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Prices, Wages, and Welfare in Early Colonial South
Australia, 1836-1850

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Abstract

From first settlement of South Australia in November 1836, the colony underwent a series of crises due to delays in surveying and distributing lands, producing crops, and employing new migrants. Histories of this period emphasize that a combination of high food prices and high wages burdened the government and new farms. To check and refine standard explanations for early colonization crises, we employ a number of sources, including South Australian newspapers and colonial government blue books, to develop monthly series for prices, wages, and the cost of “respectable” and “bare bones” consumption baskets over the 1838-1850 period. We use Corden’s model of a booming economy with traded and non-traded goods to understand how various shocks, including the 1840 stop in immigration and the 1844/1845 copper discoveries, could have affected the SA economy. We find that the model’s implications are consistent with changes in our newly developed SA data series.

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I. Introduction

The colony of South Australia (SA) was conceived as an experiment for Edward Gibbon Wakefield's theory of systematic colonization. In his 1829 pamphlet, *A letter from Sydney*, Wakefield outlined his ideas for avoiding the negative moral and social effects found in colonies reliant on slave or convict labor. Broadly, the theory was oriented around sales (rather than grants) of small tracts of land, concentration of settlement within a defined geographic area, and subsidization of passage for British workers needed to provide a labor force to newly established farms. To achieve these results, Wakefield's systematic colonization plan focused on two elements. First, all land would be sold at a fixed price (referred to as the 'sufficient price') set high enough to prevent laborers from purchasing land soon after their arrival in the colony. Land was to be surveyed and sold in stages to accommodate additional buyers and laborers who had worked several years and saved enough to purchase a new parcel and establish a farm. Setting the price of land at the sufficient price would also limit the overall extent of land sales, thereby concentrating settlement and raising population density in the areas around emerging cities and ports. This would facilitate establishment of religious and educational institutions and help to remedy problems of lawlessness and immorality that Wakefield associated with other British colonies.

Second, all revenue from SA land sales would be dedicated to subsidizing the cost of passage to British laborers. Wakefield argued that a large passage subsidy would induce a large increase in the flow of migrants to SA because this would make it less costly for a migrant to travel to distant SA than to Canada or the United States. The larger supply of labor would allow accommodation of additional demand for labor by newly established farms and thereby ensure good returns to investors purchasing SA land and providing capital. The good returns would eventually lead to another round of sales of newly opened lands and the virtuous cycle of land purchases, migration, and capital investment would repeat.

Wakefield's ideas for "systematic colonization" gained popularity in Britain during the early 1830s and the National Colonization Commission used them as a

blueprint for the intended settlement of SA – a vast area of almost 985,000 square miles situated between the two British colonies already established on the Australian continent, New South Wales (NSW) on the east coast and Swan River (Perth) on the west coast. SA was sparsely inhabited by perhaps 10,000-14,000 Aboriginal organized in small bands, and Wakefield and other advocates of an SA colony believed that they could take most of SA's land area for farming and grazing by colonists without much resistance.

After Parliament authorized an SA colony organized along Wakefield's principles in 1834, a series of errors by the new colonial authorities resulted in settlers arriving in the colony in November 1836 before land in the capital of Adelaide and the surrounding country parcels, already purchased by investors in London, was surveyed and made available for selection (Harris and La Croix 2018a). Even after land in the city of Adelaide was surveyed, selected and sold in March 1837, long delays in surveying and selecting country lands meant that during the first three years of settlement, agricultural production was extremely limited and the colony remained heavily reliant on imports from NSW and Van Diemen's Land (VDL) for basic necessities for much longer than expected (Harris and La Croix, 2018b).¹ The delay in allocating country lands meant there was little demand for agricultural labor and, consequently, migrants remained in Adelaide where some were employed building housing for current and anticipated future migrants. Some migrants could not find work and, as promised by their immigration contracts, the government provided relief via employment on public works projects. Newspapers and contemporary observers reported that both wage rates and food prices were exceptionally high through 1840.² Speculation in Adelaide's one-acre

¹ There is very little evidence of squatting in SA during the first two years of settlement. Settlers did squat on parklands surrounding the city but few ventured further away from Adelaide. This was because remaining close to the city meant being close to market and provisions. In addition, moving into the largely unexplored interior raised a very real potential for conflict with hostile Aboriginals.

² For examples, see reports in Price (1924: 185, 187, 200, 215-217).

lots led to a 59-fold increase in their price by 1839, thereby generating huge returns to investors who sold their city lots (Harris and La Croix, 2018a).

Government spending, primarily on surveying, police, and public works, exceeded revenue by 288 percent from 1839 to 1841 (Harris and La Croix, 2018b). Warnings of problems in SA finances came in late 1839 as British investors slowed their purchases of SA land following reports that good agricultural lands were already taken. Despite these developments, the Colonization Commission—established by the SA Act to manage land sales and migration to the Colony—continued to subsidize immigrant passage to SA and to pay bills of exchange issued by Governor Gawler. Efforts by the Commission to raise a new loan during May/June 1840 were unsuccessful and when the land fund was exhausted in August 1840, the Commission stopped assisted migration and declined £20,000 in bills issued by Governor Gawler. Four months later, in December 1840, the British government decided to replace Governor Gawler with a military officer who had led an exploratory mission in South Australia, 26-year old Captain George Grey. He assumed office in Adelaide on May 14, 1841.

Gawler had already cut some government spending in the first half of 1841 and Grey quickly acted to slash expenditures on police, surveying, public works, and relief. In their excellent general histories of colonial SA, Grenfell Price (1924: Ch. 10) and Douglass Pike (1967: Ch. 10) relate similar narratives regarding how the economy contracted in 1840-1842. They provide scattered evidence that Adelaide lot prices, nominal wages, and food prices fell over the 1841-1843 period, and attribute some of the decrease in wages to a reduction in the generous relief payments provided to unemployed emigrants by the SA government. Both find that despite the depressed economic conditions in 1841 and 1842, acres under cultivation increased more than seven-fold between 1840 and 1842. By 1843, employment opportunities on farms and sheep stations outside of Adelaide had increased so much that “unemployment entirely ceased” along with expenditures on temporary relief (Price, 1924: 222). Both historians agree that the discovery of copper deposits in 1842 and the opening of the large Kapunda copper mine in 1844 and the massive Burra copper mine in 1845, brought

prosperity to SA that persisted until the discovery of gold in neighboring Victoria in August 1851.

Our aim in this article is to augment the fragmentary economic data that provide the basis for these accounts and then to consider how more complete data series might confirm or change our understanding of the early development of the SA economy. Our first step is to compile a data base of important economic data over the 1836-1850 period. We focus on assembling data on occupational wages and commodity prices from 1838 to 1850 from various sources including newspapers, government Blue Books, and secondary sources and then constructing series of wages and prices. (See Appendix for details.) Our second step is to use these series to estimate the standard of living of workers in five unskilled and thirteen skilled occupations using methods developed by Allen (2001; 2009) and applied by Panza and Williamson (2019) to Victoria, Western Australia, SA (from 1850), and NSW. These authors provide dietary requirements and rudimentary household products required for a “bare bones” consumption basket and a “respectable” consumption basket that allows for a better diet and a more comfortable life (Table 1).³ Using the cost of bare bones and respectable baskets, we then calculate how many bare bones and respectable baskets (“the welfare ratio”) each group of workers is able to purchase with their annual income. This enables us to examine how the welfare of different groups of workers changed over time, and how worker welfare in SA compared with workers in more developed economies and other frontier economies.

We then use Corden’s (1984) immigration-augmented model of an economy with traded and non-traded goods to understand more precisely how various shocks, including the initial migration flows of 1836-1840 and the 1844/1845 copper discoveries, could have affected the SA economy. The model’s implications allow us to critically examine standard historical narratives of the colony’s initial settlement (1836-1840), its financial and economic crisis (1840-1843), and its copper boom (1844-1850).

