MARKET INTEGRATION AND A LOWER-PRODUCTIVITY ECONOMY: THE CASE OF AUSTRALIAN FEDERATION AND QUEENSLAND'S MANUFACTURING SECTOR, 1897–1906

BY

BRIAN D. VARIAN
(NEWCASTLE UNIVERSITY)

Market integration and a lower-productivity economy: the case of Australian federation and Queensland's manufacturing sector, 1897–1906

Brian D. Varian
Newcastle University

Abstract

At the time of Australian federation in 1901, Queensland's manufacturing sector was considerably less productive than those of its southern neighbours: New South Wales and Victoria. It remained propped by a protectionist tariff policy that was the most trade-restrictive among the policies of all six colonies. The formation of the Australian customs union entailed both the free entry into Queensland of Australian goods and the replacement of Queensland's colonial tariff by the Commonwealth's common external tariff. Following a difference-in-differences approach across industries, this paper analyses the effect of Australian market integration, including the adoption of the common external tariff, on Queensland's intra-industry growth in output, employment, labour productivity, total factor productivity, the number of factories, and average output per factory. This case study makes use of the annual, industry-specific output data reported by the colony—the only Australian colony to have done so both pre- and post-federation. The predictions of 'new trade theory' do not find much support in this case study. Nevertheless, the intensity of trade liberalisation was significantly and negatively associated with intra-industry growth in employment, to the extent that Queensland's manufacturing employment would have been an estimated 11.4 per cent higher in 1906, but for federation.

Introduction

At the time of Australian federation in 1901, the manufacturing sector of Queensland was considerably weaker than those of New South Wales and Victoria. According to Cameron (1999, p. 160), Queensland's manufacturing was ' … a rather laggardly cousin compared to its southern competitors', and similar assertions can be found in other histories of the colony (Fitzgerald 1982, p. 299; Evans 2007, pp. 141–2). The historical economic data are consistent with this characterisation. Taking wages as an approximation of the value of the marginal revenue product of labour, Queensland's manufacturing sector emerges as comparatively unproductive. For 1900, Butlin (1962, pp. 160–2) estimated an average annual factory wage income of £74 for New South Wales, £66 for Victoria, and £61 for Queensland. Of course, the composition of manufacturing differed among the colonies. Even still, intra-industry comparisons, to the extent that they are possible given the available data, render Queensland's manufacturing as lower productivity. In 1903, in the boots and shoes industry, labour productivity in Queensland was 12 per cent lower than in Victoria and 19 per cent lower than in New South Wales (Coghlan 1904, p. 986).[1] In brewing, another manufacturing industry prominent in nineteenth-century settler economies, labour productivity was 24 per cent lower than in Victoria and 25 per cent lower than in New South Wales (Coghlan 1904, pp. 983–4).

In 1901, this comparatively lower-productivity manufacturing sector became exposed to the trade-policy shock of Australian market integration. Several months after the birth of the Commonwealth in January, the Australian customs union went into effect in October of that same year, at which time the existing tariffs on intercolonial (now interstate) trade—each colony had possessed the autonomy to set its own tariffs—were permanently abolished. At once, the tariffs that afforded Queensland's manufacturing sector some degree of protection

---

[1] Labour productivity is calculated as the quantity, in this case the number of pairs of boots and shoes, produced per labourer.

from 'southern' imports were gone. Indeed, trepidation over the potential integration of the Australian market was one of the main reasons why, in the 1899 referendum on federation, Queensland's 'yes' vote had the slimmest margin of any colony; Brisbane, where the colony's manufacturing was concentrated, voted decisively against federation (Evans 2007, p. 141). The formation of the Australian customs union entailed not only the removal of tariffs on interstate trade but also each of the states adopting the Commonwealth's common external tariff. Whereas manufactured imports from outside of the Commonwealth had formerly been subject to Queensland's independent tariff schedule, these imports became subject to the Commonwealth's common external tariff beginning in October 1901.

Queensland's participation in Australian federation involved a lower-productivity manufacturing sector becoming integrated into an overall more productive market for manufactured goods. This paper, a case study of Queensland's manufacturing sector, determines the effects (or absence of effects) of the formation of a customs union, including internal market integration, on various *intra-industry* economic outcomes, specifically growth in: 1) output, 2) employment, 3) labour productivity, 4) total factor productivity (TFP), 5) the number of factories, and 6) average output per factory. What were (might be) the consequences of market integration for the industries of a lower-productivity manufacturing sector? Indeed, this is the general economic question that this historical case study intends to answer. It does so following a difference-in-differences econometric strategy that exploits the cross-industry variation in the intensity of trade liberalisation, which resulted both from the removal of tariffs on interstate trade and from the replacement of Queensland's tariff schedule by the common external tariff.

The 'new trade theory' offers some theoretical priors. New trade theory, as articulated by Helpman and Krugman (1985), assumes internal scale economies, product differentiation, and monopolistic competition—plausible assumptions for manufacturing industries. In the

Helpman-Krugman model, market integration results in increased intra-industry trade in differentiated products, with consumers benefitting from greater product variety and lower prices, as the expansion of the market reduces average costs. Extending the Helpman-Krugman model, Melitz and Ottaviano (2008) allowed for intra-industry heterogeneity in firm productivity.[2] Competition arising from trade liberalisation causes the least efficient firms to exit the market, thus increasing the aggregate productivity of the industry through the reallocation of market shares. Consequently, those firms remaining in the market become larger on average. The Melitz-Ottaviano model, particularly its prediction that trade liberalisation is productivity-enhancing at the industry level, has received some empirical support from studies of the modern economy. For manufacturing industries in OECD countries, Badinger (2007, p. 2153) found that increased competition accounted for 28 per cent of the productivity growth from trade. For Canadian manufacturing industries specifically, Lileeva (2008) determined that domestic tariff reductions under NAFTA were productivity-enhancing because the resultant competition caused the exit of plants from the market and, concomitantly, an increase in the market share of the more productive plants within the industry.[3] Did Australian market integration increase the productivity of Queensland's manufacturing industries, as theory would predict?

The selection of Queensland for a colony-specific case study of the intra-industry effects of the formation of the Australian customs union is hardly an arbitrary one. Rather, there are several reasons why Queensland is the most—it may even be argued, *only*—colony conducive to such a study. First, Queensland was the sole colony to collect annual, industry-

---

[2] Although the predictions of both models are similar, the well-known Melitz (2003) model differs from the Melitz and Ottaviano (2008) model insofar as, in the former, the mechanism driving productivity growth is an increase in the market share of more efficient firms resulting from *export market* access.

[3] Plants in the fourth quartile of the productivity distribution gained market share from plants in the third quartile, but not from plants in the first and second quartiles (Lileeva 2008, p. 375).

specific data on gross output for manufacturing industries both prior to and after federation, with the *Statistics of the Colony (State) of Queensland* (hereafter *SCQ*) reporting such data commencing in 1895.[4] Comparable data begin in 1903 for New South Wales and Victoria, and in later years for the other Australian colonies (Butlin 1962, p. 155). Insofar as this study considers intra-industry growth in output, labour productivity, TFP, and the average output per factory, the availability of pre-federation output data is indispensable.

Second, while the canonical literature on Australian economic history has emphasised the distinction between New South Wales as the free-trade colony and Victoria as the protectionist colony, recent quantitative research has cast Queensland's trade policy as comparatively protectionist and restrictive within an Australian context. In 1900, Queensland's average weighted tariff of 20.4 per cent was markedly higher than that of Victoria, which was 11.8 per cent (Lloyd 2017, p. 342).[5] Varian and Grayson (2024, p. 85) estimated that, on the eve of federation, Queensland had the most restrictive trade policy of all of the Australian colonies, as measured by the trade restrictiveness index (TRI). The TRI is the uniform tariff rate such that, if applied to all commodity imports, then the welfare loss would equal the welfare loss produced by the existing tariff structure in which heterogeneous tariffs are applied to elasticity-varying commodity imports. Queensland's trade policy was also the most welfare-adverse of all of the colonies, irrespective of the elasticities used in the estimation and whether the highly dutiable commodities of alcohol and tobacco are included or excluded (Varian and Grayson 2024, p. 87). For Queensland, the trade-policy shock of market integration in 1901 was commensurate with its generally high and restrictive tariffs. Furthermore, Queensland's tariffs were high enough that, for many industries, the replacement of Queensland's

---

[4] Although, the data only become complete and 'usable' beginning in 1896 (Butlin 1962, p. 155).

[5] Before it was surpassed by Tasmania in 1894, Queensland had the highest average tariff of any colony (Lloyd 2017, p. 342).

independent tariff by the Commonwealth's (protectionist) common external tariff resulted in a trade-policy liberalisation with respect to Queensland's imports from outside of Australia.

Effects of tariffs in economic history

Even a modestly exhaustive review of the literature on the effects of tariffs in history would be impossible here. Still, it is worth surveying some such studies that have examined their effects on certain of the economic measures considered in this paper—and those studies focusing on Australia are an appropriate place to begin. With respect to Victoria, Sinclair (1955, 1971) suggested that protective tariffs played *some* role in raising the colony's manufacturing employment in the late nineteenth century. In an early cliometric study of the topic, Haig (1989, p. 5) estimated that more than half of the increase in Victoria's manufacturing employment between 1860 and 1900 can be attributed to tariff changes. The relationship between tariffs and productivity growth (across all sectors), as proxied by GDP per capita, in pre-federation Australia was examined by Varian (2022) using panel data for the colonies. In the decades before federation, there was no statistically significant correlation between productivity growth and either average tariff levels or manufacturing tariff levels.[6] This finding runs contrary to those of O'Rourke (2000) and Lehmann and O'Rourke (2011): for a sample of countries in the late nineteenth century, there was a positive and statistically significant correlation between tariffs and productivity growth.[7] However, it should be stressed that the abovementioned studies mainly concern the effects of tariffs at the sector or aggregate level, which could be

---

[6] In this study, manufacturing tariff levels were proxied by the average tariff on a basket of manufactured goods that was comparable across colonies and time (Varian 2022, p. 63–5).

[7] While O'Rourke (2000) found a positive correlation between tariffs and growth, this finding was qualified by Lehman and O'Rourke (2011), who found a positive correlation between industrial tariffs and growth, although not between other tariffs and growth.

affected by inter-sectoral and inter-industry compositional shifts.[8] In contrast, this paper concerns the intra-industry effects of tariffs.

In the late nineteenth century, Canada, like several of the Australian colonies, was a settler economy pursuing a policy of manufacturing protection. Canada's adoption of the National Policy in 1879 was certainly a leap in the direction of protection, but one that involved differential tariff increases across manufacturing industries. Exploiting these differential increases, Harris et al. (2015) found that tariffs were positively and highly significantly associated with both intra-industry output growth and intra-industry TFP growth, which were attributed to increasing returns to scale and learning-by-doing effects in those industries targeted by the National Policy. Evaluating the effects of Canada's National Policy and its Tupper Tariff of 1887 on, specifically, its domestic iron industry, Inwood and Keay (2013) determined that higher tariffs raised output by way of inducing investment in technologically advanced blast furnaces.

