

# **THE HISTORICAL ROOTS OF INDIA'S SERVICE-LED DEVELOPMENT: A SECTORAL ANALYSIS OF ANGLO- INDIAN PRODUCTIVITY DIFFERENCES, 1870-2000**

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# INTRODUCTION

- Existing sectoral studies of comparative productivity since 1870 focus on rich-country convergence club
- Compare a LDC (India) with a rich country (UK)
- Feasible because of information collected by British in India before 1947 and reconstruction of HNA by Sivasubramonian
- Aim to shed light on emergence of India as tiger economy

# Summary

- Overall Indian Y/L only 15% of UK level between early 1870s and late 1920s
- India fell further behind 1929-1950, remained at 10% of UK level until 1970s
- India catching-up since 1970s, but still further behind in 2000 than in 1870s
- Agriculture crucial: India/UK comparative Y/L has declined continuously, still accounts for 65% of labour force
- Services only sector to show improving trend in India/UK Y/L, rising from 15% to 30%
- India's recent emergence as dynamic service-led economy has long historical roots

# DATA AND METHODS: INDIAN TME SERIES

- Main data sources: Sivasubramonian for C20<sup>th</sup> and Heston for C19<sup>th</sup>
- Fiscal year basis: 1 April to 31 March
- British India to 1946/47, then modern India
- Agriculture: arable & livestock farming, forestry & fishing
- Industry: manufacturing, mining, construction, utilities
- Services: transport & communications, commerce, govnt, professions, domestic service, housing

# TABLE 2B: Indian labour productivity growth (% per year)

	Agriculture	Industry	Services	GDP
1872/73 to 1900/01	0.4	1.1	0.0	0.4
1900-01 to 1946/47	0.0	1.4	1.0	0.5
1950/51 to 1970/71	0.9	3.4	2.8	2.2
1970-81 to 1999/00	0.9	2.7	2.3	2.3

# Table 2 results

- Late C19<sup>th</sup>, Y/L growth fastest in industry, slowest in services
- First half of C20<sup>th</sup>, respectable Y/L growth in industry & services, overall growth held back by stagnation in agriculture
- Second half of C20<sup>th</sup>, respectable Y/L growth in industry & services again offset by slow growth in agriculture

# DATA AND METHODS: UK TIME SERIES

- Main sources: Feinstein to 1950, then output from National Accounts, employment from O'Mahony
- UK includes GB & whole of Ireland before 1920, then GB & N. Ireland

# TABLE 4B: UK labour productivity growth (% per year)

	Agriculture	Industry	Services	GDP
1871 to 1911	0.6	0.8	0.6	0.8
1920 to 1950	1.7	2.3	0.1	1.1
1950 to 1970	5.2	2.6	1.5	2.1
1970 to 1999	3.6	3.0	1.0	1.7



# Table 4 results

- Pre-1914: UK Y/L growth evenly spread across sectors, but slightly faster in industry
- 1920-1950: increase in Y/L growth in industry & agriculture, stagnation in services
- Post-WWII: further acceleration in Y/L growth, especially in agriculture & industry

# Differential performance

- Comparing Tables 2 & 4:
- Overall Y/L grew faster in UK before 1950, about same in UK & India 1950-1970, faster in India after 1970
- Largest growth rate differentials in agric, so important contributor to Indian falling behind
- Since 1970, Y/L growth faster in industry & agric than in services in both countries, but only in services was Y/L growth faster in India than in UK

# A benchmark for 1950

- Pin down levels of comparative Y/L in 1950, using nominal value added per employee compared at sector-specific price ratios adjusted for PPP
- Balassa/Samuelson highlight tendency for LDCs to have lower overall price level
- For agriculture, use wholesale rather than farm gate prices, otherwise miss out prices of major Indian crops