³ Bare bones and respectable baskets are also calculated for a worker with a wife and two children.

Four main findings emerge from our comparison of the model's implication and our newly developed data series. First, at the start of settlement (1838-1839), we find high levels of nominal wages for both skilled and unskilled workers relative to Van Diemen's Land (VDL) and NSW, with skilled workers earning a premium over unskilled workers of roughly 100-135 percent in 1839. Second, we find that prices of all locally produced agricultural goods fell between 79 and 94 percent from their 1838-1840 peaks to December 1844; this compares with much smaller declines in the prices of goods imported from VDL over the same period. Third, the substantial fall in SA prices led to big drops in the cost of living, with the cost of a bare bones basket falling by 55 percent and the cost of a respectable basket falling by 58 percent over the 1840-1845 period. Fourth, average standards of living for unskilled workers fluctuated over the 1838 - 1845 period, with some unskilled occupations registering small gains and others small declines. Standards of living for skilled workers fell from 1838 to 1841. This is partly due to the flawed management of the Wakefieldian immigration mechanism by the Colonial Commission, which pushed thousands of new immigrants to SA in 1840 despite possessing information that the Colony was entering into a major financial crisis. From 1841, standards of living for skilled workers were volatile but increased to levels in 1845 that were, on average, still 12 percent below their exceptionally high 1838 levels.

Finally, we again apply Corden's model to understand how the 1844-1850 boom in copper mining could have changed wages, production of non-traded goods and traded agricultural and pastoral goods, and prices of non-traded goods. We find, consistent with the model's predictions, that wages of skilled and unskilled workers increased between 1844 and 1850 and that prices of non-traded housing and land in Adelaide soared. Colonization officials in London used proceeds from sales in 1845/1846 of four 20,000-acre tracts with potential for copper mining to heavily subsidize passage from Britain to SA for 18,755 migrants from 1845 to 1850. We conclude that the Wakefieldian mechanism linking revenue from land sales to subsidized passage for migrants worked to the Colony's advantage this time. The massive new migration flows had the salutary effects of moderating wage increases for unskilled and skilled workers

during the copper boom, while allowing rapid expansion of copper mining without big cutbacks in the output of wheat and wool, the two other important SA exports.

II. Estimating the standard of living in Adelaide for various occupations

Both contemporary observers and twentieth-century historians relied heavily on sporadic observations of wages and prices to characterize SA's economy from 1837 to 1850. Our strategy is to augment the fragmentary data by assembling monthly price and occupational wage data from newspapers and Blue Books. After examining properties of these series, we use them to estimate average SA living standards for various groups of skilled and unskilled workers using methods pioneered by Robert Allen (2001; 2009) and Allen et al. (2011). Allen's methods have been widely employed to estimate living standards in Europe (Broadberry et al., 2015), the Americas (Allen et al., 2012; Arroya Abad, 2014; Gelman and Santilli, 2018; Lindert and Williamson, 2016), Asia (Allen et al., 2011), and Australia (Panza and Williamson, 2017, 2019) in the nineteenth century. They involve calculating the cost of a 'bare bones' consumption basket and the cost of a 'respectable' consumption basket and then determining how many baskets could be purchased by workers in a particular occupation with their annual incomes. Our first step is to assemble monthly price series of goods included in the bare bones and respectable baskets over the 1838-1850 period.

A. Price Series

In some cases, neither newspapers nor government reports included the price of various goods. For those items we looked to prices in two other colonial markets, Hobart (VDL) and Sydney (NSW). In the first instance, we used Hobart prices for missing observations because it was less expensive to ship items from VDL to SA than from NSW to SA. When Hobart prices were unavailable, we used Sydney prices. When prices in both locations were not recorded, we used prices from secondary sources, particularly Coghlan (1918). The Appendix provides details on our use of primary sources and substitutions from secondary sources to assemble price series.

Figure 1 presents graphs of monthly prices for eight imported goods.⁴ Prices of six imported goods decline over the 1838-1844 period at the following annual rates: Candles at 1.3 percent, soap at 10.5 percent, rum at 6.4 percent, tea at 7.4 percent, cheese at 11.2 percent, and sugar at 8.2 percent. Fuel prices are unchanged over this period, while the price of linen increases at an annual rate of 6.0 percent. Prices of seven imported goods declined over the 1845-1850 copper boom period at the following annual rates: Candles at 11.5 percent, soap at 5.0 percent, rum at 9.6 percent, tea prices at 1.4 percent, sugar at 2.8 percent, and linen at 0.9 percent.⁵

Figure 2 presents graphs of monthly prices for nine locally produced goods. Prices of all nine locally produced goods decline substantially over the 1838-1844 period: The price of butter by 83.4 percent from its October 1838 peak, bread by 89.1 percent from its March 1840 peak, potatoes by 85.4 percent from their July 1839 peak, mutton by 79.1 percent from its July 1838 peak, eggs by 90.8 percent from their September 1839 peak, wheat by 93.8 percent from its September 1839 peak, and milk by 49.6 percent from its October 1840 peak. The price of peas and beans is a bit of an exception, rising throughout the period before plunging in 1844 to register an overall decline of 70.8 percent. Note that prices of seven of the nine locally produced goods move closely together, declining by between 79.1 percent and 93.4 percent from their 1838-1840 peaks to December 1844.

Prices of most locally produced goods rose modestly during the 1845-1850 copper boom period, despite the near tripling of the Colony's population: From December 1844 to December 1850, the price of butter increased at an annual rate of 3.8 percent, milk at 1.9 percent, cheese at 4.4 percent, eggs at 11.4 percent, bread at 2.3 percent, and wheat at 4.8 percent. The price of peas and beans increased at a much higher annual rate, 27 percent, while the price of potatoes fell at an annual rate of 7.1 percent and mutton at 6.7 percent.

⁴ Cheese was initially an imported good. We report wholesale prices of cheese through 1843 and retail prices from 1844.

⁵ Price changes are from Dec 1844 to Dec. 1850 except for linen (March 1844 to Dec. 1850).

B. Wage Series

We collect wages for several occupations from government Blue Books (available in January, April, July, and October from 1838) and newspaper reports. Ideally, we would like to have monthly observations for each occupation but for some we have only the four monthly observations from the Blue Books. Appendix 1 provides more information on the sources of wage data for different occupations.

Figure 3 presents average annual wage data for five unskilled occupations and Figure 4 for eleven skilled occupations.⁶ In 1838, the first year for which we have reliable SA wage data, we note that occupational wages differed somewhat from those reported for VDL. Average daily wages for blacksmiths and masons in VDL (£0.31) were higher than in SA (£0.29), while average daily wages for carpenters in VDL (£0.31) were lower than in SA (£0.36). SA Wages generally increased between 1838 and 1840, with wages rising for five of seven skilled occupations and two of four unskilled occupations for which we have 1838 and 1840 data.⁷ From 1840, there was a secular decline in virtually all wage series. For example, between 1840 and 1843 the average wage of laborers in building trades fell by 64.48 percent while wages of male domestics fell by 54.78 percent. Much of the fall in wages was concentrated in 1841 and early 1842. For example, between December 1840 and April 1842, wages for cabinetmakers fell by 43 percent, shoemakers by 34 percent, and tailors by 34 percent. Wages generally continued to fall for most occupations, albeit at a lower pace, through 1843 and, for most unskilled and a few skilled occupations, through 1844.

For example, 1838 annual wages for painters and plasterers were £182 while bricklayers earned £173.60, and carpenters £166.88. Just five years later, in 1843, painters and plasterers' incomes were less than half of their 1838 value at £57.87 and £67.43 respectively. Wages for bricklayers and carpenters had also fallen dramatically

⁶ Some of the annual averages in the occupational wage series are derived from just a few monthly observations, particularly in the 1838-1841 period. For unskilled workers in 1842, we have just a one observation for each occupation that was offered for the entire year.