Equally as momentous of a break in trade policy as Canada's National Policy of 1879 was Britain's Import Duties Act of 1932, the consequences of which have been debated by economic historians. Prior to the 1930s, only a relatively small assortment of British manufacturing industries were recipients of protective tariffs, but there was no statistically significant correlation between an industry's protected status and its labour productivity growth rate during the 1920s (Varian 2019, p. 709).[9] In 1932, nearly all manufactured imports that had not previously been dutiable, which were the vast majority of manufactured imports, became subject to a blanket 10 per cent duty, while an Import Duties Advisory Committee was created and empowered to recommend higher duties on selected commodity imports, which it

---

[8] Sinclair (1955) did draw inferences based upon a division of manufacturing industries into heavily protected, moderately protected, and unprotected categories.
[9] The correlation is only statistically insignificant after controlling for faster productivity growth in the 'new' industries.

frequently did in following years. Using a difference-in-differences approach in which industries were divided into three categories (viz. pre-1932 protected; no or 10 per cent tariff; and greater than 10 per cent tariff), Broadberry and Crafts (2011, p. 271–2) and Crafts (2012, pp. 21–22) found that the association between protection and intra-industry labour productivity growth was statistically insignificant during the 1930–5 intercensal interval, but statistically significant and *negative* during the 1935–48 intercensal interval.[10] Contrastingly, while also following a differences-in-differences approach, but defining treatment differently, Lloyd and Solomou (2020) estimated that Britain's tariffs in the 1930s were positively and statistically significantly correlated with productivity growth, and also positively and significantly correlated with output and employment growth.

Altogether, the limited literature surveyed here yields consistent evidence of a positive association between tariffs and both output and employment growth. Yet, across the studies described above, the correlation between tariffs and productivity growth varies in sign and statistical significance. It is therefore difficult to form an expectation of the direction, if any, in which Queensland's intra-industry productivity growth was affected by the trade-policy shock of the Commonwealth customs union.

Effects of federation on the Australian economy

With the formation of the Commonwealth customs union, all six of the Australian colonies replaced their independent tariff schedules with the Commonwealth's common external tariff—more precisely, common external *tariffs*, as the Commonwealth's import statistics enumerated nearly 600 commodities, which were subject to a range of duties or, in many cases,

---

[10] For a post-treatment interval of 1930–5, the pre-treatment interval was 1924–30. For a post-treatment interval of 1935–48, the pre-treatment interval was 1924–35.

no duty.[11] Forster (1977, p. 101) claimed that, with respect to imports of goods from outside Australia, the common external tariff represented an increase over the colonial tariffs, if the pre-federation colonies are considered 'as a whole'. Lloyd (2015) quantitatively validated this claim. For a basket of 31 'major' commodities imported from outside of Australia, weighted average *ad valorem* equivalent tariffs were calculated: 1) for each of the colonies in 1900 on the basis of their tariff schedules; 2) for pre-federation 'Australia' in 1900, as an import-share-weighted average of the 31-commodity-average tariffs calculated for each of the six colonies; and 3) for the Commonwealth in 1903 on the basis of the common external tariff schedule.[12] A comparison of the average colonial tariff in 1900 and the Commonwealth's tariff in 1903 *on the same basket of major imports from outside Australia* reveals that the common external tariff, calculated to have been 13.5 per cent, indeed exceeded the average colonial tariff (on imports from outside of Australia), which was calculated to have been 10.8 per cent (Lloyd 2015, p. 159). Yet, Queensland did not conform to the typical colonial experience. Prior to federation, its tariff on the 31-commodity basket of imports from outside Australia was 16.1 per cent, indicating that the replacement of Queensland's independent tariff schedule by the common external tariff schedule was, overall, a trade-liberalising development with respect to its overseas imports. In direction, it was a development complementary to the internal market integration.

A higher common external tariff than the average colonial tariff (on imports from outside Australia) would imply that there was a static deadweight welfare loss incurred by the Australian economy, as a whole. Nevertheless, the dismantling of tariffs on intercolonial trade would imply that there was a static welfare gain. Varian and Grayson (2024) sought to

---

[11] As for commodities imported by the Commonwealth in 1903, 39.7% by number and 28.8% by value were non-dutiable (Varian and Grayson 2024, p. 81).

[12] In order for a commodity to qualify as a 'major' import, the average annual value of imports into Australia had to exceed £200,000 for the period from 1899–1903 (Lloyd 2015, p. 171).

determine which was dominant: the welfare loss resulting from the higher common external tariff or the welfare gain arising from the internal trade liberalisation. All of their estimates, under various assumptions, of the net welfare effect are positive, and their preferred estimate is that the formation of the Australian customs union produced a net static welfare gain of 0.17 per cent of GDP (Varian and Grayson 2024, p. 86). Queensland would almost certainly have realised a net static welfare gain, as both the internal market integration and the shift to the common external tariff were, generally, tariff-reducing developments.

Other economic historians have explored how federation altered the pattern of trade. Irwin (2006, p. 322) found that, as early as the 1890s, there was already a substantial Australian border effect, which actually declined slightly by 1906, indicating that the customs union and the first common external tariff were not trade-diverting during the early years of the Commonwealth. Coleman (2018) calculated a number of standardised measures of the strength of the colonial trading relationships both pre-federation, taken to be the period from 1896–1900, and post-federation, taken to be the period from 1905–9. Most relevant for the present paper is Queensland's propensity to import from the rest of Australia, which increased following federation; that was not the case for every one of the colonies (Coleman 2018, p. 241).[13]

Tariffs and manufacturing in Queensland on the eve of federation

According to Lewis (1973, p. 14), Queensland's 'protectionist apogee came between 1888 and 1892'. Legislation in 1888 increased the duties on many manufactures, including by means of doubling the 'blanket duty', which applied to dutiable commodities without any duty explicitly stated in the legislation, from 7.5 to 15 per cent *ad valorem* (Patterson 1968, p. 116). Further

---

[13] The propensity to import from the rest of Australia was calculated as the geometric mean of the share of imports from Australia in Queensland's GDP and the share of Australian exports to Queensland in the GDP of the other five Australian colonies (Coleman 2018, pp. 236–7).

increases in duties and an elevation of the blanket duty from 15 to 25 per cent were enacted in 1892 (Patterson 1968, p. 161). The direction of Queensland's trade policy was hardly unusual, as there was a marked worldwide turn toward protectionism in the late 1880s and early 1890s (Bairoch and Burke 1989). In the other Australian colonies too, protectionism was the policy *du jour*, with even New South Wales passing a (debatably) protectionist tariff, the Dibbs-See Tariff, in 1892 (Varian 2022, pp. 56–7).[14]

By the late 1890s, Queensland's manufacturers were beginning to consolidate their political position. They were clustered in the south, specifically Brisbane, which alone accounted for two out of every three labourers in the colony's manufacturing sector on the eve of federation (Gough et al., 1964, p. 5). In October 1899, the Brisbane Chamber of Manufactures was founded with the initial purpose of sending a delegation to the Intercolonial Tariff Conference of Manufacturers in Melbourne the following month (Cameron 1999, p. 222). At the Conference, which involved early discussions of the tariff policy that would be implemented by the future Commonwealth, the Queensland delegation took what has been described as a moderately protectionist stance, while remaining concerned over the prospect of cheap Australian manufactured goods pouring into the colony once the intercolonial floodgates got opened (Cameron 1999, p. 224).

The comparatively uncompetitive state of much of Queensland's manufacturing sector, vis-à-vis manufacturing in New South Wales and Victoria, was recognised by contemporaries. Barton (1909, p. 223) attributed this situation, in part, to the smallness of the Queensland economy: 'One disadvantage under which the local manufacturer lies, as against his southern competitor, is the much smaller population amongst which he has to work: for whilst this does not relieve him from the necessity of laying down costly machinery, it does in many instances

---

[14] Between 1891 and 1892, the average tariff of New South Wales increased from 8.4% to 12.4%, a level which had not been exceeded since 1845 (Lloyd 2017, pp. 341–2).

deprive him of demand sufficiently large to keep his machinery fully employed'. Cameron (1999, p. 186) pointed to the low density of urban concentrations in Queensland as unconducive to sophistication and diversity in manufacturing production. Comprising 12 per cent of Australian GDP in 1900, Queensland's economy was certainly smaller than those of New South Wales and Victoria (Sinclair 2009). Moreover, its sectoral composition skewed against manufacturing. In 1904, by which time such data become available for all six states, the proportion of the population engaged in factory labour was lower in Queensland than in any other state, and by a substantial margin (Hughes 1964, p. 333).[15]

Data

Economic outcome variables

Annual, industry-specific data for (nominal) gross output, employment, capital, and the number of factories—these data enable the calculation of labour productivity, TFP, and average output per factory—are obtained from the annual volumes of the *SCQ* for the interval from 1897–1906.[16] Recognisably, new trade theory is concerned with firms rather than individual factories. While not discounting the possible existence of multi-factory firms, this study assumes that the number of factories approximates the number of firms. The initial year, 1897, is selected due to the fact that, in the year prior, there occurred the final comprehensive revision of Queensland's tariff schedule (Patterson 1968, p. 161).[17] Thus, the period from 1897 to the formation of the Australian customs union in October 1901 was essentially unaffected by

---

[15] Per 1,000 of the population, the numbers engaged in factor labour were as follows: Queensland (40), New South Wales (47), Tasmania (47), South Australia (51), Western Australia (55), and Victoria (66).

[16] New trade theory is concerned with firms rather than individual factories. While not discounting the possible existence of multi-factory firms, this study assumes that the number of factories approximates the number of firms.

[17] A number of duties were reduced on goods that, allegedly, were not produced in Queensland.

revisions to Queensland's tariff policy.[18] Also, it should be recalled that Queensland's annual reporting of industry-specific data only commenced in 1895 (Butlin 1962, p. 155). The interval concludes in 1906, just prior to the enactment of Australia's protectionist Lyne tariff in the following year. Thus, from 1897–1906, the singular development in Queensland's tariff policy was its integration into the Australian customs union. Depending upon the year, the *SCQ* enumerate between 45 and 59 manufacturing industries. However, with respect to the sample in the ensuing analysis, the number of industries is reduced to 23. Part of this reduction results from the exclusion of non-import-competing manufacturing industries, such as the gas industry.[19] The number of industries is also reduced through the aggregation of certain industries reported in the *SCQ*, which is done in order to achieve consistent industries across time. To give an example, window blinds are included within the bedding and upholstery industry from 1897–8 but, subsequently, within the furniture industry. In this case, it is necessary to create an aggregate furniture, bedding, and upholstery industry. Inevitably, certain industries are excluded from the sample due to the impossibility of constructing any consistently defined industry, typically because some manufacturing activity is shifted between a reported industry and a residual 'other' category. Altogether, the sample includes 229 industry-year observations (23 industries x 10 years); the industry of paper boxes and bags is included in the sample despite a lack of industry-specific data for 1897 only.

Although the 23 industries within the sample are consistently defined in terms of the manufacturing activities encompassed within each, there is a discontinuity in the data between 1900 and 1901. Prior to 1901, the data for gross output, employment, capital and the number

---

[18] In 1897, there was an increase in the duty on beer, with the increase exactly matched by the imposition of an excise duty (Queensland, *An Act for granting to Her Majesty curtained Altered and Increased Duties of Customs*, 61 Vic. 4, 1897; Queensland, *An Act to Impose a Duty on Beer Manufactured in Queensland and to Provide for the Regulation and Licensing of Breweries*, 61 Vic. 5, 1897).

[19] As well, the cooperage industry must be excluded because it cannot be matched to any commodity import.

of factories reported in the *SCQ* covered only those factories employing four or more hands (Cameron 1999, p. 164).[20] However, beginning in 1901, the scope of the government's data collection was widened to include all factories employing two or more hands. As there is no reporting of data on *both* the four-or-more and two-or-more basis for any overlapping year, there is no way to correct for the change in the scope of the reported data. The empirical strategy in the following section of the paper is devised to account for the discontinuity between 1900 and 1901, which would be expected to affect industries differentially.