**TABLE 5: An India/UK PPP for agriculture,  
1950/51**

	<b>PPP (Rs per £)</b>	<b>Indian weights (%)</b>	<b>UK weights (%)</b>
<b>Wheat</b>	<b>16.12</b>	<b>15.1</b>	<b>14.2</b>
<b>Rice</b>	<b>6.97</b>	<b>52.9</b>	
<b>Barley</b>	<b>10.37</b>	<b>3.5</b>	<b>13.2</b>
<b>Tea</b>	<b>12.38</b>	<b>3.5</b>	
<b>Coffee</b>	<b>7.68</b>	<b>0.3</b>	
<b>Sugar</b>	<b>19.33</b>	<b>14.9</b>	<b>15.2</b>
<b>Mutton</b>	<b>17.78</b>	<b>1.6</b>	<b>50.5</b>
<b>Cotton</b>	<b>7.15</b>	<b>4.7</b>	
<b>Wool</b>	<b>12.59</b>	<b>0.2</b>	<b>6.6</b>
<b>Silk</b>	<b>20.41</b>	<b>0.3</b>	
<b>Jute</b>	<b>9.46</b>	<b>2.5</b>	
<b>Hides</b>	<b>8.07</b>	<b>0.5</b>	<b>0.3</b>
<b>Total agriculture</b>	<b>13.32</b>	<b>100.0</b>	<b>100.0</b>

# Agricultural PPP

- At Indian weights, PPP for agriculture is £1=Rs 10.80, well below exchange rate of £1=Rs 13.36. This reflects importance of cheap rice in India
- At UK weights, PPP for agric is £1=Rs 16.43, reflecting importance of livestock products such as meat
- Geometric mean is £1=Rs 13.32, close to exchange rate

**TABLE 6: An India/UK PPP for industry,  
1950/51**

	<b>PPP (Rs per £)</b>	<b>Indian weights (%)</b>	<b>UK weights (%)</b>
<b>Chemicals &amp; allied</b>	<b>20.98</b>	<b>8.8</b>	<b>7.2</b>
<b>Metals &amp; engineering</b>	<b>11.66</b>	<b>20.6</b>	<b>46.9</b>
<b>Textiles &amp; clothing</b>	<b>6.99</b>	<b>54.3</b>	<b>17.9</b>
<b>Food, drink &amp; tobacco</b>	<b>15.43</b>	<b>11.0</b>	<b>10.7</b>
<b>Other industry</b>	<b>14.71</b>	<b>5.3</b>	<b>17.3</b>
<b>Total industry</b>	<b>11.43</b>	<b>100.0</b>	<b>100.0</b>

# Industrial PPP

- For industry, use factory gate prices from production censuses for India and UK
- Weights reflect shares in VA for major branches in Table 6
- Within branches, weights reflect shares of gross output
- Industrial PPP is £1=Rs 11.43, geometric mean of Rs 10.52 at Indian weights, Rs 12.43 at UK weights
- Lower industrial price level in India reflects importance of textiles & clothing sector.

# Services and whole economy

- For services and economy as a whole, use weighted average of PPPs for agriculture and industry (£1=Rs 12.25)
- Lower price level in India than in UK, but scale of deviation from PPP small compared with more recent times
- Absence of large Balassa-Samuelson effect in 1950 consistent with Bergin, Glick & Taylor (2006)



**TABLE 7B: Comparative India/UK GDP per employee by sector, 1950/51, at sectoral PPPs**

	<b>Agriculture</b>	<b>Industry</b>	<b>Services</b>	<b>GDP</b>
<b>India (Rs)</b>	<b>421</b>	<b>833</b>	<b>997</b>	<b>556</b>
<b>UK (£)</b>	<b>587</b>	<b>498</b>	<b>466</b>	<b>487</b>
<b>PPP (Rs per £)</b>	<b>13.32</b>	<b>11.43</b>	<b>12.26</b>	<b>12.26</b>
<b>India/UK (UK=100)</b>	<b>5.4</b>	<b>14.6</b>	<b>17.5</b>	<b>9.3</b>

# Comparative Y/L in 1950

- For economy as a whole, Indian Y/L in 1950 less than 10% of UK level
- India's worst performance in agriculture, at around 5% of UK level
- India's performance better in industry (14.6%) and services (17.5%)
- These sectoral benchmarks form basis of time series projections to other years