⁷ One unskilled wage series—predial laborer—fell 48.5 percent in the 1838-1840 period.

by 1843 to £71.87 and £77.00, respectively. (Refer to Appendix two for a table of average wages for the 18 occupations in our data set.)

The extremely high wages in the 1838-1840 period, particularly for trades and other skilled workers, reflected the general scarcity of labor and high demand for those in building occupations due to the construction boom in Adelaide geared to build public works and housing for recent and future migrants. The end of assisted immigration arrivals in December 1840 marked a turning point for workers in the building trades, as housing construction activity in Adelaide abruptly stopped in response to the unexpected news.

Wages for unskilled occupations were generally stagnant over the 1844-1846 period, increasing from an annual average of £41.99 in 1844 to just £42.39 in 1846. Demand from the copper boom pushed average wages up to £50.13 in 1847 and £49.08 in 1848, but the average wage fell to post-settlement lows of £40.76 in 1849 and £40.35 in 1850. The decline coincided with immigration flows that tripled the Colony's population from 1844 to 1850 and were concentrated in the 1848-1850 period. The decline in average unskilled wages over the full 1838-1850 period masks significant variation among unskilled occupations, with wages of female domestics, and shepherds falling far below their mid-1840s lows and wages of day laborers and male domestics settling at levels above their mid-1840s lows.

Wage rates for four of the five skilled building trades hit a low in 1843 and then registered spectacular increases of 28.2 – 52.8 percent to reach peaks in either 1847 or 1848. These increases were likely tied to the building construction boom generated by the surge of immigrants from 1845. Average wages for the five building trades then decreased 15.2 percent from 1848 to 1850. Wages of other skilled workers follow a similar pattern, as their average wage reached a peak in 1848 before receding 12.6 percent by 1850. We speculate that the source of the decline in both skilled and unskilled wages from 1848 to 1850 was the effect on labor supply of the 36,188 migrants who arrived in the 1848-1850 period, more than doubling the overall population in just three years.

How did skill premiums change over the 1838 to 1850 period? Between 1838 and 1841, the skill premium was extremely volatile, falling from 73.4 percent in 1838 to 33.4 percent in 1839, increasing to 114.4 percent in 1840 and then falling to 24.3 percent in 1841. The skill premium rose from 1841 to 1849, reaching 91.3 percent in 1846 and 113.7 percent in 1849 before falling back somewhat in 1850 to 101.2 percent. We note that the lowest skill premiums were observed from 1841 to 1843—24.3 percent in 1841, 47.9 percent in 1842 and 47.1 percent in 1843. The low premiums occurred when housing construction in Adelaide came to a virtual standstill due to the sudden stop in assisted immigration arrivals from Britain in December 1840 whereas higher skill premiums come during periods with robust housing construction.⁸

C. ‘Bare bones’ and ‘respectable’ baskets

To calculate SA living standards over the first 14 years of colonial settlement, we estimate how many bare bones and respectable baskets that workers (and their families) in a particular occupation were able to consume each year. To accomplish this, we make several adjustments to our series of daily and monthly wages. The first step is to account for rations provided to domestic servants, predial workers, and shepherds that supplemented their money wages. Newspaper reports from 1845 provide the following rations for shepherds and farm laborers: 10-12 pounds of flour, 10 pounds of fresh meat, two pounds of sugar, and a quarter of a pound of tea per week (Adelaide Observer, 24/5/1845: 2; Adelaide Observer, 27/9/1845: 5). Since rations were provided weekly while wages were paid per diem, we assume shepherds and farm laborers were on weekly contracts and worked 50 weeks per year (Panza and Williamson, 2017). By multiplying weekly ration values by 50, we find that the annual consumption levels of food provided in these occupations were: 249.48 kilograms (kg) of flour, 226.48 kg of meat, 45.36 kg of sugar, and 5.67 kg of tea. In other words, yearly rations were

⁸ How do these skill premiums compare with those computed by Williamson and Panza (2018) for NSW in 1828? Their skill premium for carpenters vis-à-vis unskilled urban workers for 1828 is 182 percent whereas our skill premium for the same groups is 151 percent for 1838; it ranges from 93.3 to 116.2 percent over the 1839-1845 period and from 143.8 to 177.7 percent over the 1846-1850 period.

provided at levels far above the minimum consumption requirements outlined in the respectable consumption basket. Following the method used in Panza and Williamson (2017; 2019) to adjust for rations provided to employees, we increase their annual income by the annual value of the rations as reported in the sources specified above.

The second step is to convert daily and weekly wages into annual wages. We follow Panza and Williamson (2019: 5-6) in assuming that a full-time year for Australian workers was 313 days, with only Sunday for rest. However, not all workers worked full weeks or found employment for the full year. For Great Britain in the 1860s, George Boyer (2018) examined hours of skilled workers, such as artisans, metal workers, and those in the building trades, and concluded that overall work hours for skilled workers should be adjusted downward by 10 percent while hours for unskilled workers in casual employment, such as day laborers, should be adjusted downward by 20 percent.⁹ We again follow Panza and Williamson (2019: 6) in adopting Boyer's estimates for SA workers in the 1840s.¹⁰ This means that skilled workers were employed for the equivalent of 280 days per year while unskilled workers were employed for the equivalent of 250 days per year.

A third step is to account for the value of lodging for workers in those occupations with employer-provided accommodation. We follow Panza and Williamson (2019: 6) who allow for rent as a 5 percent premium in the bare bones basket and an 11 percent premium in the respectable basket.¹¹ We add these premiums to annual wages

⁹ Lindert and Williamson (2016) apply the same reasoning to their analysis of U.S. living standards in the nineteenth century. Boyer (2018: Ch. 3, Sec. 1) draws his conclusions on hours worked from a critical reading of Baxter (1868: 46-49, Appendices) who incorrectly included the effects of paupers and "non-effective" workers in his estimates of hours worked by a typical worker in a manual occupation.

¹⁰ Governor Grey noted in April 1842 that during the early period of Adelaide's settlement, remuneration was so high that "men would only work for three to four days a week" (British Parliamentary Papers, 1843: 186).

¹¹ The rental ratios chosen by Panza and Williamson (2019: 6) follow the suggested allowances outlined in Coghlan (1918) and McLean and Woodland (1992).

for the following occupations for which employers typically provided lodging: Male and female domestics, bakers, and shepherds.

D. Standard of Living Estimates

We begin our analysis of SA living standards by estimating four measures of the annual SA cost of living, i.e., the cost of purchasing a bare bones basket, a bare bones basket with family, a respectable basket, and a respectable basket with family. Results are displayed in Figure 5. The cost of a bare bones basket for a single worker increased by 64.1 percent from 1838 to 1839 to £16.21, an amount substantially higher than the cost of a bare bones basket in NSW (£6.73) or Great Britain (£3.47) during the 1830s.¹² Some of this premium could be attributed to a severe drought that affected most of Eastern Australia in 1839, but the cost in SA was also much higher in the years bounding the drought: 1838 (£9.88), 1840 (£14.06), and 1841 (£10.47). As more farm land was brought into production, the cost of a bare bones basket in SA fell by 67.3 percent between 1840 and 1845, so that by 1845 its cost (£4.60) was below the 1830s benchmark for NSW. The cost of a respectable basket in SA followed a similar path, increasing by 35.3 percent from 1838 to 1839 to a high of £27.57 and then falling by 64.3 percent to £9.83 in 1845. During the copper boom and immigration surge (1845-1850), the cost of and bare bones and respectable baskets followed similar patterns. Both declined in 1846, increased in 1847 and 1848, and then declined in 1849 and 1850 to levels (£5.30 for bare bones and £10.41 for respectable baskets) that clearly exceeded their levels (£4.60 for bare bones and £9.83 for respectable baskets) in 1845.