The *SCQ* reported data for nominal gross output. These data are deflated so as to obtain industry-specific annual series of real gross output (and, thus, real labour productivity and average real output per factory). In the absence of systematically compiled, annual prices for the output of Queensland's manufacturing industries, two alternative approaches are taken to deflate the nominal values. The first approach involves using average unit values for British manufactured exports and imports (to and from all countries), calculated from the data reported in the *Annual Statements of the Trade of the United Kingdom*. For each of the 23 industries, a corresponding manufactured commodity is selected that satisfies each of the following criteria: the commodity is consistently reported in Britain's trade statistics from 1897–1906; both values and quantities are reported for the commodity, enabling the calculation of average unit values; and the output of the industry consists partly or wholly of the selected commodity.[21] The 23 industries and their matched commodities from the British trade statistics are listed in Appendix A. While it would be possible to calculate average unit values from data on Queensland's manufactured imports, which are reported in the *SCQ*, these average unit values would potentially have been affected by intra-commodity shifts in the composition of imports

---

[20] To be considered a factory, it was also required that non-hand-powered machinery be used (Cameron 1999, p. 162). This requirement did not change between 1897 and 1906.

[21] The sole exception is the aerated waters industry, for which refined sugar, a common ingredient, is selected as the corresponding manufactured commodity in the absence of anything more suitable.

induced by the formation of the customs union. As Australia and, *a fortiori*, Queensland accounted for small shares of Britain's manufactured exports (and a miniscule share of Britain's manufactured imports), it is expected that average unit values would have been minimally, if at all, affected by Australian market integration. The second and cruder approach to deflating the nominal values of gross output involves using a non-industry-specific, annual manufacturing price index pertaining to Australian manufacturing in general (Butlin 1962, p. 455). In the ensuing analysis, regressions are estimated for real gross output (and, thus, real labour productivity and average real output per factory) obtained using both the industry-specific deflators and, alternatively, the non-industry-specific deflator. (For ease of expression hereafter, the 'real' is omitted—but it should be assumed—when referring to output, labour productivity, and average output per factory).

Like other studies in economic history, this study considers labour productivity, calculated by dividing output by employment. It is also possible to consider TFP because the *SCQ* reported annually, and for each industry, the values of 'machinery and plant' and, separately, 'land and premises'. Machinery, plant, land, and premises are collectively taken to be the capital stock. Using the following production function, (the log-difference of) TFP is calculated for each industry:[22]

$$\Delta \ln(A_{i,t}) = \Delta \ln(Y_{i,t}) - \alpha \Delta \ln(K_{i,t}) - (1-\alpha)\Delta\ln(L_{i,t}) \tag{1}$$

In Equation 1, *A* stands for TFP, *Y* for gross output, *K* for the capital stock, *L* for employment, *i* for the industry, and *t* for the year. A value of 0.3 is assumed for the output elasticity of capital (α), which is consistent with the value assumed by Banerjee and Wilson (2016, p. 54) when they calculated Australian TFP growth for sub-intervals from 1860–1939. Thus, a value of 0.7

---

[22] In the following econometric analysis, all dependent variables are log-differenced.

is assumed for the output elasticity of employment $(1 - \alpha)$.[23] Although this paper considers TFP alongside other economic outcomes, a greater degree of caution is required when interpreting the econometric results with respect to TFP, for a couple of reasons. First, in the late nineteenth century, there was lack of standardisation in corporate accounting, including the depreciation of capital, such that the industry-specific (firm-aggregate) capital stock figures reported in the *SCQ* may present systematic biases.[24] Second, there are no industry-specific deflators for the industry-specific *capital stock* estimates. In calculating TFP, no deflation of the capital stock (K) has been performed, whereas output (Y) is deflated in the manner previously described.

Descriptive statistics for the distribution, across industries, of output, employment, labour productivity, the number of factories, and the average output per factory are presented in Appendix B. For the 23-industry sample, sector-wide series are presented in Figure 1 (output), Figure 2 (employment and labour productivity), and Figure 3 (number of factories and average output per factory).[25] In interpreting these series, it is necessary to remain mindful of the aforementioned discontinuity between 1900 and 1901, owing to the expanded scope of small-scale manufacturing activity reported in the *SCQ*. Nevertheless, these series offer insights into the performance of the sector from 1897–1900 and, separately, from 1901–6, as the scope of recorded manufacturing activity had been unaltered within each of these intervals. The exact timing of the formation of the Australian customs union warrants attention; the elimination of tariffs on interstate trade and the implementation of a common external tariff

---

[23] Although Banerjee and Shanahan (2016, p. 54) assumed a value of 0.3 for the output elasticity of capital, it does not follow that the output elasticity of labour was 0.7 in their production function because it had three factor inputs: capital, labour, and land.

[24] One study of corporations in late-nineteenth-century Britain found that the amount of depreciation was positively and statistically significantly associated with the profitability of the corporation (Carlon and Morris 2003). It was not until 1931 when legislation in Queensland required corporations to publish annual audited balance sheets (Morris and Barbera 1990, p. 246).

[25] It is emphasised that these figures are somewhat different than those presented in Cameron (1999, pp. 166–7), due to the fact that the figures in this paper pertain to a 23-industry sample.

did not occur until 8 October 1901, prior to which the colonial tariff policies remained operational. Thus, with respect to trade policy, 1901 was a mostly pre-federation year, and any short-term effect of the Australian customs union would likely be observed between 1901 and 1902. Output rises from 1897–9, falls from 1901–4, and rises again from 1904–6. Employment follows a similar pattern, but with an especially precipitous decline of 19 per cent in the immediate aftermath of Queensland's integration into the Commonwealth market, between 1901 and 1902.[26] The decline in employment coincided with a more modest improvement of 8 per cent in labour productivity, irrespective of the method of deflation. In the late 1890s, the number of factories increased nearly commensurately with the rise in output, such that the average output per factory changed little. Between 1901 and 1902, the number of factories decreased by 7 per cent and did not fluctuate much thereafter. With the number of factories rather constant from 1904–6, the substantial increase in output during these years resulted in a corresponding rise in the average output per factory.

[Figures 1–3 here]

Import exposure

While these figures are suggestive of the effects of Australian market integration on Queensland's manufacturing sector as a whole—or, more precisely, the 23-industry sample— this study concerns the intra-industry effects of market integration on various economic measures. For such a study of the intra-industry effects market integration, the following analysis exploits the cross-industry variation in the intensity of trade liberalisation resulting from both the cessation of tariffs on Queensland's imports from Australia *and* the changes in the tariffs on Queensland's imports from outside of Australia, i.e. the difference between

---

[26] The 23-industry sample understates the full extent of the decline in manufacturing employment, which was 24%.

Queensland's colonial tariff levels and the Australian Commonwealth's (common external) tariff levels. A prerequisite to constructing industry-specific measures of the intensity of trade liberalisation is the calculation of industry-specific average tariff levels for colonial Queensland and for the Commonwealth. Relying on the commodity data on import values and customs revenue in the dataset underlying Varian and Grayson (2024), average tariffs for each of the 23 industries are calculated for Queensland in 1900 and for the Commonwealth in 1903. Although not used in the econometric analysis, average tariffs are also calculated for Victoria in 1900, for comparative purposes. The import classification systems of the colonies and the Commonwealth differed from each other not inconsiderably. The 23 manufacturing industries correspond to 204 commodities (Queensland), 233 commodities (Victoria), and 179 commodities (Commonwealth); the constituent commodities within each industry are listed in Appendix C. The industry-specific average (nominal) tariff levels are each calculated as an import-weighted average of the *ad valorem* (or *ad valorem* equivalent) tariffs on the commodities within that industry.[27]

Table 1 presents the industry-specific average tariff levels for Queensland, Victoria, and the Australian Commonwealth. All of the pairwise correlation coefficients are positive and statistically significant at the 1 per cent level. The highest correlation coefficient (0.81) is between the Victorian and Commonwealth industry tariffs, consistent with the understanding among economic historians that the Victorian tariff served as the basis for formulating the first federal tariff, which ultimately resembled it closely (Forster 1977, p. 100). The correlation between the Queensland and Commonwealth industry tariffs, depicted in Figure 4, is nearly as strong with a coefficient of 0.78. It is noteworthy that Queensland and the Commonwealth, as well as Victoria, applied especially high tariffs in the brewing and grain-milling industries.

---

[27] Although nominal, rather than effective, tariffs are used in the analysis, there is evidence from the late-nineteenth-century United States that industry-specific nominal and effect tariffs were correlated (Hawke 1975).

Very low tariffs in the metal industries were consistent with the worldwide tendency, during the protectionist revival of the late nineteenth century, to impose lower tariffs on capital inputs (Juhász and Steinwender 2024, p. 32). However, in applying relatively low tariffs in the textile industry, as compared to other industries, Australia deviated from the worldwide pattern of generally high tariffs in this light manufacturing industry (Varian 2023, pp. 833–4).[28] Given that there were never more than two textile factories in Queensland during the period under consideration—this was the lowest number of factories for any industry in the sample— pressure on policymakers for greater protection would likely have been limited.[29]

[Table 1 and Figure 4 here]

Continuous measures of import exposure that capture the intensity of trade liberalisation encountered by each industry are constructed. These import-exposure measures incorporate the two simultaneous policy changes typical of the formation of a customs union: the elimination of tariffs on internal trade within the customs union and the replacement of an independent tariff by a common external tariff applicable to imports from outside of the union. For 1903, following the formation of the customs union, the industry tariff applicable to goods entering Queensland can be written as follows:

$$\tau_{i,QLD,1903} = \frac{M_{i,EXT,1903}}{M_{i,AUS,1903}+M_{i,EXT,1903}} \times \tau_{i,AUS,1903} \tag{2}$$

In this equation, τ stands for the average tariff level and M for the value of imports into Queensland. The subscript i refers to the industry, *QLD* to Queensland, *AUS* to the Australian Commonwealth, and *EXT* to trade partners outside of the Commonwealth. Thus, the average

---

[28] For a sample of 23 countries, including Australia, for which Britain's Board of Trade collected commodity-specific tariff data for the year 1902, it was found that the cross-country median tariff on woollen and worsted cloth commodities ranged from 31.6% (broad piece goods: heavy, all wool) to 53.4% (broad piece goods: heavy, mixed), while the median tariffs for cotton cloth commodities were similarly high (Varian 2023, p. 833).

[29] Although, Victoria too imposed a relatively low tariff on textile imports, despite having a more sizable textile industry. In 1903, there were 1,138 employed in Victorian woollen mills, compared to 87 in Queensland woollen mills. (Coughlan 1904, p. 986).

industry tariff on goods entering Queensland is simply the Commonwealth's common external

tariff multiplied by the share of imports from outside of the Commonwealth, as the tariff on

imports from within the Commonwealth is zero. Defining import exposure as the difference

between Queensland's industry tariff in 1900 and the average industry tariff on goods entering

Queensland in 1903 would be intuitive but also problematic, because the share of imports from

outside of the Commonwealth is endogenous to the creation of the customs union. If, for a

given industry, the common external tariff was set high enough to completely divert

Queensland's imports to the customs union, then the share of imports from outside of the

Commonwealth would fall to zero. In this case, import exposure would be exactly equal to the

level of Queensland's industry tariff in 1900, i.e. the difference between Queensland's industry

tariff in 1900 and zero. Thus, an increase in the common external tariff would actually produce

an increase in the measured intensity of trade liberalisation. For this reason, import exposure

is defined using the pre-federation share of imports from outside of the Commonwealth:

$$\varphi_i = \tau_{i,QLD,1900} - \frac{M_{i,EXT,1900}}{M_{i,AUS,1900} + M_{i,EXT,1900}} \times \tau_{i,AUS,1903} \tag{3}$$

In this equation, φ stands for import exposure, while the other letters and subscripts retain their

meanings from Equation 2.

