 291 |
| Workers[a] | 955 | 833 | 1,101 |
| No. of firms | 79 | 72 | 57 |
| 1917 | | | |
| Mules | 7,591 | 781 | 5,280 |
| Rings | 29,433 | 20,236 | 22,873 |
| Loom | 724 | 391 | 480 |
| Workers[a] | 1,562 | 817 | 1,175 |
| No. of firms | 77 | 82 | 72 |
| 1929 | | | |
| Mules | 4,637 | 494 | 2,940 |
| Rings | 39,812 | 21,007 | 26,670 |
| Loom | 994 | 464 | 584 |
| Workers[a] | 1,423 | 968 | 1,213 |
| No. of firms | 75 | 111 | 100 |
| 1933 | | | |
| Mules | 3,636 | 177 | 2,200 |
| Rings | 41,930 | 24,071 | 28,642 |
| Loom | 1,014 | 526 | 608 |
| Workers[a] | 1,863 | 1,041 | 1,367 |
| No. of firms | 67 | 128 | 103 |

*Note: a* No. of workers employed daily.
*Source:* BMOA, *Annual reports* (various years), apps.

In the absence of information on union membership at the level of the firm, the regional difference in labour movement is used here in order to understand its effect on labour productivity in different regions. Bombay and Ahmedabad were regions with union activity, while the other regions were not. The hypothesis tested is as follows: Bombay is significantly different from the rest of India in terms of the measure of labour productivity outlined above.

The dependent variable, the number of workers employed daily, is regressed on the number of mules, rings, and looms within a firm. To allow for the possibility that labour in a particular region, Bombay or Ahmedabad, is systematically less (or more) efficient, a dummy variable for the region is interacted with each of the machinery variables. That is, our regression takes the form:

$$N_{it} = \beta_m(1+\gamma BD_{i+}\mu AD_i)\,Mule_{it} + \beta_r(1+\gamma BD_{i+}\mu AD_i)\,Ring_{it} + \beta_l(1+\gamma BD_{i+}\mu AD_i)\,Loom_{it} + \varepsilon_{it} \quad (2)$$

where $N_{it}$ is employment in firm $i$ in year $t$, $Mule_{it}$ is the number of mules used by the firm in this year, and so on, and $BD_i$ is a dummy variable that takes the value 1 if the firm is in Bombay and $AD_i$ is a dummy variable that takes the value 1 if the firm is in Ahmedabad. This equation is estimated separately for each year; that is,

Table 6. *Labour use: Bombay compared to other regions (dependent variable: number of workers employed)*

| | *1889*[a] | *1910* | *1917* | *1929* | *1933* |
|---|---|---|---|---|---|
| Number of mules | 0.03 | 0.02 | 0.01 | 0.02 | 0.02 |
| | (21.5) | (4.4)** | (4.8)** | (4.5)** | (5.2)** |
| Number of rings | | 0.04 | 0.04 | 0.03 | 0.03 |
| | | (9.8)** | (19.2)** | (24.1)** | (31.0)** |
| Number of looms | 0.82 | 0.7 | 1.2 | 1.2 | 1.2 |
| | (8.4) | (4.1)** | (13.2)** | (14.8)** | (15.4)** |
| Bombay dummy | –0.41 | –0.24 | –0.26 | –0.48 | –0.33 |
| | (0.9) | (3.3)* | (8.5)** | (23.0)** | (12.2)** |
| Ahmedabad dummy[b] | | –0.21 | –0.30 | –0.22 | –0.25 |
| | | (2.3)** | (8.4)** | (7.08)** | (7.7)** |
| Difference between Bombay and Ahmedabad | | –0.03 | 0.04 | 0.26 | 0.08 |
| | | (0.3) | (1.3) | (0.8.9)** | (2.5)** |
| No. of firms | 99 | 208 | 231 | 286 | 298 |
| $R^2$ | 0.96 | 0.73 | 0.93 | 0.94 | 0.93 |