Figure 6 displays the annual bare bones welfare ratios for single workers from five unskilled occupations. Over the 1838-1845 period, the welfare ratios for the four occupations with initial observations in 1838 decline between 1838 and 1840, rise to a peak in 1841 and then gently fall over the next four years to a level in 1845 that equals or somewhat exceeds the initial 1838 values. This means that the large decline in the prices of goods contained in the bare bones basket outpaced the large decline in

¹² See Panza and Williamson (2017: Table 5) for costs of bare bones baskets in Sydney, Hobart, and London during the 1830s.

nominal wages, thereby yielding increases in the welfare ratios of these four occupations. The wage for shepherds is the exception, with welfare ratios declining sharply from the initial 1841 observation thru 1845. Throughout this period, unskilled workers in each occupation were able to consume at least 2.78 bare bones baskets, with bounds on bare bones baskets available for consumption in 1845 registering at 5.16 and 8.46 baskets. Over the course of the copper boom period (1845-1850), welfare ratios for four unskilled occupations (predials, male domestics, female domestics, and day laborers) rose, and for shepherds fell.

Figure 7 displays corresponding respectable welfare ratios for single workers from the same five unskilled occupations. Changes in the five ratios within the 1838-1845 period are similar to those described above for the bare bones series. However, male and female domestics register moderate gains, shepherds register small gains, day laborers register a small decline, and predials a moderate decline. Throughout this period, unskilled single workers in each occupation were able to consume at least 1.71 respectable baskets, with bounds on respectable baskets available for consumption in 1845 registering at 2.58 and 3.96 baskets. During the copper boom period, respectable welfare ratios mirror the same patterns observed for the bare bones welfare ratios.

Families were not as well off. Unskilled workers with families in every occupation were, in various years, unable to consume at least one respectable family basket over the 1838-1850 period.¹³ A snapshot from 1850 shows that unskilled workers with families were able to consume at least 1.19 respectable baskets in three occupations (day laborer, male domestic, and predial), 1.01 respectable baskets as a shepherd, and 0.78 respectable baskets as a female domestic.

Figure 8 displays the annual bare bones welfare ratios for single workers from ten skilled occupations. The welfare ratios for the seven occupations with initial observations in 1838 exhibit considerable year-to-year variation, rise to a peak in 1846 at the start of the copper boom, and over the full 1838-1850 period register either small

¹³ To calculate the cost of the Bare Bones basket with a family, we follow Allen (2009: 38) and Lindert and Williamson (2016: 70) by multiplying the original basket values by 3.15.

increases or decreases. During the copper boom period, the bare bones welfare ratios of all but one skilled occupation increased over their 1845 level. This indicates that despite the surge in immigration during this period, the demand for skilled workers in non-traded goods industries, such as housing construction, outpaced the increased supply of skilled workers, thereby leading to wage increases. Throughout the period, single workers in each skilled occupation were able to consume at least 8.22 bare bones baskets. Bounds on bare bones baskets available for consumption in 1845 registered at 8.22 and 16.35 baskets and increased by 1850 to 8.98 and 18.3 baskets.

Figure 9 displays the annual respectable welfare ratios for single workers from the same skilled occupations. Changes in the welfare ratios within the period are similar to those described above for the bare bones series, while over the full 1838-1850 period, eight occupations register increases and six decreases. During the copper boom period, changes in respectable welfare ratios for skilled single workers mirror the same patterns observed for the bare bones welfare ratios, with welfare ratios for 8 occupations increasing over this six-year period, the welfare ratio for 5 declining, and the welfare ratio for one unchanged. Throughout the period, skilled single workers in each occupation were able to consume at least 3.84 respectable baskets, with bounds on respectable baskets available for consumption in 1845 registering at 3.84 and 8.32 baskets. All skilled workers with families but for butchers and glaziers were able to consume at least 1.92 respectable baskets in 1850.

How did SA standards of living compare with those in other parts of Australia and the world? Allen et al. (2011: Tables 5 and 6) calculated annual welfare ratios for a variety of cities and countries during the 1830s and 1840s (Table 2). For single unskilled workers in 1845, Amsterdam had a welfare ratio of 2.52, Milan 0.84, London 4.35 and Leipzig 2.21. This suggests unskilled English and German migrants who moved to SA experienced significant improvements in their living standards compared with what they might have obtained in London or Leipzig.¹⁴ Consequently, while there were concerns

¹⁴ Between 1836 and 1840, 70 percent of assisted migrants to SA were from southern England, with 35 percent being from Sussex and counties surrounding London (Pike, 1967: 183). George

over the high cost of living in SA during the first five years of settlement, the average living standard of unskilled migrants in SA was actually better than that attained by the average unskilled worker in major European cities. How did SA welfare ratios compare with welfare ratios in another country that still had an open frontier in the 1830s and 1840s, the United States? Lindert and Williamson (2016: Table 10.1) use benchmarks for 1800 and 1850 to interpolate a bare bones welfare ratio for unskilled U.S. workers in the 1830s (5.10 baskets) and we extend their interpolations to the 1840s (5.49 baskets). For 1845, welfare ratios for SA predial workers (7.18 baskets), male domestics (6.44 baskets), and shepherds (7.83 baskets) exceed the U.S. ratio for the 1840s, while the welfare ratio for female domestics (5.16) registers at just below the U.S. ratio for the 1840s.

What about other Australian colonies? Panza and Williamson (2017) examine living standards in NSW and VDL over the 1820s and 1830s by calculating welfare ratios of both rural and urban unskilled workers. For urban unskilled workers Panza and Williamson (2017: 29) calculate ratios for the 1830s of 2.88 and 2.19 for NSW and VDL, respectively (Table 1). In Adelaide unskilled single urban workers (female and male domestics) in 1845 had bare bones welfare ratios of 5.16 and 6.44, respectively, meaning they could purchase 79.2 to 194.1 percent more bare bones baskets than unskilled urban workers in NSW and VDL. Surprisingly, rural unskilled workers in Panza and Williamson's (2017) analysis were better off in the 1830s than their urban counterparts, with welfare ratios of 3.60 and 3.47 for NSW and VDL, respectively. Predial laborers are our rural unskilled counterparts for SA, and they were able to purchase 9.47 bare bones baskets in 1838 and 7.18 baskets in 1845, substantially more than their NSW and VDL counterparts during a similar period.

We conclude that over the 1838-1850 period, unskilled workers in Adelaide and surrounding rural areas were substantially better off than unskilled workers almost anywhere else in the world. Skilled workers also achieved large relatively stable wage

Angas personally sponsored the re-settlement of several communities of dissenting Lutherans being persecuted in Prussia to South Australia in 1841 and 1843.

premiums over what they could have earned in Great Britain. In sum, wages of unskilled and skilled SA workers varied substantially from year to year, but remained high relative to wages in other new and old world cities, colonies, and countries throughout the period.

III. Understanding Changes in the SA Economy, 1836-1850

In this section, we critically review narratives offered by historians regarding the development of South Australia's economy over its first 15 years. We augment these narratives with insights from a simple model of traded and non-traded goods and then consider whether our newly developed data series on prices, wages, and worker welfare are consistent with the augmented narratives.

A. Initial Settlement, Land Boom, and Financial Crisis

After a number of proposals to establish the SA colony were rejected as impractical by the British government in the early 1830s, the final version of the Foundation Act (1834) created a colony with a dual executive. Executive powers were divided between two officials: a Resident Commissioner responsible to the SA Colonization Commission, (whose nine members were appointed by the Secretary of State for War and the Colonies) and a governor nominated by the Colonization Commission, albeit responsible to the Crown.¹⁵ The Resident Commissioner was to have sole control over an Emigration Fund consisting of all revenues generated by land sales and dedicated to subsidization of passage for qualified migrants (Table 3). The colonial governor was responsible for all other activities including, law and order, surveys, and public works. The governor's ability to provide these services was quite limited, as he

¹⁵ Weijia Li's (2018) model of split executive authority can be usefully applied to problems of colonial governance. Consider a situation in which the colonial secretary in the home government determines that an appointed governor of a colony has a good chance of initiating activities that could impose high costs on the central government. One way to forestall this is to appoint two governors with separate yet overlapping responsibilities. This raises transaction costs to the executive of taking and executing decisions and reduces the likelihood that a risky activity with potentially large losses is undertaken. In SA, the split executive served this purpose and impeded overall government operations. Unification of executive authority in late 1838 had the ironic result that the new governor initiated risky activities that imposed huge losses on the crown. See Harris and La Croix (2018b).

had access to just two revenue sources: (1) funds raised from selling £20,000 in securities on the London stock market and (2) proceeds from levying import duties on spirits, wine, beer, and tobacco.