Table 2 presents the shares of Queensland's imports from outside of the

Commonwealth in 1900, which can be calculated from the bilateral commodity import data

reported in the *SCQ*. It also presents the import-exposure measures for the 23 manufacturing

industries. A positive import-exposure measure is interpreted as a liberalisation of trade policy,

while a negative import exposure, i.e. a 'deliberalisation', could result if the import-share-

weighted common external tariff exceeded Queensland's colonial tariff, as happened to occur

in six of the industries. The industries subject to the greatest trade-policy liberalisation were

flour and grain mills; biscuits and bread; and confectionary. In the case of the former two

industries, the magnitude of the trade liberalisation is partly attributable to the low shares of imports from outside of Australia.

[Table 2 here]

Closely following these industries, with respect to trade liberalisation, was Queensland's sawmilling and wood industry, which, in the weeks after the operationalisation of the customs union, conducted a highly publicised protest against the federal tariff. In a letter to Barton, the first Premier of the Australian Commonwealth, a consortium of Queensland-based firms argued for higher duties, noting:

> If duties similar to the above are passed, we hold that they will not necessarily increase the cost of timber to any appreciable degree, while they will have the effect of greatly increasing employment in the sawmills in all the States and retaining a very large amount of money in the Commonwealth which otherwise would be lost; as far as Queensland is concerned, it will be a slight offset against the great losses which the State will suffer through federation, and many people here will duly appreciate it as a grateful recognition of the rights of a State with vast potentialities, but which cannot compel recognition by reason of the small number of its representatives in comparison with the States of New South Wales and Victoria ('Tariff and Timber', *Telegraph*, 23 November 1901).

The sawmill industry's protest underscores the dual nature of the trade liberalisation that it confronted, i.e. with respect to imports from other Australian states and from outside of Australia. Higher tariffs on imports from outside of Australia could serve as a mechanism for offsetting the, allegedly, adverse effects of the elimination of tariffs on interstate trade. However, in the case of the sawmilling industry, the Commonwealth's average tariff was set at barely half the level of Queensland's average tariff prior to federation.

Difference-in-differences analysis

This paper follows a difference-in-differences approach to estimate the intra-industry effects of market integration, including the shift from Queensland's colonial tariff to the Commonwealth's common external tariff, on various economic measures. The following regression equation is estimated:

$$\Delta\ln(y_{i,t}) = \beta(\varphi_i)(\pi_t) + \gamma_i + \delta_t + \varepsilon_{i,t} \tag{4}$$

In this equation, y represents some economic outcome, viz. output, employment, labour productivity, TFP, the number of factories, or average output per factory. As in Equation 3, φ is the measure of import exposure, which is interacted with a binary 'post' variable (π) taking a value of 1 for all year-on-year observations posterior to the formation of the Australian customs union, i.e. for 1901–2 to 1905–6, and a value of 0 for all observations prior to it. Also in Equation 4 are industry (γ) and year (δ) fixed effects, which absorb, respectively, the 'treated' and 'post' variables sometimes included in difference-in-differences regression equations. Importantly, δ controls for the faster growth of output and employment pre-federation (and slower growth after it), consistent with the fact that, in the late 1890s, there was a general economic boom throughout the Australian colonies.[30] The subscripts i and t retain their meanings from previous equations. The error term is represented by ε. Of interest is the difference-in-differences coefficient (β). A statistically significant β would indicate that the economic outcome varied according to the degree of import exposure.

The log-differencing of outcome variables permits a circumvention of the discontinuity in the data between 1900, until which year the data include only factories employing four or more hands, and 1901, the year in which the data begin to include all factories employing two or more hands.[31] Due to this discontinuity, the year-on-year observations for 1900–1 are dropped from the sample, as these observations span the change in coverage of the *SCQ*, which would be expected to affect industries differentially. Further regressions are estimated for the sample excluding all 1900–1 *and* 1901–2 year-on-year observations, since some amendments

---

[30] In Varian's (2022, p. 55) convergence model for the Australian economy, 1895/7–1898/1900 is the only inter-triennium in the late nineteenth century for which there was a systematically higher growth of GDP per capita across the six colonies. See also Richmond's (1987, p. 9) description of the Queensland economy in the late 1890s.

[31] The implicit assumption in this approach is that, from 1897–1900, the cross-industry distribution of year-on-year *growth rates* was similar between those factories employing four or more hands and those factories employing two or three hands.

to the first Commonwealth tariff of October 1901 were made during 1902 (Forster 1977, p. 100). Unlike in the difference-in-differences analysis of Broadberry and Crafts (2011), Crafts (2012), and Lloyd and Solomou (2020), here the 'treatment', i.e. import exposure, is a continuous measure. Thus, β is interpreted as the marginal effect.

Table 3 reports the regression results for all six outcome variables, with industry-specific deflators used for the following four variables: output, labour productivity, TFP, and average output per factory. Analogous regression results for these four variables, using the non-industry-specific deflator, are presented in Appendix D. The standard errors in all regressions have been clustered at the industry level. The only regressions in which the difference-in-differences coefficients are statistically significant at a conventional level are those for which the outcome variable is employment. For the sample in which only the 1900–1 observations are dropped, the interpretation of the coefficient is that a 1 percentage-point increase in import exposure arising from Queensland's entrance into the customs union is associated with an approximately 0.39 percentage-point lower annual growth rate in employment thereafter. To illustrate this effect, consider the industry of flour and grain mills, for which the measure of import exposure was greatest (0.2692), i.e. it experienced the greatest intensity of trade liberalisation. Counterfactually, if the import exposure of this industry had been 0 and not 0.2692, post-federation employment growth from 1901–6 would have increased from –7.0 per cent to an estimated 57.3 per cent. This industry is an extreme example, however. For boot and shoe factories, the industry with the median level of import exposure (0.0094), post-federation employment growth would have increased more modestly, from –25.5 per cent to an estimated –24.1 per cent. Relying on the more conservative coefficient of –0.39, given the (varying) import exposure of each industry, it is can be estimated that, but for Queensland's integration into the Australian customs union, within-sample manufacturing employment would have been

an estimated 11.4 per cent higher in 1906, i.e. a counterfactual employment of 18,505 persons as opposed to an actual employment of 16,609 persons.

[Table 3 here]

The finding that employment was negatively associated with the extent of trade liberalisation is corroborated by the textual historical evidence. In the 'State of Trade' section of the *Report of the Chief Inspector of Factories and Shops for 1902* (1903, p. 22), it was written that 'The chief sufferers, as already mentioned, have been the boot operatives and employees connected with the meat industry; the former due in great measure to the effect of federation, from which cause also the confectionary, tobacco, and jam industries have also suffered'. It is noteworthy that those industries identified by the Chief Inspector (and that are within the 23-industry sample) had median or higher import-exposure measures. Federation resulted in unemployment in Queensland, and parliamentarians in the newly constituted state lengthily discussed the so-called 'unemployed question' and how the government should or should not respond to it (e.g. Queensland Hansard, 11 August 1905, pp. 241–92). To some degree, Queensland's unemployed solved the problem themselves by migrating southward. Although the interstate free movement of commodities only commenced in October 1901, the nearly free (from government proscriptions) mobility of labour among the colonies/states had been a longstanding feature of the Australian economy.[32] In the Legislative Assembly, it was observed, 'While in the last three quarters of 1901, when the census was taken, there was an excess of arrivals over departures to the extent of about 1,000, in 1902 the departures exceeded arrivals by 3,600' (Queensland Hansard, 28 July 1903, p. 85).

That employment varied statistically significantly (and negatively) with import exposure would, *ceteris paribus*, suggest that labour productivity also varied statistically

---

[32] As Hatton (2024, p. 10) commented, even despite colony/state-assisted immigration, ' … immigrants could move fairly freely between colonies and so one colony/state could benefit from the largesse of its neighbours'.

significantly (and positively) with import exposure. Yet, such was not the case. In the regressions in which the outcome is labour productivity, the difference-in-differences coefficient is positive but statistically insignificant at any conventional level. And in those regressions in which the outcome is output, the coefficient is negative but also statistically insignificant. It is noteworthy that, in the output regression dropping the 1900–1 and 1901–2 observations, the (negative) coefficient has a p-value of 0.135. Still, it cannot be determined whether the negative coefficient estimated in the employment regressions coincided with some negative association between import exposure and output or with some offsetting, positive association between import exposure and labour productivity.

The results of robustness tests, in which Equation 4 is estimated for sub-samples of industries, are presented in Appendix E. In one battery of robustness tests, those six industries with negative import-exposure measures, as evident from Table 2, are excluded from the sub-sample. In other words, only those industries that underwent a liberalisation of trade policy are retained in the sub-sample. In another battery of robustness tests, small industries are excluded from the sample. An industry is defined as small if, in any year from 1897–1906, employment was less than 100 persons. The six small industries are cement and lime; coffee and condiments; manure; monumental masonry; paper boxes and bags; and textiles. Across both batteries of robustness tests, the difference-in-differences coefficient is only statistically significant in those regressions in which the outcome is employment. In these regressions, the coefficients are negative and of greater absolute magnitudes than in the full sample.

Returning to new trade theory, the predictions of Melitz and Ottaviano (2008) that trade-liberalisation-induced competition increases an industry's productivity, decreases the number of firms within it, and increases their average size finds scant support in this cliometric study of Queensland. While the estimated coefficients of labour productivity, TFP, and the number of factories take the predicted sign, none of these coefficients is statistically significant

at any conventional level. These inconclusive results are despite considerable variation in the measure of import exposure, which ranged from –0.1618 to 0.2692, with a standard deviation of 10 percentage points in *ad valorem* equivalent terms.

Conclusion

The comparatively low productivity of Queensland's manufacturing sector; the formation of the Australian customs union, entailing both internal market integration and the adoption of the common external tariff; and the availability of annual, industry-specific data, including gross output both pre- and post-federation—all of these features coalesce to produce an ideal case for examining how a weaker manufacturing sector fares as a consequence of integration into a market with a stronger manufacturing sector. While this particular case is historical, such occurrences are not confined to history. The case of Queensland's manufacturing sector offers insights for prospective episodes of customs union formation and, more generally, market integration.

The most conclusive finding from the difference-in-differences analysis in this paper is that the intensity of trade liberalisation, taking into account both interstate and international trade, was negatively and significantly associated with the rate of intra-industry employment growth. Those industries that became more exposed to imports as a consequence of federation exhibited a greater tendency to shed labour, albeit without any (significant) corresponding productivity growth. The effect of federation on manufacturing employment in Queensland was both statistically and economically significant, to the extent that it would have been an estimated 11.4 per cent higher in 1906, if not for the creation of the Commonwealth customs union.

As with most case studies in economic history, generalisable results were sought. And as with most case studies in economic history, the unique features of the case circumscribe, to

some extent, their generalisability. One of the peculiar features of Australia was the degree of market integration even prior to federation, with Irwin (2006, p. 322) having identified a pre-Commonwealth Australian border effect. Although there were internal tariff barriers within Australia until October 1901, Queensland was hardly an autarky. The degree of market integration pre-federation may have served to curtail the predicted effects of (further) market integration.

Queensland's manufacturing sector in the wake of the formation of the Australian customs union does not offer a surfeit of evidence in support of new trade theory, specifically the model of Melitz and Ottaviano (2008). While the estimated coefficients mostly take the expected signs, the coefficients of import exposure are statistically insignificant, save for the regressions in which the dependent variable is employment. As for the empirical literature, the findings of this study may be cautiously contrasted with those of Harris et al. (2015) for the effects of Canada's National Policy, occurring two decades before federation. While both studies exploit differential tariff changes across manufacturing industries, the present study did not find a negative and statistically significant association between the intensity of trade liberalisation and productivity growth. Of course, Canada in 1879 and Queensland in 1901 differed in major ways. The former had a much larger manufacturing sector that received an increase in protection, while the latter had a much smaller manufacturing sector that became enveloped in a customs union, which, for most of its industries, entailed a liberalisation of trade policy.