# TABLE 8: Comparative India/UK labour productivity by sector (UK=100)

	Agriculture	Industry	Services	GDP
1871-73	11.2	18.2	18.1	15.0
1881-83	11.3	16.8	15.9	14.1
1890-91	10.4	17.3	15.6	13.8
1900-01	10.5	18.6	15.6	13.2
1910-11	11.1	24.2	17.7	14.4
1920-21	9.8	21.1	21.1	13.4
1929-30	8.3	25.3	25.2	14.2
1935-36	7.1	21.8	23.2	12.8
1946-48	7.0	18.1	23.5	11.7
1950-51	*5.4	*14.6	*17.5	*9.3
1960-61	4.3	16.4	20.0	9.7
1970-71	2.3	17.3	22.6	9.4
1980-81	1.6	16.1	29.3	10.2
1990-91	0.9	18.3	33.0	11.0
1999-00	1.0	15.8	32.8	11.4

# Comparative Y/L levels by sector

- India's falling further behind 1871-73 to 1950-51 and slowness of India's subsequent catching up has much to do with agriculture
- In 1870s, Indian agric Y/L at 10% of UK level. By 1950s, down to 5%, by 1990s just 1%
- Industry: comparative Y/L stationary, fluctuating but returning to around 15% of UK level
- Services: upward trend from 15% to 30% of UK level, but setback around independence

# TABLE 9: Labour force by sector (%)

<b>A. India</b>			
	<b>Agriculture</b>	<b>Industry</b>	<b>Services</b>
<b>1875</b>	<b>73.4</b>	<b>14.5</b>	<b>12.1</b>
<b>1910/11</b>	<b>75.5</b>	<b>10.3</b>	<b>14.2</b>
<b>1929/30</b>	<b>73.1</b>	<b>9.1</b>	<b>14.8</b>
<b>1950/51</b>	<b>73.6</b>	<b>10.2</b>	<b>16.2</b>
<b>1970/71</b>	<b>72.5</b>	<b>11.6</b>	<b>15.8</b>
<b>1999/00</b>	<b>64.2</b>	<b>13.9</b>	<b>21.9</b>

  

<b>B. United Kingdom</b>			
	<b>Agriculture</b>	<b>Industry</b>	<b>Services</b>
<b>1871</b>	<b>22.2</b>	<b>42.4</b>	<b>35.4</b>
<b>1911</b>	<b>11.8</b>	<b>44.1</b>	<b>44.1</b>
<b>1929</b>	<b>7.5</b>	<b>44.2</b>	<b>48.3</b>
<b>1950</b>	<b>6.8</b>	<b>43.5</b>	<b>49.7</b>
<b>1970</b>	<b>3.5</b>	<b>42.9</b>	<b>53.6</b>
<b>2000</b>	<b>1.9</b>	<b>22.9</b>	<b>75.2</b>

# The structure of economic activity

- Sectoral composition very different in India and UK
- UK: small share of L in agric, compared even with other developed economies
- India: 75% of L in agric for century after 1870, still 65% by late 1990s
- Services accounted for growing share of L in India as well as UK
- During GB rule, this accompanied by declining share of industry. Later, industry & services both expanded as agric shrank in relative size

**TABLE 10: Comparative India/UK per capita income and labour productivity (UK=100)**

	<b>GDP per capita</b>	<b>GDP per employee</b>
<b>1871-73</b>	<b>15.6</b>	<b>15.0</b>
<b>1881-83</b>	<b>15.1</b>	<b>14.1</b>
<b>1890-91</b>	<b>14.4</b>	<b>13.8</b>
<b>1900-01</b>	<b>13.6</b>	<b>13.2</b>
<b>1910-11</b>	<b>14.8</b>	<b>14.4</b>
<b>1920-21</b>	<b>13.1</b>	<b>13.4</b>
<b>1929-30</b>	<b>13.5</b>	<b>14.2</b>
<b>1935-36</b>	<b>11.9</b>	<b>12.8</b>
<b>1946-48</b>	<b>9.7</b>	<b>11.7</b>
<b>1950-51</b>	<b>*9.1</b>	<b>*9.3</b>
<b>1960-61</b>	<b>8.9</b>	<b>9.7</b>
<b>1970-71</b>	<b>8.4</b>	<b>9.4</b>
<b>1980-81</b>	<b>8.0</b>	<b>10.2</b>
<b>1990-91</b>	<b>8.8</b>	<b>11.0</b>
<b>1999-00</b>	<b>10.8</b>	<b>11.4</b>