The selection of a site for Adelaide and the survey and staking out of city lots were delayed due to an under-resourced survey team as well as conflict between Governor Hindmarsh and Surveyor-General Light regarding the capital's site. This short delay was followed by long delays in survey and selection of country lands purchased by investors and settlers in 1835. Surveyed country lands in Districts A and B surrounding Adelaide were not opened for selection until May 1838 and many selections were not staked out for delivery until later in 1838 (Figure 10). Surveys in the other districts (C-F) were delayed during 1839 and 1840 by the government's use of the survey team to conduct special surveys of large purchases within tracts of 15,000 acres. Some lands in Districts C-F were not delivered until 1841, more than four years after initial settlement. Conflict between the Resident Commissioner, James Hurtle Fisher, and Governor Hindmarsh in 1836 and 1837 led to very public clashes and even the announcement of contradictory public notices on colonial administration. Both men appealed to London to have the other removed, and London responded by firing both of them early in 1838. With the arrival in October 1838 of Hindmarsh's replacement, George Gawler, the experiment with a dual executive ended, with the new governor consolidating both authorities. This allowed Gawler to gain more control over the colony's finances by borrowing revenue from the Commission's Emigration Fund to increase the pace of the land survey, provide police protection, and build public projects. The slow pace of surveying in 1836-1838 had delayed settlers from cultivating country land (Table 4). Despite the faster pace of country land survey in 1839 and 1840, many emigrants arriving during these two years were unable to find work on farms and instead found work with private employers in Adelaide or on public projects in Adelaide designed to provide work and relief to unemployed new migrants.

A newspaper article detailing the early circumstances of the colony states that in the first few years colonists,

congregated at the fist too much in town. Almost all the population were consumers, very few were producers. In such circumstances a vast number of buildings were built in town, and large quantities of imports were required to support the inhabitants....” (Southern Australian, 26 April 1844: 2).

Edward Stephens, an Emigration Agent, argued at a public meeting that the problems originated:

in the inevitable expense necessary to establish themselves in their new circumstances, and in the great abstraction of wealth for the necessities of life, increased by the high prices that were obtained during the early period of the colony, augmented by the high prices of labor (Southern Australian, 3 March, 1843: 2).

SA’s reliance on costly imported food during the first two years of settlement was to be expected, as organizers of other frontier settlements typically did not expect substantial harvests for a few years. For example, Massachusetts in the 1630s required settlers to bring at least 18 months of food with them. The long delays in surveying and distributing SA country lands extended the importation of even the most basic staples from two to four years and concentrated the growing population within Adelaide’s boundaries. Our data on prices of agricultural goods confirm this, as in 1840 these prices remained much closer to their 1838/1839 peaks than to levels achieved in 1843/1844 when acreage in cultivation had soared.

Historians’ analyses of the SA economy from 1836-1840 rightly emphasize distortions that resulted from the SA government’s inability to expeditiously survey and distribute country lands to their owners.¹⁶ The delays forced new flows of migrants to remain in Adelaide, and historians have documented that the less-than-fully-employed Adelaide residents with backing from investors in NSW and London engaged in a frenzy of speculation on Adelaide land lots. Using a sample of 27 Adelaide city lots sold at auction in March 1837 and resold in 1839, Harris and La Croix (2018a: 45) find that these

¹⁶ See Price (1924: Ch. 5), Pike (1967: 169-179), and Pascoe (1901, Ch. 4).

lots sold for an average price of £6.86 in March 1837 and £644.67 in 1839. There is some evidence that construction of housing accompanied the land boom, with rudimentary residences rising in the first year of the settlement (1837), construction stagnating along with land prices in 1838, and then reviving in 1839 and 1840. A January 1839 count shows 620 homes (plus a scattering of other buildings) in Adelaide. A July 1840 count registered 1,615 buildings in Adelaide, a 160.5 percent increase in just 18 months.¹⁷

What was behind the Adelaide construction boom? To understand this, we specify a simple three-factor, two-good model of the SA economy and consider its implications.¹⁸ In this simple model, firms use labor and capital to produce a non-traded good, housing, and labor and land to produce an internationally traded good, wheat, which has its price set in global markets. We assume that labor is mobile across sectors and competition equalizes wage rates across sectors and firms. Trade deficits are financed from settler capital.

The key to understanding why the Adelaide construction boom occurs is to recognize that the demand in a new colony for housing—the non-traded good in our model – is derived not only from the population of newly arrived migrants but also from residents’ expectations of arrivals of new migrants over the next 1-2 years (Kochin, 1992). SA residents’ expectations regarding future migration were firmly anchored in the Foundation Act’s dedication of revenues from SA land sales to assistance of passage for qualified migrants from Great Britain to SA. Additional land sales today could be expected to translate into flows of new immigrants over the next 6-18 months who upon arrival would increase demand for housing. In an August 1839 letter to Under-Secretary of State for the Colonies James Stephen, Robert Torrens, the chair of the Colonization Commission, noted that the Colony had experienced a surge of

¹⁷ “Progress of the Colony—First Six Months of 1840,” *South Australian Register*, July 11, 1840, p. 4.

¹⁸ When copper mining begins in 1844, we expand the model to three goods, one non-tradeable and two tradeable. See Corden (1984).

immigration in the second half of 1838, with nearly as many arriving as had arrived from November 1836 to June 1838. Providing housing for them “would require scarcely less than the whole strength of the colony, and in point of fact the laborers sent out ... consisted for the most part of Carpenters, Brick-Layers, Stone-Masons, Smiths, and others required in the erection of Buildings.”¹⁹ Torrens then argues that importation of food was efficient for the Colony, as it facilitated the effective employment of these specialized laborers in the building industry, where their skills could be employed to better advantage than on farms.²⁰

A second factor pushing the 1837-1840 construction boom in Adelaide was the initial concentration of the colony’s population in Adelaide, a result of the government’s long delays in making country lands available to the owners of the 437 priority land orders sold in London in 1835. The long delays had the mechanical effect of reallocating labor from rural agriculture and rural construction to the city’s construction sector, and the additional labor employed by this sector allowed more homes to be built.²¹

A third factor behind the boom in housing construction was Governor Gawler’s massive debt-fueled spending on public works (such as clearing land, constructing public offices, and building roads), police, relief to unemployed migrants, and land surveys (Harris and La Croix, 2018b: 23-25). In London reports of Gawler’s excessive spending and the government’s poor financial condition began to be discussed in official dispatches and newspaper reports in spring and early summer of 1840. Financiers reacted to the news by rejecting loans to the Colonization Commission, while the government reacted by rejecting bills drawn by Gawler on the British Treasury. Gawler continued to draw bills on the Treasury until his removal in May 1841 by Governor Grey, but had started to wind down government spending after news of the colony’s financial

¹⁹ Robert Torrens to Stephens, August 24, 1839. U.K. National Archives, CO 386/15, pp. 138-143 at 142.

²⁰ Ibid at p. 142. Torrens also noted (p. 143) that the Commission had primarily selected agricultural workers for the next wave of assisted immigration to SA.