References

Badinger, H., 'Market size, trade, competition and productivity: evidence from OECD manufacturing industries', *Applied Economics*, 39 (2007), pp. 2143–57.

Bairoch, P. and Burke, S., 'European trade policy, 1815–1914', In P. Mathias and S. Pollard, eds., *Cambridge economic history of Europe*, vol. 8, *The industrial economies: the development of economic and social policies* (Cambridge: Cambridge University Press, 1989), pp. 1–160.

Banerjee, R. and Wilson, J. K., 'Roles of education in productivity growth in Australia, 1860–1939', *Economic Record*, 92 (2016), pp. 47–66.

Barton, E. J. T., *A jubilee history of Queensland: a record of political, industrial, and social development* (Brisbane: H. J. Diddams, 1909).

Broadberry, S. and Crafts, N., 'Openness, protectionism and Britain's productivity performance over the long run', In G. Wood, T. C. Mills, and N. Crafts, eds., *Monetary and banking history: essays in honour of Forrest Capie* (London: Routledge, 2011), pp. 254–86.

Butlin, N. G., *Australian domestic product, investment and foreign borrowing, 1861–1938/9* (Cambridge: Cambridge University Press, 1962).

Cameron, D. B., 'An historical assessment of economic development, manufacturing, and the political economy of Queensland, 1900 to 1930', University of Queensland, unpublished PhD dissertation (1999).

Carlon, S. A. and Morris, R. D., 'The economic determinants of depreciation accounting in late nineteenth-century Britain', *Accounting, Business & Financial History*, 13 (2003), pp. 275–303.

Coleman, W., 'Was federation uniting or dividing? The impact of the customs union of 1901 on Australian trade relationships', *Economic Papers*, 37 (2018), pp. 230–47.

Coghlan, T. A., *A statistical account of Australia and New Zealand, 1903–4* (Sydney: W. A. Gullick, 1904).

Crafts, N., 'British relative economic decline revisited: the role of competition', *Explorations in Economic History*, 49 (2012), pp. 17–29.

Evans, R., *A history of Queensland* (Melbourne: Cambridge University Press, 2007).

Fitzgerald, R., *From the dreaming to 1915: a history of Queensland* (St. Lucia, Queensland: Queensland University Press, 1982).

Forster, C., 'Federation and the tariff', *Australian Economic History Review*, 17 (1977), pp. 95–116.

Gough, M., Hughes, H., McFarlane, B. J., and Palmer, G. R., *Queensland, industrial enigma: manufacturing in the economic development of Queensland* (Melbourne: Melbourne University Press, 1964).

Haig, B. D., 'Manufacturing employment and tariffs in Victoria and New South Wales: 1861 to 1911', Australian National University Centre for Economic Policy Research Discussion Paper no. 207 (1989).

Harris, R., Keay, I., and Lewis, F., 'Protecting infant industries: Canadian manufacturing and the national policy, 1870–1913', *Explorations in Economic History*, 56 (2015), pp. 15–31.

Hatton, T. J., 'The political economy of assisted immigration: Australia 1860–1913', *Explorations in Economic History*, 92 (2024), no. 101965, pp. 1–13.

Hawke, G. R., 'The United States tariff and industrial protection in the late nineteenth century', *Economic History Review*, 28 (1975), pp. 84–99.

Helpman, E. and Krugman, P., *Market structure and foreign trade: increasing returns, imperfect competition and the international economy* (Cambridge, MA: MIT Press, 1985).

Hughes, H., 'Federalism and industrial development in Australia', *Australian Journal of Politics & History*, 10 (1964), pp. 323–40.

Inwood, K. and Keay, I., 'Trade policy and industrial development: iron and steel in a small open economy, 1870–1913', *Canadian Journal of Economics*, 46 (2013), pp. 1265–94.

Irwin, D. A., 'The impact of federation on Australia's trade flows', *Economic Record*, 82 (2006), pp. 315–24.

Juhász, R. and Steinwender, C., 'Industrial policy and the Great Divergence', *Annual Review of Economics*, 16 (2024), pp. 27–54.

Lehmann, S. H. and O'Rourke, K. H., 'The structure of protection and growth in the late nineteenth century', *Review of Economics and Statistics*, 93 (2011), pp. 606–16.

Lewis, G., 'The tariff, laissez-faire, and federation in colonial Queensland', *Queensland Heritage*, 2 (1973), pp. 14–21.

Lileeva, A., 'Trade liberalization and productivity dynamics: evidence from Canada', *Canadian Journal of Economics*, 41 (2008), pp. 360–90.

Lloyd, P., 'Customs union and fiscal union in Australia at federation', *Economic Record*, 91 (2015), pp. 155–71.

Lloyd, P., 'The first 100 years of tariffs in Australia: the colonies', *Australian Economic History Review*, 57 (2017), pp. 316–44.

Lloyd, S. P. and Solomou, S., 'The impact of the 1932 General Tariff: a difference-in-difference approach', *Cliometrica*, 14 (2020), pp. 41–60.

Melitz, M. J., 'The impact of trade on intra-industry reallocations and aggregate industry productivity', *Econometrica*, 71 (2003), pp. 1695–1725.

Melitz, M. J. and Ottaviano, G. I. P., 'Market size, trade, and productivity', *Review of Economic Studies*, 75 (2008), pp. 295–316.

Morris, R. D. and Barbera, M. R., 'A chronology of the development of corporate financial reporting in Australia, 1817 to 1988', In R. H. Parker, ed., *Accounting in Australia: historical essays* (New York: Garland, 1990), pp. 237–72.

O'Rourke, K. H., 'Tariffs and growth in the late 19th century', *Economic Journal*, 110 (2000), pp. 456–83.

Patterson, G. D., *The tariff in the Australian colonies, 1856–1900* (Melbourne: F. W. Cheshire, 1968).

Queensland, *Report of the Chief Inspector of Factories and Shops for 1902*, C. A. 12 (1903).

Queensland, *Statistics of the colony (state) of Queensland* (Brisbane: Edmund Gregory, various years).

Richmond, W. H., 'Government and economic development in Queensland, 1883–1914: a study of policy making', University of Queensland, unpublished PhD dissertation (1987).

Sinclair, W. A., 'The tariff and manufacturing employment in Victoria, 1860–1900', *Economic Record*, 31 (1955), pp. 100–4.

Sinclair, W. A., 'The tariff and economic growth in pre-federation Victoria', *Economic Record*, 47 (1971), pp. 77–93.

Sinclair, W. A., 'Annual estimates of gross domestic product: Australian colonies/states, 1861–1976/77', Database, Monash University, Economics Department (2009).

United Kingdom, Board of Trade, *Annual statements of the trade of the United Kingdom* (London: HMSO, various years).

Varian, B. D., 'The growth of manufacturing protection in 1920s Britain', *Scottish Journal of Political Economy*, 66 (2019), pp. 703–11.

Varian, B. D., 'Revisiting the tariff-growth correlation: the Australasian colonies, 1866–1900', *Australian Economic History Review*, 62 (2022), pp. 47–65.

Varian, B. D., 'British exports and foreign tariffs: insights from the Board of Trade's foreign tariff compilation for 1902', *Economic History Review*, 76 (2023), pp. 827–43.

Varian, B. D. and Grayson, L. H., 'Economic aspects of Australian federation: trade restrictiveness and welfare effects in the colonies and the Commonwealth, 1900–3', *Economic Record*, 100 (2024), pp. 74–100.

Table 1.   Average tariffs in Queensland, Victoria, and the Commonwealth, 1900–3

Industry	Queensland	Victoria	Commonwealth
Aerated Waters	0.250	0.071	0.212
Biscuits and Bread	0.219	0.066	0.106
Boot and Shoe Factories	0.226	0.303	0.220
Breweries	0.450	0.366	0.450
Bricks, Earthenware, and Pottery	0.250	0.155	0.194
Cement and Lime	0.191	0.369	0.353
Clothing	0.242	0.225	0.191
Coffee and Condiments	0.128	0.333	0.284
Confectionary	0.309	0.264	0.132
Fellmongeries and Wool-scouring	0.000	0.000	0.000
Flour and Grain Mills	0.309	0.694	0.324
Furniture, Bedding, and Upholstery	0.208	0.178	0.171
Jams, Pickles, Sauces, and Vinegars	0.270	0.264	0.232
Manure	0.000	0.000	0.000
Metal Works	0.052	0.049	0.073
Monumental Masonry	0.157	0.146	0.204
Paper Boxes and Bags	0.236	0.254	0.195
Printing and Bookbinding	0.024	0.021	0.025
Saddlery and Harness	0.095	0.054	0.000
Sawmills and Wood	0.211	0.079	0.112
Smelting	0.004	0.000	0.000
Tanneries	0.028	0.059	0.144
Textiles	0.091	0.062	0.108

Source: Constructed from Varian and Grayson (2024).

Notes: The tariff rates for Queensland and Victoria are for 1900. The tariff rates for the Commonwealth are for 1903. See Appendix C for the commodity imports within each industry.

Table 2. Import exposure

Industry	Share of imports from outside Australia	Import exposure
Aerated Waters	0.643	0.1137
Biscuits and Bread	0.069	0.2120
Boot and Shoe Factories	0.986	0.0094
Breweries	0.993	0.0030
Bricks, Earthenware, and Pottery	0.980	0.0603
Cement and Lime	1.000	–0.1618
Clothing	0.958	0.0593
Coffee and Condiments	0.642	–0.0547
Confectionary	0.944	0.1844
Fellmongeries and Wool-scouring	0.000	0.0000
Flour and Grain Mills	0.124	0.2692
Furniture, Bedding, and Upholstery	0.975	0.0416
Jams, Pickles, Sauces, and Vinegars	0.908	0.0590
Manure	0.381	0.0000
Metal Works	0.930	–0.0160
Monumental Masonry	0.900	–0.0266
Paper Boxes and Bags	0.989	0.0433
Printing and Bookbinding	0.810	0.0042
Saddlery and Harness	0.965	0.0949
Sawmills and Wood	0.465	0.1591
Smelting	0.840	0.0036
Tanneries	0.731	–0.0774
Textiles	0.994	–0.0158

Source: For shares of imports from outside Australia: *SCQ*; for import exposure: see the text.
*Notes:* The shares of imports from outside of Australia are for 1900. For a discussion of the construction of the measure of import exposure, see the text and Equation 3.

Table 3. Difference-in-differences regressions, 1897–1906

	(1) Output	(2) Employment	(3) Labour productivity	(4) TFP	(5) Factories	(6) Average output per factory
Excluding 1900–1 year-on-year observations						
Import exposure x Post	–0.16	–0.39*	0.23	0.33	–0.26	0.11
	(0.29)	(0.22)	(0.30)	(0.33)	(0.24)	(0.35)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	183	183	183	183	183	183
R^2	0.22	0.26	0.06	0.06	0.16	0.13
Excluding 1900–1 and 1901–2 year-on-year observations						
Import exposure x Post	–0.34	–0.47*	0.13	0.24	–0.28	–0.07
	(0.22)	(0.27)	(0.33)	(0.35)	(0.26)	(0.33)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	160	160	160	160	160	160
R^2	0.21	0.21	0.09	0.08	0.16	0.12

Notes: The dependent variables are log-differenced. In col. 1, real output is obtained using industry-specific deflators. Similarly, in cols. 3, 4, and 6, the dependent variables are calculated on the basis of real output obtained using industry-specific deflators. See the text for a discussion of the construction of the measure of import exposure. Post takes a value of 1 beginning with the 1901–2 year-on-year difference (0 before). The panel is balanced, except that there is no observation for the industry of paper boxes and bags for the 1897–8 year-on-year difference. Standard errors are clustered by industry and reported in parentheses. * indicates statistical significance at the 10% level.