*Notes: a* Total spindles. There was no breakdown between mules and spindles for this year
*b* The coefficient for Ahmedabad is not reported for 1889 as the number of firms is small. The coefficients are estimated using non linear least squares
* Statistically significant at 90%.
** Statistically significant at 95%. T-statistic in parentheses.
*Source:* BMOA, *Annual reports* (various years), appendices

the coefficients $\beta$, $\gamma$, and $\mu$ are allowed to vary across years. As this equation is non-linear in the parameters, the estimation is by non-linear least squares. Here we are interested in the values of $\gamma$ and $\mu$, that is, the extent to which labour requirements in Bombay and in Ahmedabad differ from other regions.

Table 6 reports the estimated coefficients from the regression. We see that $\gamma$ is negative in every single year. Although this is statistically not significant in 1889, the coefficient is significant in subsequent years. In 1910 and in 1917, before the spurt of labour unrest, Bombay had significantly fewer workers per machine compared to the rest of India. This was also true of Ahmedabad. However, the difference between the two cities is not statistically significant.

In 1929 the coefficient for Bombay is negative and significantly different from the rest of India, and the magnitude of the difference is larger. Further, it is also negative and significantly different in comparison with Ahmedabad. Labour use in Bombay is 48 per cent less compared to other regions. We need to interpret this result with some caution. The figures for 1929 partly reflect working days lost due to industrial action. Total employment in Bombay mills declined significantly in 1928 and 1929, but even in 1930 was well below the 1927 level. The industry did not go back to the employment level of the mid-1920s until 1937.[68] The difference between Bombay and Ahmedabad persisted in 1933, suggesting that not all of this difference can be explained in terms of the closure of cotton mills during industrial action. A t-test shows that the coefficient for labour use in Bombay is significantly different from the coefficient for labour use in Ahmedabad for the years 1929 and 1933, but not in 1889, 1910, and 1917.

The results suggest that the relatively higher wages in Bombay and Ahmedabad required workers to be more efficient (see table 3 to compare wages). This encour-

[68] Morris, *Emergence*, p. 218.

Table 7. *Wage cost per unit of output*

| | *Rest of India* | *Bombay* | *Ahmedabad* |
|---|---|---|---|
| 1929 | 1.00 | 0.75* | 1.08 |
| 1933 | 1.00 | 0.97 | 1.04 |

*Source:* Tabs. 3 and 6.
*Note:* The index is calculated using wages for men in 1929 and labour productivity coefficients for respective years.
* The low value here reflects the number of days lost in strike action.

aged firms to economize on wage costs in order to remain competitive in the product market. Although the wage difference between Bombay and Ahmedabad was marginal after 1929, there was a significant difference in labour productivity. This is puzzling. However, a closer examination suggests that the product and factor markets in the two cities were very different. Firms in Ahmedabad produced finer-quality yarn and cloth and competed with British imports. Bombay, on the other hand, produced more lower-count yarn and exported to the Chinese market. This export market in yarn disappeared after the war. Simple calculations of the profits of the firms in the two cities show that profits fell faster in Bombay.[69] Consequently, the pressure on entrepreneurs in Bombay to reduce inefficiency was greater.

The point estimate on Bombay shows a reduction in labour use between 1910 and 1933. The standard error in 1910 is large, but relatively smaller in 1933, and suggests that the mills were more similar in labour use in 1933 compared to 1910. In other words, less efficient mills reduced labour use per machine or went out of business.

Bombay mills had a high turnover of the workforce and a large proportion were casual workers, estimated to constitute about 28 per cent of the workforce.[70] This made it relatively easier to reduce employment. Estimates based on the data set presented here show that Bombay saved in total wage costs as the number of workers per machine declined. Wage cost per unit of output in Bombay was 3 per cent lower in 1933 relative to the rest of India, while in Ahmedabad it was roughly 4 per cent higher (see table 7). These figures suggest that efficiency gains were made by Bombay mills in the 1920s. Falling profits, older machinery, and changes in the product market created additional pressure on firms in Bombay to bring about organizational change. There is no evidence that unionization prevented a rise in productivity. On the contrary, firms in Bombay were more productive.