²¹ This is analogous to the “resource movement effect” in Corden’s 1984 Dutch-disease model. See Section VI below.

problems first circulated in Adelaide in August 1840. The Colonization Commission halted assisted migration in July 1840, and this brought a sudden stop to all migration to SA, with the last ship with assisted emigrants arriving in Adelaide in December 1840.

The negative effects on construction activity from lower government spending and a sudden stop to current and future migration flows were coupled with more country acres being distributed to landowners over the 1840 to 1842 period. As farmers' demand for labor to prepare and work new farms increased, labor moved from Adelaide to the country, leaving less labor for the city's construction industry. Cuts in relief payments to unemployed migrants in July 1841 also induced some migrants to leave Adelaide for employment on farms but the magnitude of this effect is unclear (Harris and La Croix, 2019).²² The exodus out of Adelaide in the early 1840s is evidenced in the fall of the city's population from 8,489 in 1840 to 6,107 by 1843 while the country population increased by 2,756 (Southern Australian, 26 April 1844: 2).

From late 1840, the SA economy went through four difficult years. The effects of the plunge in government spending and the sudden stop in migration were compounded by an Australia-wide depression that persisted from 1842 into 1845. Two events set the stage for future growth in SA. First, cultivated acreage increased from 2,693 acres in 1840 to 28,690 acres by 1844 (Table 4). The increased supplies of locally produced food were associated with plunging food prices over the 1840-1843/1844 period that led to a sharp fall in the cost of living, as measured by the cost of bare bones and respectable baskets (Table 5). Second, in 1842 the British government passed legislation that forgave the colonial government for roughly 63 percent of the debt incurred by Governor Gawler over the 1838-1842 period, thereby stabilizing colonial finances.²³

²² In July 1841, Governor Grey eliminated rations and cut the pay of workers receiving relief by working on public works projects. Our calculations show that in April 1841 a married migrant with two children receiving relief by working on public works projects in Adelaide received compensation in wages and rations that exceeded the total compensation paid to a predial worker by 14.1 percent. After Grey's cuts, the premium flipped to a 35.9 per cent discount. See Harris and La Croix (2019) for a detailed analysis of this episode.

²³ The remainder was converted to debentures, with most of it paid via increases in land sale revenues during the 1844-1851 copper boom. See Blair (1878: 475-477).

B. The Copper Boom, Migration, and their Effect on Wages and Prices

In the early 1840s, rich copper leads were discovered in the vicinity of Adelaide. The discovery of a silver-lead mine in 1841 at Glen Osmond, only four miles from the capital, sparked further exploration of the interior for precious metals (Blainey, 1978). Twelve months later, copper deposits were discovered at Kapunda, 50 miles north of Adelaide, and in 1845, the richest copper mine in SA was located at Burra, 88 miles north of Adelaide (Blainey, 1978). Copper exports soared in the second half of the 1840s, growing from £12,613 in 1845 to £362,130 in 1850. To put this in perspective, SA copper exports over just the 1845-1850 period amounted to 5.4 percent of world output over the 1841-1850 period (Davies, 1977: Appendix 13A and pp. 32-33).

To understand how this resource boom affected the SA economy, we apply Corden's (1984) core model of a booming small open economy to show how a resource discovery might affect skilled and unskilled wages, prices of non-traded goods, and outputs of copper, agricultural exports, and non-traded goods. We then use our newly developed data series on the SA economy to investigate whether actual changes over the 1844-1850 period are consistent with the model's predictions. Corden's model has three sectors, in which products are produced with a factor specific to the sector and labor which can be reallocated across sectors. Labor mobility across sectors equalizes the nominal wage (W) across sectors. Industry production functions in each sector have constant returns to scale. One sector is the booming (B) resource sector which produces copper by combining copper deposits and labor; all output is exported at the world price.²⁴ The second sector is a traded agricultural good (A) which is produced by combining land and labor; the sector exports some of its production at given world

²⁴ SA's copper output in the late 1840s was large enough that its addition to world supplies could have lowered world copper prices. Owners of the Burra mine, the largest SA mine with 80 percent of SA's output, could have acted unilaterally to reduce output and perhaps realized additional economic rents.

prices.²⁵ The third sector is the non-tradeable (N) goods sector which combines labor and capital to produce housing, which is sold at market-clearing prices.

What happens when there are new discoveries of copper ore?²⁶ In Corden's core model, the new copper discoveries generate two effects: a *spending effect* and a *resource movement effect*. The *spending effect* is triggered by the additional income generated by new copper production. Assuming that the non-traded good N is a normal good and the additional income from the booming sector is fully spent, then the demand for N increases. In a small open economy like SA, this bids up the price (P_N) of N relative to the price of Sector A agricultural goods, which are set in international markets, i.e., the resource discovery leads to an appreciation of the real exchange rate (P_N). This, in turn, draws labor from the agricultural sector (A) into sector N, thereby shrinking sector A.

The *resource movement effect* comes about because the marginal product of labor in the booming sector increases with new copper discoveries (Corden, 2004: 360-361). Holding the wage (W) in terms of tradeable agricultural goods constant, labor moves from the agricultural sector (A) to the booming sector B, thereby reducing output in sector A. Holding the real exchange rate constant, labor also moves from the non-traded sector N to the booming copper sector (B). Accounting for appreciation of the real exchange rate due to the resource movement effect draws additional resources into sector N from sector A.

Now combine the spending effect and resource movement effect to determine the overall effects of the boom in copper production. Corden's theory predicts the following: (1) Labor moves into the booming copper sector (B) and out of sector A; (2) there could be more or less labor in sector N; (3) the overall effect of the resource boom on P_N is positive, but output of N could expand or contract, depending on whether there

²⁵ This sector could also be modelled as a set of goods imported and exported on world markets at world prices.

²⁶ This is represented as an increase in the productivity of mining in Corden's model.

are net labor flows into or out of sector N; and (4) output in traded sector A—wheat and wool in SA—unambiguously decreases at constant world prices.

We know that the discovery of copper also affected the SA economy via a third channel not included in Corden's core model: migration of skilled and unskilled laborers from Britain to SA between 1845 and 1850. Assisted migration to SA had been halted in August 1840 as the Colony faced imminent bankruptcy and its Emigration Fund was exhausted, its balances borrowed by Governor Gawler to meet operating expenses of the Colony's government. Assisted and unassisted immigration resumed in mid-1844 as SA's economic prospects brightened, and then accelerated over the 1845-1850 period, with 29,872 unassisted migrants and 18,755 assisted migrants coming to SA (British Parliamentary Papers, 1863: 4). The new immigration was responsible for a tripling of the Colony's population in just seven years, from 17,366 in 1844 to 63,700 in 1851.

How would immigration, increasing due to the increase in wages over the 1844-1847 period and expansion of employment opportunities in the copper sector (B), change the effects of a resource discovery in Corden's core model? Corden (1984: 365-367) extends his model to cover immigration. He finds that output in the booming copper sector (B) and the agricultural sector A should be greater than otherwise due to increased supplies of labor, though output of A will not necessarily increase compared to the pre-boom equilibrium. Output of N should increase due to increases in the supply of labor available to the sector and increases in demand for N provided by the new migrants.²⁷ The effect of the increase in immigration on P_N is indeterminate, depending on the relative size of the changes in the supply of and demand for N.²⁸ To sum up the effects of immigration into an economy with a booming sector: Immigration short-circuits the resource movement effect in the labor market and accentuates the spending effect on non-traded goods. Thus, with sufficiently large immigration flows, the classic

²⁷ Raveh (2014) and Beine et al. (2015) also consider this case.

²⁸ We conclude that the "Alberta effect", in which the government of the booming economy spends additional tax revenue to improve the colony's attractiveness, is not relevant for SA and we ignore it. See Beine et al. (2015), Raveh (2014), and Corden (1984) for discussions.

effect generated by Corden's Dutch disease model—declines in non-booming export sectors—will be smaller or may not occur at all.