Figure 1. Output (within sample), 1897–1906
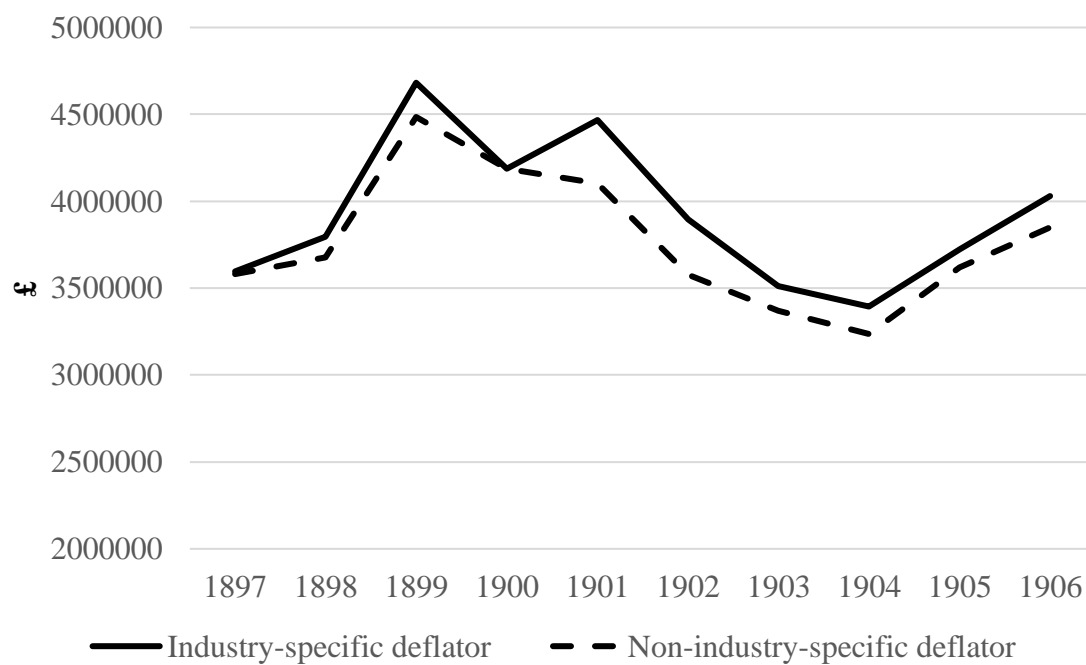
Source: Constructed from *SCQ* (1897–1906).
Notes: See the text for a discussion of the deflation. Monetary values are expressed in 1900 prices. For the industry of paper boxes and bags, for which data are unavailable for 1897, the 1898 are used for 1897.
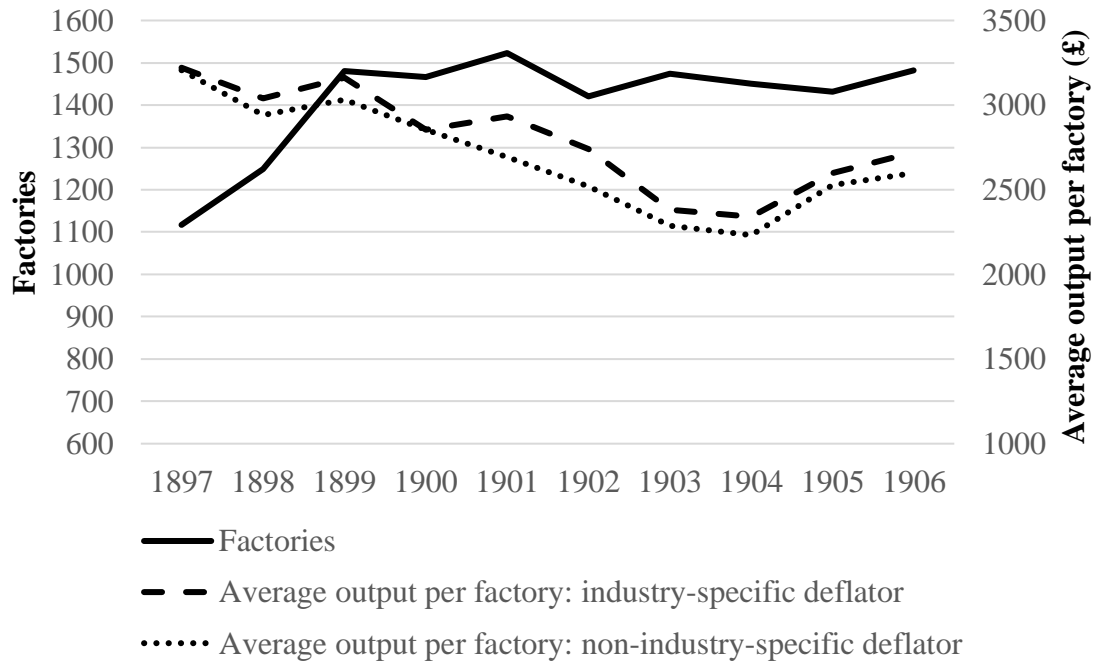
Figure 2. Employment and labour productivity (within sample), 1897–1906

Source: Constructed from *SCQ* (1897–1906).
Notes: See the text for a discussion of the deflation. Monetary values are expressed in 1900 prices. For the industry of paper boxes and bags, for which data are unavailable for 1897, the 1898 are used for 1897.

Figure 3.   Number of factories and average output per factory (within sample), 1897–1906

Factories

Average output per factory (£)

— Factories

– – Average output per factory: industry-specific deflator

······ Average output per factory: non-industry-specific deflator

Source: Constructed from *SCQ* (1897–1906).
Notes: See the text for a discussion of the deflation. Monetary values are expressed in 1900 prices. For the industry of paper boxes and bags, for which data are unavailable for 1897, the 1898 are used for 1897.
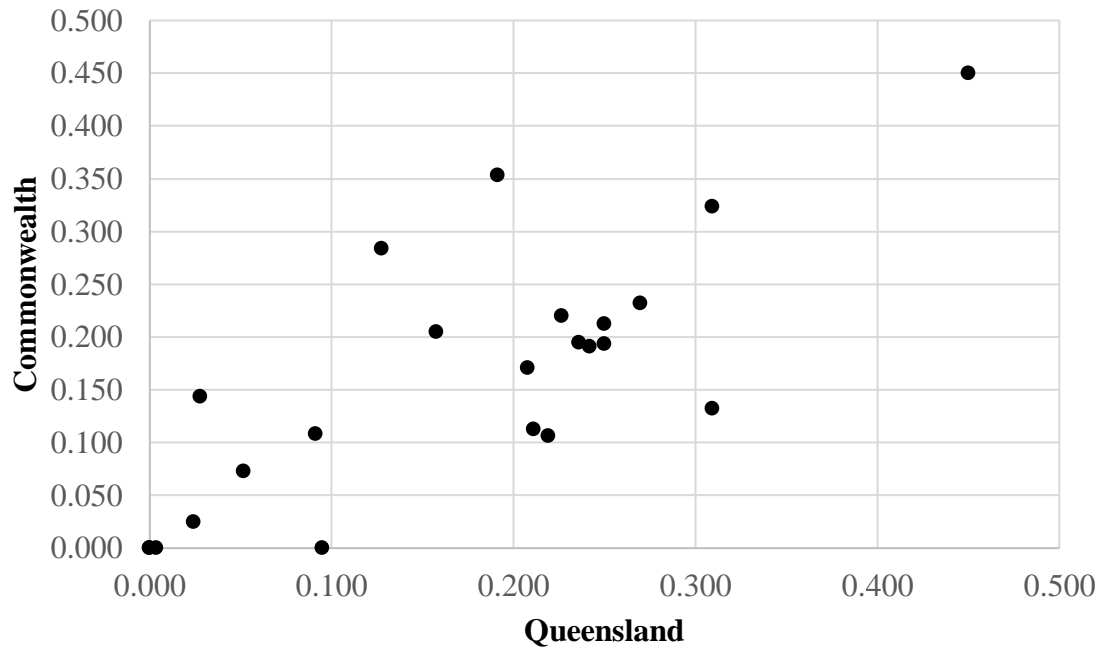
Figure 4.   Industry-specific tariffs for Queensland and the Commonwealth, 1900–3

Notes: The tariff rates for Queensland and the Commonwealth are for 1900 and 1903, respectively. See Appendix C for the commodity imports within each industry.

Appendix A: Representative British tradable commodities for industry-specific deflators, 1897–1906

Industry	Direction	Representative British tradable commodity
Aerated Waters	Export	Sugar, viz.: refined and candy
Biscuits and Bread	Export	Biscuits and bread
Boot and Shoe Factories	Export	Leather, tanned, tawed, or dressed, viz.: wrought, viz.: boots and shoes
Breweries	Export	Beer and ale
Bricks, Earthenware, and Pottery	Import	Chinaware or porcelain, earthenware
Cement and Lime	Export	Cement
Clothing	Export	Cotton, viz.: hosiery, viz.: stocks and socks
Coffee and Condiments	Export	Chicory, roasted or ground in bond
Confectionary	Export	Sugar, viz.: refined and candy
Fellmongeries and Wool-scouring	Import	Hides, raw and pieces thereof: dry
Flour and Grain Mills	Import	Wheatmeal and flour
Furniture, Bedding, and Upholstery	Export	Woollen and worsted manufactures: carpets, not being rugs
Jams, Pickles, Sauces, and Vinegars	Import	Vinegar
Manure	Import	Bones for manure (whether burnt or not)
Metal Works	Export	Rails (iron or steel)
Monumental Masonry	Import	Stones, slabs, and marble, rough hewn, or manufactured (other than works of art)
Paper Boxes and Bags	Export	Paper: unenumerated and articles of paper (including bags)
Printing and Bookbinding	Export	Books, printed
Saddlery and Harness	Export	Leather, tanned, tawed, or dressed, viz.: unwrought
Sawmills and Wood	Import	Wood and timber: sawn: fir
Smelting	Export	Pig iron
Tanneries	Export	Leather, tanned, tawed, or dressed, viz.: unwrought
Textiles	Export	Woollen tissues, viz.: heavy, weighing above 11 oz. per square yard: broad, all wool

Source: United Kingdom, Board of Trade, *Annual statements of the trade of the United Kingdom* (various years).