## VI

Having ruled out the negative effect of unions on labour productivity, let us now go back to the model of wage–effort trade-off. Did workers show a preference for low effort? Evidence on indebtedness suggests that the majority of the workers earned well below their expenditure levels. A survey conducted by the Bombay Labour Office showed that in 1926, 47 per cent of families and 45 per cent of

[69] Patel, *Making of industrial relations*, p. 34.
[70] Chandavarkar, *Origins*, p. 296.

 

single men were in debt.[71] This on average was equal to two-and-a-half months' earnings at an average interest of 75 per cent per year. In Ahmedabad 69 per cent of families were in debt, while in Sholapur the figure was 63 per cent.[72] Most of the workers sent money to families in the villages. Many incurred debts due to marriage and other social customs. Whatever the cause, the debt burden would have made higher earnings attractive to most cotton mill workers. It is unlikely that, given the right incentive, the worker would not have been willing to offer greater effort.

Indirect evidence also suggests that the workers were prepared to increase effort in return for higher wages. The industry in Bombay had a wide differential in wages across firms for the same category of workers. This was noted as early as 1893. The differential increased over time, suggesting that greater effort was rewarded by higher pay. The maximum difference before 1920 was about 30 per cent between high and low wages. This figure rose 33 per cent for one-side ring spinners, 34 per cent for two-loom weavers, 87 per cent for grey winders, and 73 per cent for reelers in 1926. The corresponding figures were even higher in 1933: 46 per cent, 90 per cent, 63 per cent, and 175 per cent respectively.[73] The weavers, winders, and reelers were on piece rates and the widening pay differences reflect differences in effort.[74] The differential in pay among both piece and time workers was significant even within the same district.[75]

The efficient mills attracted better workers by offering them higher wages. Workers tended to compete for jobs in mills that had better pay and better working conditions. In mills that had poor-quality machines, jobbers had to attract workers by lending them money or standing as a guarantor for loans.[76] Newer mills tried to reduce the cost of training by luring away efficient workers from existing employment.[77] Competition for more efficient workers raised wages. Mills such as Sassoon, Bombay Dyeing, Finlay, and Kohinoor were ready to pay more for higher effort.[78]

There are many examples of workers accepting greater workloads when rewarded by higher pay. In general, piece-rate workers earned more than time-rate workers. This suggests that workers did respond to incentives towards higher earnings (see table 8). Four-loom weavers earned 50 per cent more than two-loom weavers (see table 9). Workers who were willing to undertake greater workloads were favoured when chances of promotion appeared.[79] Jobs were highly differentiated in the context of a labour-intensive technology. Yet when two jobs were combined, as in Tata's Swadeshi mills, the worker was paid more, suggesting an efficiency–wage trade-off.[80] Absenteeism was lower among piece-rate male workers in Bombay, particularly among weavers.[81] There is little evidence to suggest that the inefficient equilibrium was determined by workers' preferences.

[71] Pearse, *Cotton industry*, pp. 92–3.
[72] Ibid.
[73] Bombay Labour Office, *Report on enquiry* (1921, 1926); Bombay Labour Office, *Wages and unemployment.*
[74] Morris, *Emergence*, pp. 157–8.
[75] Ibid., p. 160.
[76] Chandavarkar, *Origins*, pp. 301–2.
[77] Morris, *Emergence*, p. 161.
[78] Chandavarkar, *Origins*, p. 351.
[79] Ibid., p. 323.
[80] Ibid., p. 317.
[81] Bombay Labour Office, *Report on enquiry* (1923), p. 8.