Are these predictions consistent with movements in our SA series of prices, wages, and welfare? First, the number of acres planted in the largest tradeable crop, wheat, did not decline during the copper boom but instead more than doubled, from 18,838 acres in 1845 to 41,807 acres in 1850 (Table 4).²⁹ We note that the value of wheat (£38,312) exported in 1850, 16.1 percent of total harvest value, was more than double the value of wheat exported in 1848 (£18,528) which was more than double the value of wheat exported in 1846.³⁰ A complementary explanation is that the more than tripling of the Colony's population since 1844 sent demands for basic foodstuffs soaring and farmers could expand production elastically by hiring newly arrived immigrant labor and opening readily available surveyed lands to wheat production. Second, the output of another tradeable good, wool, also increased during the copper boom. While output initially fell from 2.04 million pounds in 1846 to 1.11 million pounds in 1847, wool output increased over each of the next three years, reaching 3.28 million pounds in 1850.³¹ We note that part of this robust output could be due to the expanding population's increased demand for mutton, a joint product of wool. Third, the respectable and bare bones welfare ratios of workers in the building trades increased over the full 1845-1850 period, and this is consistent with an expansion of demand for non-traded goods N , which would have led to an increase in the derived demand for labor in the building trades.

Finally, did the output of the most important non-tradeable good, housing, increase substantially during the copper boom? A newspaper writer reported in 1849 that "[s]warms of small buildings...rise...as if by magic, in every part of the town

²⁹ The 1847-1849 phase-out of Britain's corn laws as applied to the colonies could have been partly responsible for the increase in acres cultivated.

³⁰ Statistical Summary of South Australia from its Foundation, 1836-1916/17, p. 8.

³¹ See Martin (1855: 355) and British Parliamentary Papers (1850; 1851).

[Adelaide] ...”³² More precisely, data from the 1844, 1846, and 1851 SA Censuses reveal a big increase in home building over the 1846-1851 period in Adelaide, mining towns, and country areas.³³ Housing units in SA increased from 3,391 in 1844 to 4,176 in 1846—an increase of 393 units per year—and then jumped to 12,033 in 1851—an increase of 1,571 per year between 1846 and 1851. Housing units in Adelaide increased from 1,314 in 1844 to 3,004 in 1851, while housing units in country areas and mining towns jumped from 2,077 to 9,029, reflecting the boom in the mining sector and expansion of the agricultural sector.

VI. Conclusion

Previous histories of the first 15 years of British settlement in South Australia have clearly identified the major events that shaped the evolution of South Australia’s economy: the early delays in land surveying, the massive waves of spending undertaken by Governor Gawler, the financial crisis of 1841, the reforms of Governor Gray, and the boom that emerged from 1845 after the discovery of rich copper deposits. These episodes have been marked by large swings in prices of agricultural goods and wages for skilled and unskilled occupations. Careful analysis of these episodes has, however, been hampered by reliance on sporadic observations of wages and prices. Our main contribution in this article is to construct wage series for 14 skilled occupations and 5 unskilled occupation and price series for 9 traded agricultural and pastoral products and 7 imported goods over the 1838-1850 period. The new data base allows us to identify more carefully fluctuations and trends in wages and prices and to use the new series to calculate two measures of welfare for workers in each of the 19 occupations. We find that “bare bones” measures of the standards of living in SA were among the highest in the world during the 1840s. Moreover, fluctuations in SA living standards between 1838 and 1845 were not so extreme as historians, colonists, and contemporary officials had believed. This is because wages and prices tended to move in tandem, with wages and

³² From Adelaide Times, 7/5/1849, p. 3B, as quoted in McDougall and Vines (2006: 16).

³³ Australian Bureau of Statistics (1989), census returns for 1844, 1846, and 1851.

prices generally rising from 1838 to 1840, generally falling from 1840 to 1845, and then rising from 1845 to 1850.

We also use Corden's (1984) classic model of an economy with a booming sector to understand how the two major shocks to the SA economy during the colonial period—the immigration stop of 1840 and the discovery of rich copper deposits in 1845—could have affected resource allocation across industries, wages, and the prices of a non-traded good, housing. We find that shocks to immigration flows are central to an understanding of the evolution of the SA economy. The sudden, unexpected stop in immigration in 1840 led to a sharp decline in the building of new homes and triggered, along with the reforms of Governor Grey to the system of unemployment relief, an exodus of Adelaide's population to farms and sheep stations. SA benefited initially from the Wakefieldian immigration mechanism, as new flows of migrants ultimately allowed new lands to be opened to cultivation and sheep grazing. But the mismanagement of the system by the London Colonization Commissioners in late 1839 and 1840 pushed migrants to the Colony even as the Commissioners knew that the Colony's financial situation was deteriorating.

The copper boom that began in 1845 initially induced reallocation of resources to copper mining and prompted sales of large tracts of land to speculators in copper mining. Revenues from these land sales fortuitously triggered the Colony's Wakefieldian subsidies to migration, and more than 37,000 migrants stepped off ships in Adelaide between 1845 and 1850. The resultant tripling of SA's population meant that the SA economy never suffered from the Dutch disease effects one might have expected from a booming resource sector. In fact, output in the other two major SA export industries, wool and wheat, increased. Thus, SA stands out as a rare case of an economy with a booming resource sector that bypassed Dutch disease effects. At the end of the day, the Wakefieldian immigration mechanism produced a stronger SA economy in which all three export sectors boomed.

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Table 1: Adelaide Consumption Baskets: Bare Bones and Respectable Baskets

Goods	Bare bones basket			Respectable basket		
	Quantity (Yearly)	Kcal per day	Proteins per day (gr.)	Quantity (Yearly)	Kcal per day	Proteins per day (gr.)
Potatoes	200 kg	667	10.25	165 kg	394	8.5
Wheat	95 kg	882	35.6			
Bread				110 kg	711	30
Sugar				16.5 kg	171	0.2
Milk	17 kg	30	1.5	45 kg	79	4
Tea				9.8 lb		
Beans/peas	17 kg	159	11.9	40 kg	370	28
Meat	20 kg	136	12	60 kg	408	36
Butter	3 kg	60	0.1	2.6 kg	104	0.1
Cheese				2.6 kg	54	1.5
Eggs				52 each	11	1
Rum				14.56 lt	118	
Soap	1.3 kg			2.6 kg		
Linen	3 m			5 m		
Candles	1.3 kg			2.6 kg		
Lamp oil	1.3 lt			2.6 lt		
Fuel	2.0 M BTU			5.0 M BTU		
Total		1934	71		2420	109.3

Source: Panza and Williamson (2017), as adapted from Allen (2009).

Table 2: Welfare Ratios for Unskilled Workers in Selected Places: Bare Bones Baskets in 1830s and 1845

Place	1830s	Place	1845
NSW		United States	5.49
<i>urban</i>	2.88	Amsterdam	2.52
<i>rural</i>	3.60	Milan	0.84
VDL		London	4.35
<i>urban</i>	2.19	Beijing	0.71
<i>rural</i>	3.47	Leipzig	2.21
United States	5.10	Buenos Aires	4.71
Chile	2.26		
Buenos Aires	1.77		

Sources: Panza and Williamson (2017: 29), Allen et al. (2011: 27-28), and (Gelman and Santilli, 2018:104). U.S. welfare ratios are for 1830 and 1840. Both are derived by interpolation from the 1800 and 1850 U.S. benchmarks, following Panza and Williamson (2017: footnote 15). Buenos Aires bare bones baskets are for 1835 and 1849.