Appendix B: Sample descriptive statistics of Queensland's manufacturing industries, 1897–1906

Year	Mean	Minimum	Median	Maximum
		Output		
1897	156,429	6,516	93,778	657,497
1898	165,069	6,516	99,960	688,905
1899	203,567	10,296	103,173	851,523
1900	182,017	8,549	99,515	716,395
1901	194,298	8,206	107,514	820,461
1902	169,303	4,408	77,524	716,395
1903	152,697	7,097	68,907	541,120
1904	147,579	7,361	74,586	577,245
1905	161,857	5,311	75,292	567,207
1906	175,279	6,248	88,794	612,656
		Employment		
1897	591	20	273	2,689
1898	655	27	358	2,711
1899	757	45	335	3,862
1900	754	26	318	3,931
1901	777	37	369	3,934
1902	628	22	284	3,254
1903	606	21	278	2,406
1904	597	15	257	2,311
1905	630	25	276	2,492
1906	722	13	293	2,910
		Labour productivity		
1897	411	115	202	2,306
1898	340	116	226	1,444
1899	363	115	240	1,237
1900	342	122	233	1,241
1901	319	130	209	1,343
1902	369	118	220	1,831
1903	352	123	209	2,177
1904	325	125	219	1,409
1905	318	115	206	1,675
1906	309	122	211	1,295
		Number of factories		
1897	49	2	24	217
1898	54	1	25	287
1899	64	1	26	330
1900	64	1	26	329
1901	66	1	25	346
1902	62	1	22	323
1903	64	1	21	357
1904	63	1	20	374
1905	62	1	18	370
1906	64	1	18	401
		Average output per factory		
1897	5,513	580	3,030	20,042
1898	7,182	669	2,507	47,144
1899	7,185	730	3,215	35,479
1900	6,750	643	3,035	33,172
1901	6,484	578	3,332	31,048

1902	6,303	414	3,080	35,028
1903	5,450	404	2,589	27,685
1904	4,755	422	2,771	19,555
1905	5,918	454	3,033	23,906
1906	6,290	519	3,312	38,535

Source: SCQ (1897–1906).

Notes: For the industry of paper boxes and bags, for which data are unavailable for 1897, the 1898 data are used for 1897. The descriptive statistics for output, labour productivity, and average output per factory reported in this table make use of the industry-specific deflators. See the text.

Appendix C: Commodity composition of industries

Non-italicised text indicates a commodity. Italicised text indicates a sub-commodity thereof, as designated within the classification system of the original source. Data pertaining to each of the commodities (sub-commodities) listed below have been obtained from the dataset underlying Varian and Grayson (2024).

Aerated Waters
Queensland: Limejuice and limejuice cordial; Seltzer and mineral waters and ginger ale
Victoria: Aerated and mineral waters; Limejuice: *Sweetened; Unsweetened (in Bulk)*
Australia: Aerated and mineral waters; Limejuice and other fruit juices and fruit syrups (non-spiritous)

Biscuits and Bread
Queensland: Biscuits
Victoria: Biscuits; Bread
Australia: Biscuits

Boot and Shoe Factories
Queensland: Boot uppers: *All other; Men's*; Boots and shoes: *Boys'; Children's; Girls' (11–2); Girls' (7–10); Mens'; Womens'; Youths'*; Boots, shoes, and slippers
Victoria: Boots and shoes: *Boot and shoe uppers; Boot webbing; Boots of indiarubber; Boys', nos. 7–1; Children's, nos. 0–3; Children's, nos. 4–6, and slippers; Girls', nos. 7–10; Girls', nos. 11–2; Goloshes and overshoes; Leather, Wellington fronts, and grafts; Mens', no. 6 and upwards; Shoes of indiarubber; Shoes, sand "plimsols", etc.; Shoes, spiked; Slipper forms; Slippers, nos. 7–2; Slippers, other (except straw); With uppers of lasting; Womens', no. 3 and upwards; Youths', nos. 2–5*; Clogs and pattens
Australia: Boots and shoes: *Gum boots; Infants' boots, shoes and slippers, sizes 0–6; Mens', youths', boys', womens', and girls', except partly or wholly of lasting or stuff, and slippers (leather); Minor articles for; N.E.I.; Rubber sand shoes*

Breweries
Queensland: Beer—bottled; Beer—draught
Victoria: Beer: *Bottled (not lager); Draught; Lager*
Australia: Ale, porter and other beer, cider and perry: *In bottle; Other*

Bricks, Earthenware, and Pottery
Queensland: Bricks: *Bath; Fire*; Chinaware and porcelain; Earthenware; Pipes: *Tobacco (clay)*; Stoneware
Victoria: Bricks: *Bath; Clay*; Chinaware and porcelain; Earthenware (being brownware, c.c. stoneware), etc.; Earthenware (unenumerated); Pipes, smoking: *Clay*; Tiles, retorts, and fireclay goods (not otherwise enumerated)
Australia: Bricks: *Bath; Fire and glazed; Fire, for special use in reverberatory furnaces; Other*; China, parian and porcelain ware, and mosaic flooring; Earthenware, brownware, and stoneware, n.e.i.; Earthenware, viz.:—spurs, stilts and thimbles; Fireclay manufactures, n.e.i. and fire lumps; Tiles: *Asphalt and roofing; N.E.I.*

Cement and Lime
Queensland: Cement and plaster of Paris; Lime
Victoria: Cement; Plaster (other); Plaster of Paris
Australia: Cement (Portland), gypsum, etc.; Lime; Plaster of Paris, and other like preparations

Clothing
Queensland: Apparel and slops; Hosiery; Tailors' trimmings; Tailors' trimmings (Italian)

Victoria: Apparel and slops: *Corsets; Diving dresses, etc.; Other*; Frillings, rufflings, etc.; Hoods, felt, pullover; Hosiery: *Cotton, linen, etc.; Other*

Australia: Apparel and attire: *Articles, n.e.i.; Diving dresses; Military or naval clothing for the army or navy; Minor articles for; Regalia, viz., embroidery woven sashes; Socks and stockings (cotton); Socks and stockings (woollen or containing wool); Towels and handkerchiefs (made of cotton or linen); Frillings, rufflings, tucked lawns, pleatings and ruchings; Trimmings—mantle, dress, bonnet, and hat, n.e.i.*

Coffee and Condiments

Queensland: Chicory; Coffee, roasted; Oilmen's stores: *Mustard*; Pepper: *Ground*; Salt; Spices

Victoria: Chicory; Coffee: *Essence; Ground*; Mustard; Pepper: *Ground*; Salt; Spices: *Ground*

Australia: Coffee and Chicory: *Roasted or ground, and in liquid form*; Mustard; Salt*: N.E.I.*; Spices: *Other, ground, n.e.i.; Pepper, ground*

Confectionary

Queensland: Confectionary and succades

Victoria: Confectionary (other); Confectionary over 1s. per lb. in value

Australia: Confectionary, n.e.i.

Fellmongeries and Wool-scouring

Queensland: Hides; Skins; Wool: *Clean*

Victoria: Hides; Skins: *Kangaroo and wallaby; Not otherwise enumerated; Opossum; Rabbit; Sheep; Scoured (overland); Scoured (seaward); Washed (seaward)*

Australia: Skins: *Hides; Other; Rabbit and hare; Sheep, with wool; Sheep, without wool;* Wool: *Scoured and washed*

Flour and Grain Mills

Queensland: Flour; Maizena and cornflour; Meal: *Linseed; Maize; Oat*; Oilmen's stores: *Patent groats and farinaceous foods*

Victoria: Grain and pulse: *Bran, Flour, Oatmeal, Peas, split; Pollard; Unenumerated*; Linseed and linseed meal; Maizena and cornflour

Australia: Grain and pulse (prepared or manufacture): *Barley, pearl and scotch; Bran, pollard and sharps; Flour; Groats; Maizena and corn flour; Malt, including granulated maize and rice malts; n.e.i.; Oatmeal, wheatmeal and rolled oats; Peas, split; Rice for manufacturing starch; Rice, n.e.i.; Rice, uncleaned*; Linseed meal

Furniture, Bedding, and Upholstery

Queensland: Carpets; Carpeting and druggeting; Drapery and haberdashery; Furniture; Furniture springs; Furniture, castors, and hair seating; Hair (curled); Upholstery

Victoria: Carpeting and druggeting; Carpeting being felt; Furniture; Furniture coverings, etc.; Furniture springs; Hair: *Curled*; Hair seating; Quilts—sewn, cosies, and cushions; Woollen manufactures: *Rugs and rugging (not otherwise enumerated)*

Australia: Carpets and Carpeting; Cosies, cushions, mantel and furniture drapery and coverings, bedcovers and furnishings, n.e.i.; Curtains; Furniture: *Billiard balls in the rough; Minor articles for; N.E.I. (except metal)*; Hair: *Curled*

Jams, Pickles, Sauces, and Vinegars

Queensland: Oil: *Salad (bottled), half-pints; Salad (bottled), pints; Salad (bottled), quarts*; Oilmen's stores: *Pickles (half-pints); Pickles (pints); Pickles (quarts); Sauces (half-pints); Sauces (pints); Sauces (quarts)*; Preserves: *Jams and jellies*; Vinegar: *In bottle; In wood*

Victoria: Jams and jellies; Oil: *Salad, pints and over half-a-pint*; Pickles: *All other; Half-pints and smaller sizes; Pints and over half-a-pint; Quarts and over a pint*; Sauces: *All other; Pints and over half-a-pint*; Vinegar

Australia: Jams and jellies; Pickles, sauces, chutneys, olives, and capers; *Capers; Half-pints and over quarter-pints; Pints and over half-pints; Quarter and over pints; Quarter-pints and smaller sizes*; Vinegar, including acetic acid, containing not more than 6 per cent. of absolute acid

Manure
Queensland: Manure
Victoria: Manures: *Bonedust; Guano; Not otherwise enumerated*
Australia: Manures

Metal Works
Queensland: Agricultural implements and dairy utensils; Agricultural implements and machines—reapers, binders, etc.; Anchors (3 cwt. and under) and chain cables; Anchors (over 3 cwt.); Boiler tubes; Brass (bar, sheet, rolled and ingot); Brass screw wire, etc.; Brassware; Buckles; Copper: *Nails, etc.; Sheet and gauze; Wire, rod, rope, and wire thread covered*; Copperware; Cream separators; Cutlery; Grindery; Grindery, tools and material; Hardware and ironmongery; Holloware; Hook and eye hinges; Iron: *Bar and rod; Castings; Galvanised; Hoop; Joists, rolled; Joists, rolled (over 10 x 5); Pipes (cast); Pipes (malleable) and metal tubing; Plates; Sheet, chequered and gauze; Wire; Wire—galvanised*; Ironware—galvanised; Lead: *Piping; Sheet*; Machinery and boilers on vessels; Machinery and engines: *All other; Carding, spinning and weaving; Dry air for refrigerating and freezing machines and yaryan evaporators; Electric, and fittings; Exempted by Governor in Council; Flour milling, porcelain; and steel rollers; Gas and oil engines; Mining; Portable and traction engines; Steam threshing and steam ploughs; Sugar; Sugar, centrifugals*; Metal (yellow munts); Metal fittings and frames for portmanteaux; Nails; Platedware; Plating materials—electro; Railway materials; Railway rails (steel); Screws; Sewing machines; Steel: *Unwrought; Wire; Wire rope*; Tin plates; Tinfoil and capsules for bottles; Tinware; Tools: *All other; Axes, hatchets, and tomahawks; Spades, forks, and shovels; Tools (dutiable)*; Traps (iron and steel); Typewriters; Wire netting; Zinc; Zincware
Victoria: Anchors; Brass: *Brassware (not otherwise enumerated); Sheet, rod, etc.*; Chain cables; Copper: *Copperware (not otherwise enumerated); Ingots; Sheet; Wire*; Cordage: *Iron and steel*; Cutlery; Grindery; Hardware and ironmongery; Holloware, iron; Implements, agricultural: *reapers and binders; [unspecified sub-commodity]*; Iron: *Bar and rod; Bolt and nuts; Buckets and tubs; Cappings, firebars, etc.; Galvanised sheet; Girders, H-rolled; Hoop; Pipes, cast, Pipes, wrought; Plates (iron and steel); Rails (iron and steel); Scrap; Sheet (not galvanised); Tanks (containing goods on importation); Wire netting; Wire, barbed; Wire, other*; Lead: *Pipe; Sheet*; Machinery: *Cream separators, etc.; Engines (not otherwise enumerated) and parts thereof; Engines, portable, and parts thereof; Engines, traction, and parts thereof; Machine tools; Machines, sewing, and parts thereof; Not otherwise enumerated; Spinning and weaving, etc.*; Manufactures of metals (not otherwise enumerated); Metal: *Not otherwise enumerated; Yellow*; Nails: *Horseshoe; Iron and steel*; Platedware and mined metalware; Screws; Steel; Tin: *Block; Foil; Plates, decorated; Plates, other*; Tools of trade (not otherwise enumerated); Zinc: *Ingots; Sheet; Sheet perforated*
Australia: Anchors: *Not over 10 cwt.; Over 10 cwt.*; Brass: *Bars, ingots, scrap, sheet, and strips; Pipes and tubes*; Britannia metal, aluminium, bronze, yellow metal, nickel, and German silver, viz.: *Pigs, ingots, scrap, blocks, bars, strips, sheets and plates*; Chains, n.e.i.; Copper: *Bars, strips, scrap and sheets; Pipes and tubes*; Cutlery n.e.i. (including manicure sets and knife sharpeners); Diving apparatus (metal); Implements and machinery, agricultural, horticultural, and viticultural: *Free; N.E.I.; Reapers and binder*; Iron and steel: *Bar, rod, angle, tee; Galvanized plate and sheet; Girders, beams, channels, joists, columns, rolled, etc.; Hoop; Ingots, blooms, slabs, etc.; Plate and sheet (except galvanized)*; Lead: *Scrap and old; Sheet and piping*; Machine tools; Machines and machinery: *Cream separators, testers, and pasteurizers; Electrical (duty 20 per cent.); Electrical appliances, n.e.i.; Engines: fire; Engines: gas and oil; Engines: high speed and turbine, water and steam; Engines: other; Engines: portable and traction; Free and parts thereof; Machinery, 15 per cent.; Machinery, mining; Mangles, clothes wringles, and washing machines; N.E.I. and parts thereof, including boilers and pumps; Printing machines and presses, and machinery used exclusively for, and in the actual process*