 

Table 8. *Wages of time- and piece-rate workers in Bombay (average daily earnings)*

| | *1921* | | *1923* | | *1926* | |
|---|---|---|---|---|---|---|
| *Worker category* | *Time-rate rupees* | *Piece-rate rupees* | *Time-rate rupees* | *Piece-rate rupees* | *Time-rate* | *Piece-rate* |
| Jobber | 2.95 | 3.85 | 2.93 | 4.06 | 2.25<br>3.96* | 4.25<br>6.7* |
| Reeler (women) | | | 0.69 | 0.78 | 0.49** | 0.68 |
| Winder | 1.17 | 0.79 | 0.93 | 0.83 | 0.93 | 1.08 |
| Spinner | 1.94 | 1–98 | 1.81 | 2.06 | n.a. | n.a. |

*Note:* * Only head jobbers. ** Few workers on time rate. N.a., The categories were different in the 1926 census and not comparable with the earlier years.
*Source:* Bombay Labour Office, *Report on enquiry* (1921, 1923, 1926).

Table 9. *Wages of weavers in Bombay, 1921–6*

| | *Average daily wage (rupees)* | | |
|---|---|---|---|
| | *Two-loom weaver* | *Three-loom weaver* | *Four-loom weaver* |
| 1921 | 1.64 | 2.23 | 2.57 |
| 1923 | 1.70 | 2.15 | 2.65 |
| 1926 | 1.83 | 2.53 | 2.89 |
| 1934 | 1.38 | | 2.07 |
| | | Wage difference (%) | |
| 1921 | 100 | 136 | 157 |
| 1923 | 100 | 126 | 156 |
| 1926 | 100 | 138 | 158 |
| 1934 | 100 | | 150 |

*Source:* Bombay Labour Office, *Report on enquiry* (1921, 1923, 1926); ibid., *Wages and unemployment* (1934).

Was the low wage–low effort equilibrium caused by an institutional failure? Hall and Jones show that institutional differences explain differences in labour productivity across countries.[82] In the Indian context, it may be argued that the managerial structure in cotton mills created certain inefficiencies. The three tiers of management created self-contained spheres of function and resulted in information gaps. Madholkar documents the friction between the men from Lancashire and the managing agents, and sees the presence of the jobber as the crucial factor in reducing the managing agent's reliance on the technicians. The agents' distrust of the technicians removed them from the sphere of decision making. The agent made decisions regarding the purchase of inputs and the technicians were asked to produce a certain output per machine.[83] An additional reason might have been the incentives of the managing agents, who held overall responsibility for the organization. Right up to the turn of the twentieth century, the managing agents' returns depended upon the *output* of the firm rather than profits, and provided relatively weak incentives to engage in cost reductions. Even when firms switched to commission on profits, the relevant category was total profits and not profits net of depreciation.

[82] Hall and Jones, 'Some countries'.
[83] Madholkar, 'Entrepreneurial and technical cadres', ch. 3.

The managerial structure and the factor prices also had implications for factory discipline, which is an important aspect of labour productivity. Pollard sees the creation of the new work discipline in the emerging factory industry in Britain as a crucial aspect of modern management. He discusses the difficulties faced by the first entrepreneurs in introducing 'regularity and steady intensity of work' and argues that this did not 'come easily to the new workforce'. Absenteeism on St Monday and feast days continued to persist and firms struggled to implement punctuality, fixed hours of work, and a ban on drinking.[84] The new industrial organization developed through a combination of penalties and incentives. For example, there were significant fines for late arrival.[85] Thompson documents the slow change in working habits in Britain after the industrial revolution.[86] Clark finds that greater discipline increased effort by 33 per cent in Britain in the course of the nineteenth century.[87] The change in length of a working day and increased effort in the workplace emerged from a stringent system of penalties. Discipline was also a crucial factor in the Japanese cotton mills. Hunter argues that dormitories were important in the evolution of factory discipline. The control of the management extended not just during working hours, but for the whole day.[88]