# PER CAPITA INCOMES AND LABOUR PRODUCTIVITY

- Trends in comparative India/UK per capita incomes and labour productivity for whole economy similar, but greater LT decline in India's position for PC income than for Y/L
- This explained by different trends in share of population in labour force
- In early 1870s India had larger share of pop working than UK, by 1990s India's share substantially lower than in UK: growing share of young people and lower female participation



**TABLE 11: Labour force share of population  
(%)**

	<b>India</b>	<b>United Kingdom</b>
<b>1871/73</b>	<b>46.1</b>	<b>44.5</b>
<b>1910/11</b>	<b>46.2</b>	<b>45.0</b>
<b>1929/30</b>	<b>41.3</b>	<b>42.6</b>
<b>1950/51</b>	<b>44.3</b>	<b>46.1</b>
<b>1970/71</b>	<b>41.0</b>	<b>45.7</b>
<b>1999/00</b>	<b>39.4</b>	<b>46.2</b>

# CROSS-CHECKING THE RESULTS

- Provide additional checks on time series projections, as suggested in Broadberry (1993)
- Ward/Devereux claims of gross inconsistency between time series projections and cross sectional benchmarks rejected for cases of:
  - US/UK: Broadberry (1997); Broadberry and Irwin (2006)
  - Germany/UK: Broadberry (1998); Broadberry and Burhop (2007)
  - Australia/UK: (Broadberry and Irwin, 2007)
  - Japan/US: Pilat (1993)

# India/UK case

- LDC like India presents greater data problems than rich countries
- Nevertheless, for agriculture can collect additional benchmark estimates
- 1935/36, use same methods as for 1950/51 to yield benchmark India/UK Y/L level of 7.5, consistent with time series projection of 7.1

**TABLE 12: Benchmarks and time series projections in agriculture**

	<b>Time series projection</b>	<b>PPP benchmarks</b>
<b>1935/36</b>	<b>7.1</b>	<b>7.5</b>
<b>1950/51</b>	<b>*5.4</b>	<b>5.4</b>
<b>1970/71</b>	<b>2.3</b>	<b>2.3</b>
<b>1980/81</b>	<b>1.7</b>	<b>2.0</b>
<b>1990/91</b>	<b>0.9</b>	<b>1.8</b>

# Cross-checks

- For period 1970-1990, Prasada Rao provides benchmark estimates of agricultural output per worker every 5 years for India and UK
- The time series projections are broadly tracking these benchmarks
- For whole economy, projection of GDP pc from 1950/51 benchmark in Table 10 puts India at 8.8% of UK level in 1990-91, compared with Maddison benchmark of 8.5%

# Cross-checks in industry

- Industry more difficult to check.
- Timmer conducts US/India benchmark comparison for manufacturing using Indian price data for 1983/84 and US price data for 1987 projected back to 1983
- Compares with 1987 US/UK benchmark. Additional adjustments make comparison with Sivasubramonian data difficult
- Timmer reports manuf benchmark for 1987, with Indian Y/L 16.4% of UK level for registered firms, but only 4.1% for all firms
- Former number is consistent with our projections, while latter number is difficult to reconcile with GDP per head data. Suggests Timmer including more of village economy in industry than Sivasubramonian

# CONCLUSION (1)

- Provide sectoral analysis of comparative India/UK Y/L, 1870-2000
- Late C19<sup>th</sup>, overall Y/L in India 15% of UK level, where remained until end of 1920s
- Between 1929 and 1950 India fell further behind, remained at 10% of UK level until 1970s
- Since 1970s, India catching up, but still further behind at end of C20<sup>th</sup> than in late C19<sup>th</sup>

# CONCLUSION (2)

- Disappointing Indian productivity performance largely due to agric
- Agric is only sector where India has continued to fall further behind, down to 1% of UK level by 1990s
- Industry: fluctuations, but no trend, with India at 15% of UK level in late C19<sup>th</sup> and late C20<sup>th</sup>
- Only in services has there been upward trend. Recent emergence of dynamic service-led Indian economy has long historical roots