of, electrotyping and stereotyping, aluminium rotary graining machines, and linotype, monotype, monoline, and other type-composing machines; Sewing, stitching, and knitting machines; Typewriters; Weighing machines, weighbridges and scales, n.e.i.; Metal, manufactures of: *Axles and springs; Bolts and nuts; Free; Mixed metal ware; N.E.I.; Nail wire and other, staples, spikes, brads and tacks; Nails, horseshoe; Pipes and tubes (iron and steel); Plated ware and plated cutlery; Tanks, containing goods, or empty; Wire netting; Wire, barbed; Wire, iron and steel; Wire, n.e.i.*; Rails, fish plates, etc.; Rails, fish-plates, fish-bolts, tie-plates, switches, points, crossings and intersections for railways and tramways; Tin: *Ingots; Plates, plain*; Tools of trade, not being machines; Zinc: *Bar, scrap and sheet, and circles and ingots, bored or unbored, for cyanide gold process*

Monumental Masonry
Queensland: Marble: *Unwrought; Wrought*
Victoria: Stones: *Marble, unwrought; Marble, wrought (monumental); Marble, wrought (not otherwise enumerated)*
Australia: Stone, including marble and slate: *Monumental, wrought; Unwrought marble*

Paper Box and Bag
Queensland: Paper bags: *Not printed; Printed*
Victoria: Boxes: *Cardboard or paper*; Paper: *Bags*
Australia: Boxes, match and vesta, empty (paper); Paper: *Bags*

Printing and Bookbinding
Queensland: Advertising matter and show cards; Books—printed and newspapers; Maps, charts, and globes; Music
Victoria: Books, printed, periodicals, etc.; Labels, printed, for hats, etc.; Paper: *Advertising matter*
Australia: Books (printed), music, periodicals, newspapers, and pamphlets, not advertising; Paper: *Advertising matter*

Saddlery and Harness
Queensland: Saddle-trees; Saddlers' materials; Saddlery and harness
Victoria: Saddle trees: *Harness; Riding*; Saddlers' Ironmongery; Saddlery and harness
Australia: Leather: *Minor articles for harness, saddles, leatherware, and whips (including saddle trees, saddlers' tacks and nails), snaps (harness and halter), spurs, and spur boxes*; Saddlers' and harness makers' materials

Sawmills and Wood
Queensland: Building material: *Doors; Sashes*; Mouldings (all other); Mouldings (gilt); Oars; Oars, hulled; Pipes: *Wooden*; Timber: *American oak for staves; Ash in plank; Beech (under 96 inches); Cedar (under 96 inches); Ditto (96 inch and over); Ditto (under 96 inches); Hardwood (log); Laths; Miscellaneous (96 inch and over); Miscellaneous (log); Miscellaneous (under 96 in.); Pine (96 inch and over); Pine (log); Pine (under 96 inches); Staves and heads (imported in shooks); Staves loose (sawn); Staves loose (split)*; Turnery; Wickerware; Woodenware
Victoria: Oars, ash; Timber: *Bent; Cut into shapes; Deals; Dressed, flooring, lining, shelving, and weatherboards; Hardwood, undressed; Laths; Logs; Mouldings (3 inches and over in width); Mouldings (under 3 inches in width); Mouldings—picture frame (not mitred); Mouldings, picture frame (mitred); Not otherwise enumerated; Oregon, of sizes less than 7 inches x 2.5 inches; Oregon, of the sizes of 7 inches x 2.5 inches and upwards, and less than 12 x 6 inches; Other of sizes less than 7 inches x 2.5 inches; Other, of the Sizes of 12 inches x 6 inches and upwards; Palings; Pickets, dressed; Pickets, undressed; Posts and rails; Shingles; Skirtings (wholly or partly prepared); Spars and piles; Spokes, felloes, and rims (hickory, rough); Spokes, felloes, and rims (rough, other); Staves, undressed; Undressed, not otherwise enumerated*; Timber manufactures: *Door and window frames; Doors over 1.5 inch and not exceeding 1.75 inch in thickness; Doors, not exceeding 1.5 inch in thickness; Window sashes*

(glazed); Window sashes (unglazed); Woodware and turnery: *Not otherwise enumerated; Woodenware (for vehicles); Woodenware (in the rough, etc.)*

Australia: Timber: *Architraves, mouldings, and skirtings of any material; Doors of wood—1½ inches and under; Doors of wood—1¾ inches and over; Doors of wood—over 1½ inches and under 1¾ inches; Dressed, n.e.i.; Hickory, undressed; Laths; Logs, not sawn, and spars in the rough; New Zealand pine, undressed; Other; Pickets, undressed; Shingles; Staves, undressed or roughly dressed, but not shaped; Undressed Oregon, in sizes of 12 inches x 6 inches (or its equivalent), and over; Undressed, n.e.i., in sizes of 12 inches x 6 inches (or its equivalent) and over; Undressed, n.e.i., in sizes of less than 12 inches x 6 inches (or its equivalent)*

Smelting

Queensland: Copper: *Smelted*; Iron: *Pig*; Lead: *Pig*; Tin smelted

Victoria: Iron: *Pig*; Lead: *Pig*

Australia: Iron and steel: *Pig*; Lead: *Pig*

Tanneries

Queensland: Bookbinders' leather and cloth; Leather; Leather (patent)

Victoria: Leather: *Black Morocco and goat levant; Imitation; Kid, calf kid, mock kid, and patent calf; Laces; Leatherware, otherwise unenumerated; Morocco, Persian, Sheep, Roan, and Skivers; Not otherwise enumerated*

Australia: Leather: *Free; N.E.I.*

Textiles

Queensland: Blanket; Cotton piece goods; Flannel; Flannel (Crimean); Linen piece goods; Moleskin (in the piece); Oil and floor cloth; Silk: *In the piece; Manufactures of; Mill*; Woollen piece goods; Yarn—Russian, Italian, coir, etc.

Victoria: Cotton manufactures (not being apparel): *Blankets, stamped; Blankets: unstamped; Other*; Cotton piece goods; Handkerchiefs (other than cotton or linen); Hessians (not bleached or coloured); Linen manufactures (not being apparel); Linen piece goods; Oil and other floorcloths; Silk: *Manufactures of (not being apparel) not otherwise enumerated; Veilings*; Silks in the piece (cut up into sizes or lengths for neckties), etc.; Silks in the piece and piece goods containing silk; Woollen manufactures: *Blankets (grey or coloured, and those on which the invoice is 1s. per lb. or under); Blankets (not otherwise enumerated); Not otherwise enumerated; Woollen piece goods*; Yarn

Australia: Blankets and blanketing; Floor cloths and coverings; Piece goods: *Coatings, vestings, and trouserings, n.e.i.; Cotton and linen; Flannelettes; Flannels; Horsehair cloth and hop cloth; Silk, milling; Silk, or containing silk, or having silk worked thereon; Velvets, velveteens, plushes, etc.; Woollens (free); Woollens or containing wool, n.e.i.*; Yarns: *Angora; Other, including coir; Partly or wholly of wool*

Appendix D: Difference-in-differences regressions, 1897–1906 (non-industry-specific deflation)

	(1) Output	(2) Labour productivity	(3) TFP	(4) Average output per factory
Excluding 1900–1 year-on-year observations				
Import exposure x Post	–0.04	0.34	0.44	0.22
	(0.31)	(0.31)	(0.33)	(0.37)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	183	183	183	183
R^2	0.22	0.06	0.06	0.12
Excluding 1900–1 and 1901–2 year-on-year observations				
Import exposure x Post	–0.24	0.23	0.34	0.03
	(0.24)	(0.34)	(0.34)	(0.37)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	160	160	160	160
R^2	0.19	0.07	0.07	0.11

Notes: The dependent variables are log-differenced. In col. 1, real output is obtained using a non-industry-specific deflator. Similarly, in cols. 2–4, the dependent variables are calculated on the basis of real output obtained using a non-industry-specific deflator. See the text for a discussion of the construction of the measure of import exposure. Post takes a value of 1 beginning with the 1901–2 year-on-year difference (0 before). The panel is balanced, except that there is no observation for the industry of paper boxes and bags for the 1897–8 year-on-year difference. Standard errors are clustered by industry and reported in parentheses.

Appendix E: Difference-in-differences regressions, 1897–1906 (sub-sample robustness tests)

	(1) Output	(2) Employment	(3) Labour productivity	(4) TFP	(5) Factories	(6) Average output per factory
Excluding negative import-exposure industries						
Import exposure x Post	–0.41	–0.54**	0.12	0.10	–0.56	0.14
	(0.47)	(0.24)	(0.48)	(0.46)	(0.35)	(0.52)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	135	135	135	135	135	135
R^2	0.23	0.31	0.09	0.09	0.18	0.14
Excluding small industries						
Import exposure x Post	–0.35	–0.61***	0.26	0.26	–0.36	0.01
	(0.39)	(0.16)	(0.34)	(0.33)	(0.24)	(0.45)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	136	136	136	136	136	136
R^2	0.25	0.33	0.09	0.10	0.21	0.17

Notes: The dependent variables are log-differenced. In col. 1, real output is obtained using industry-specific deflators. Similarly, in cols. 3, 4, and 6, the dependent variables are calculated on the basis of real output obtained using industry-specific deflators. See Table 2 for those industries with negative import-exposure measures. See the text for those industries categorised as small. See the text for a discussion of the construction of the measure of import exposure. Post takes a value of 1 beginning with the 1901–2 year-on-year difference (0 before). The panel is balanced, except that there is no observation for the industry of paper boxes and bags for the 1897–8 year-on-year difference. Standard errors are clustered by industry and reported in parentheses. ** indicates statistical significance at the 5% level and *** at the 1% level.