For the first-generation worker in cotton mills in Bombay and in other Indian towns, this was a transition from the world of free labour working at his/her own pace in the environment of the family and the open space of the rural community. The factory compound was a place where the cotton mill worker spent most of his time: he bathed, washed clothes, ate his meals, and took naps. The worker typically arrived earlier than the starting time, and took many breaks during the working hours to smoke a cigarette or to drink tea. On average a mill worker was said to spend 10–15 per cent of his working day outside the mill building. A commentator wrote in the *Indian Textile Journal*: 'The Indian mill to the worker is their home',[89] and a few months later: 'It is bad for a human being to stay long hours in the atmosphere of a factory, but the chawls [living quarters] have much worse conditions with overcrowding, poor sanitary conditions and lack of light'.[90]

The Indian cotton mills did little to develop mechanisms for higher discipline on the shop floor. A survey conducted by the Bombay Labour Office in 1926 documented the penalties imposed on workers for the first 10 months of the year.[91] Information on dismissals is not available, but we do know how many workers were penalized. Table 10 is based on information collected from 45 mills. Rough calculations show that there was less than one complaint for every 100 workers during this period.[92] An overwhelming proportion of the fines for men and women were for negligence in work. This referred to spoilt or damaged material and the fine was deducted from the worker's wage. Weavers in particular were subjected to

[84] Pollard, *Genesis*, pp. 181–6.
[85] Ibid.
[86] Thompson, 'Time'.
[87] Clark, 'Factory discipline'.
[88] Hunter, *Women*, pp. 103–10.
[89] *ITJ* (Feb. 1905).
[90] *ITJ* (Oct. 1905).
[91] Bombay Labour Office, *Report on enquiry* (1926).
[92] This is an underestimate as the data on complaints relate to only 45 mills, whereas the labour force data relate to the all the mills in Bombay. Total employment is calculated by multiplying daily employment by 42 weeks and six working days a week.

 

Table 10. *Fines for indiscipline or incompetence, Jan.–Oct. 1926*

| *Causes for fines* | *No. of instances* | *% share* |
|---|---|---|
| Breach of discipline | 21,158 | 6 |
| Bad or negligent work | 300,296 | 87 |
| Damage to employer's property | 12,881 | 4 |
| Other | 9,771 | 3 |
| Total | 344,106 | 100 |

*Source:* Pearse, *Cotton industry*, p. 89.

large penalties.[93] Late arrival at work or taking time off during working hours were less serious offences compared to a failure to produce the right quality product. Interestingly, the survey showed that in activities other than textiles, 49 per cent of the fines were for breach of discipline.[94] Morris argues that in the textile industry, although the formal system of rules was severe, regulation of work discipline was surprisingly lax. Workers drifted in at the start of work and gradually drifted away as the light began to fade.[95] Either supervisors were not concerned about work intensity or chose to ignore breaches of it. The latter could arise from the social relation between the worker and the jobber. Alternatively, as equipment costs were relatively high, the managers may have chosen to economize on capital cost by running the machines as long as possible and responded to worker absence by employing *reserve labour*. The low wages provided a reason for over-manning rather than imposing greater discipline.

This was a contrast to productivity-enhancing measures introduced in Japan as a response to high capital cost. Japanese firms introduced a system of double shifts and shorter working hours in each shift to increase labour use per unit of capital. This did not happen in India and is another example of organizational failure. The Indian mills persisted with the long hours of a single shift system. Pearse, who studied cotton mills in different parts of the world, shows that mills working two shifts reduced costs by 12–13 per cent on average.[96]

As early as 1905, the BMOA discussed reduction of the working day to 12 hours. Firms such as Wadia, Sassoon, and Petit, who were the industry leaders, favoured a reduction in working hours and argued that long hours reduced worker efficiency.[97] In 1919 Wadia moved to introduce two shifts of eight hours. However, the BMOA voted against the introduction of double shifts. One of the arguments was that the city infrastructure would not be able to cope with the additional 100,000–150,000 men required for the second shift.[98] The reluctance to work double shifts could have been associated with greater costs of supervision and the high salaries paid to European technical staff.[99] Several mill owners argued that mills on a double shift would bid up the wages and cause labour disputes in mills

[93] Pearse, *Cotton industry*, pp. 89–90.
[94] BMOA, *Annual report* (1927).
[95] Morris, *Emergence*, pp. 111–12.
[96] Pearse, *Cotton industry.*
[97] BMOA, *Annual report* (1905).
[98] BMOA, *Annual reports* (1919–21).
[99] Morris, *Emergence*, pp. 56–7.

using a single shift system.[100] The BMOA passed a resolution in 1920 prohibiting the implementation of double shifts. Two firms that introduced a double shift were expelled from the association in 1921.[101] In his statement to the Industrial Disputes Committee, Wadia claimed that the introduction of double shifts had reduced absenteeism.[102] However, double shifts did not become the norm until the 1930s. In fact, the BMOA rescinded the resolution of 1920 to allow firms to implement this system.[103] The agency problems associated with the separation of financial and technical jobs in the cotton mills and the managers' lack of technical qualifications may explain the failure of organizational change.

The pressure to increase labour productivity in Bombay mills came with the rise in wages during the war. There was a move towards organizational change in Bombay cotton mills in the 1920s by standardization of the wage structure. The strike of 1928 in Bombay ended with the promise to look into standardization of wages based on the Lancashire lists.[104] Standardization of wages and efficiency gains together were seen as a package. However, there was no consensus among firms.[105] On the issue of wage cuts, too, there were differences among the mills. In mills that reduced wages, pay had been below the industry average.[106] The more efficient ones typically did not reduce wages, but tried to raise productivity. In his representation to the Tariff Board in 1927, Sassoon's representative produced estimates of savings in the total wage bill with increased workloads and higher wages.[107] However, the scale of this change remained small. Only 10,000 workers were affected by the efficiency schemes.[108] If standardized piece rates in Lancashire in the mid-nineteenth century were a mechanism to move to a high wage–high effort equilibrium, as Huberman suggests,[109] then the differential pay structure in Bombay mills could have prevented the industry from moving to a high effort–high wage outcome. The evidence for organizational failure is persuasive.

## VII

This article has revisited the question of unionization and labour productivity in Bombay cotton mills using firm-level data. The view of Wolcott and Clark that worker militancy prevented efficiency gains in the 1920s is not borne out by the empirical analysis when the regional variation in unionization is considered.[110] On the contrary, labour productivity was higher in the unionized regions of Bombay and Ahmedabad compared to regions with little union activity. Cotton mills in these cities used less labour per machine and paid higher wages in 1929. Labour use per machine was lowest in Bombay, which suggests that worker militancy

[100] Chandavarkar, *Origins*, pp. 353–4.
[101] BMOA, *Annual report* (1921).
[102] *ITJ* (Jan. 1922).
[103] BMOA, *Annual report* (1928).
[104] Morris, *Emergence*, pp. 170–2. Lancashire lists refer to standardized piece rates for different categories of workers.
[105] Ibid.
[106] Bombay Labour Office, *Wages and unemployment*, p. 33.
[107] Ibid., p. 17.
[108] Chandavarkar, *Origins*, pp. 275–6.
[109] Huberman, 'Piece rates reconsidered'.
[110] Wolcott and Clark, 'Why nations fail', pp. 397–423.

 

could not have led to inefficient practices. This conclusion is in line with the model of wage–effort trade-off, when the firm operates at a suboptimal outcome. Unionization, through its effect on wages, acted as a spur to efficiency in Bombay cotton mills.

This article also proposes a new explanation for why low wages determined low labour productivity in Indian cotton mills in the early twentieth century. Contrary to Clark's view that cultural preference for low effort explains why wages were low,[111] it has been argued that low wages reflected surplus labour in a predominantly agricultural economy. As the Lewis model predicts, wages in industry remained low and, given the price of capital and labour, managers chose to employ more workers per machine. Low wages reduced managerial incentives to make productivity-enhancing changes until there was an exogenous shock to wages during the war. The organizational structure of the industry and the separation between the managerial and the technical staff and the jobbers may explain the failure to bring about changes subsequently.

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[111] Clark, 'Why isn't the whole world developed?', pp. 107–14.

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