Table 3: Emigrants to South Australia, July 1836 - 1850

Year	Ships	Assisted Migrants			Unassisted Migrants			Total Emigrants
		Adults		All	Adults		All	
		Males	Females	Children	Males	Females	Children	
1836	14	433	201	179	78	41	9	941
1837	10	383	349	366	88	38	55	1,279
1838	30	900	837	960	258	98	101	3,154
1839	37	1,440	1,378	1,772	373	161	196	5,320
1840 thru Aug.	19	786	783	1,441	98	25	15	3,148
						↓		
1841	-	0	0	0		856		856
1842	-	0	0	0		604		604
1843	-	18	8	3		1,184		1,213
1844	-	6	0	0		1,108		1,114
1845	-	63	45	11		2,217		2,336
1846	-	719	678	647		2,414		4,458
1847	-	846	1,054	1,173		2,572		5,645
1848	-	1,913	2,179	1,830		3,742		9,664
1849	-	1,706	1,939	1,530		10,991		16,166
1850	-	914	807	701		7,936		10,358

Source: British Parliamentary Papers (1843:312) and Pike (1967, Appendix A).

Table 4: Acres of Land under Cultivation in South Australia, 1837-1847

Crop	1837	1838	1839	1840	1841	1842	1843	1844	1845	1846	1847	1848	1849	1850
Wheat	0	20	120	1,059	4,154	14,000	23,000	18,980	18,838	26,135	25,920	29,737	35,185	41,807
Barley	0	1	28	388	897	2,700	3,300	4,264	4,343	3,490	5,840	8,480	5,752	4,029
Oats	0	5	30	424	501	700	790	1,045	1,486	1,964	2,947	3,978	1,471	2,112
Maize	0.25	10	60	192	714	850	290	241	86	106	162	4,603	7	38
Potatoes	1.5	20	75	440	456	690	470	397	459	591	381	596	875	1,785
Vineyard	na	na	na	na	na	na	na	na	na	112	198	219	198	283
Gardens	6	25	60	na	na	850	840	761	631	896	993	1,300	1,497	1,372
Total	7.75	86	443	2,693	6,722	19,790	28,690	25,698	25,843	33,294	36,440	48,913	44,978	51,426
Population	3,000	6,000	10,315	14,630	15,485	16,500	17,196	18,999	22,460	25,893	31,153	38,666	52,904	63,700
Acres/person	0.0026	0.014	0.043	0.18	0.43	1.2	1.67	1.35	1.15	1.29	1.17	1.27	0.85	0.81

Sources: Data for 1845-1847 are from Colonial Secretary's Office, *Reports Exhibiting the Past and Present*, Enclosure No. 19, April 1848; data for 1848-1850 are from House of Commons, British Parliamentary Papers, *The Reports ... to Exhibit Generally the Past and Present State of Her Majesty's Colonial Possessions*, Enclosure No. 20 (1858:254); data for 1843 and 1844 are from Colonial Secretary's Office, 31 January 1845; data for 1837-1839 are from *British Parliamentary Papers* (1843:320). Data for 1840-1842 are from *British Parliamentary Papers* (1844:21). Crop data for 1837 and 1838 are not official returns

Table 5: The annual costs of the Bare Bones and Respectable Baskets in SA, 1839-1850

Year	Bare Bones Basket (£)	Respectable Basket (£)
1838	9.88	20.38
1839	16.21	27.57
1840	14.06	24.31
1841	10.47	19.89
1842	7.88	14.20
1843	5.63	11.93
1844	4.86	9.90
1845	4.60	9.83
1846	4.21	9.70
1847	5.49	10.77
1848	6.30	11.96
1849	5.93	11.38
1850	5.30	10.41

Figure 1: Prices for selected imported goods, 1838-1850

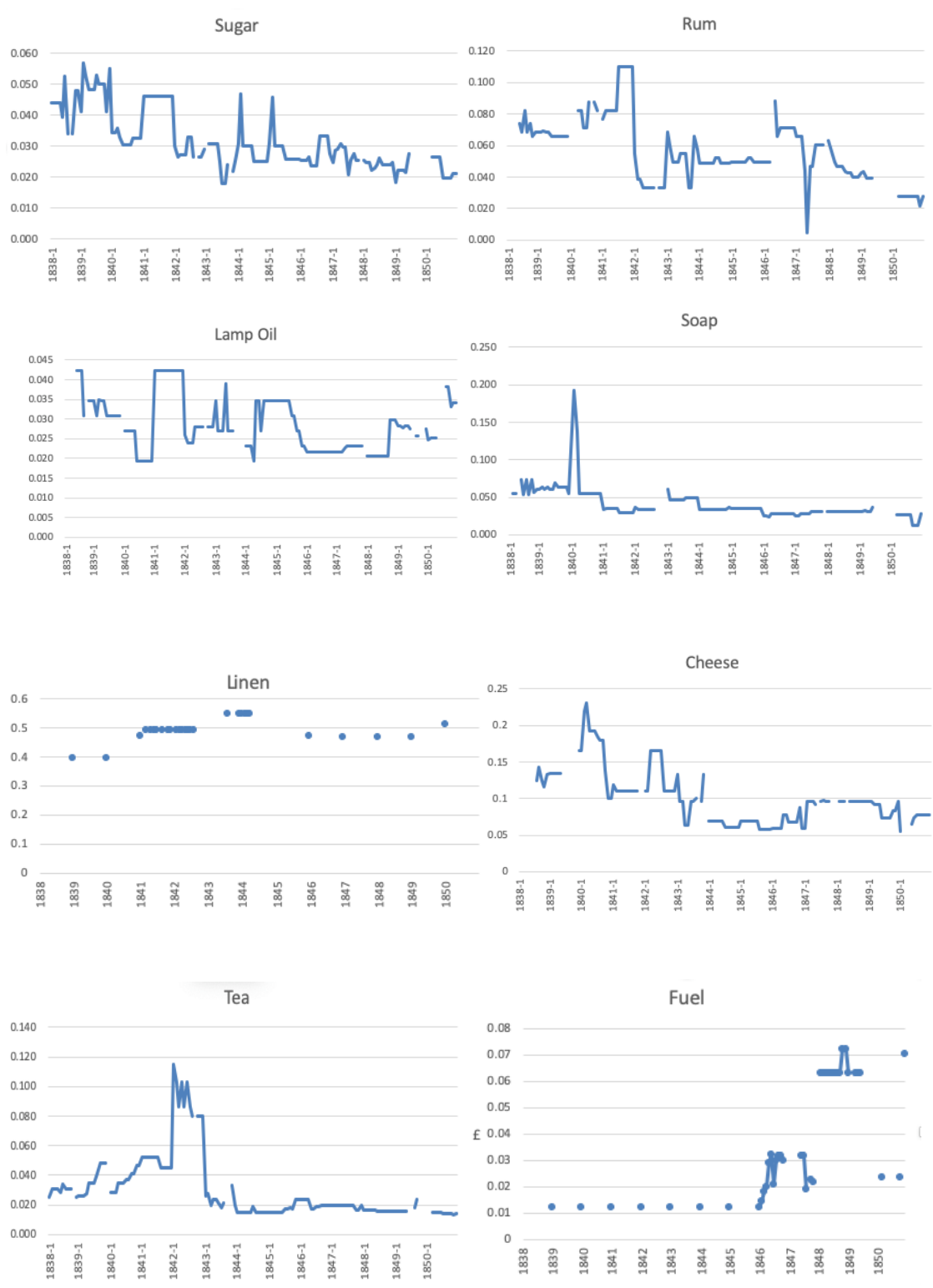
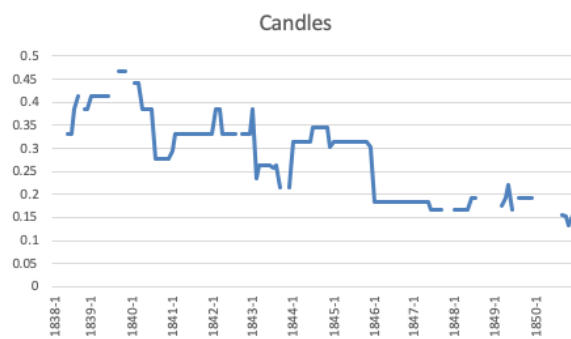
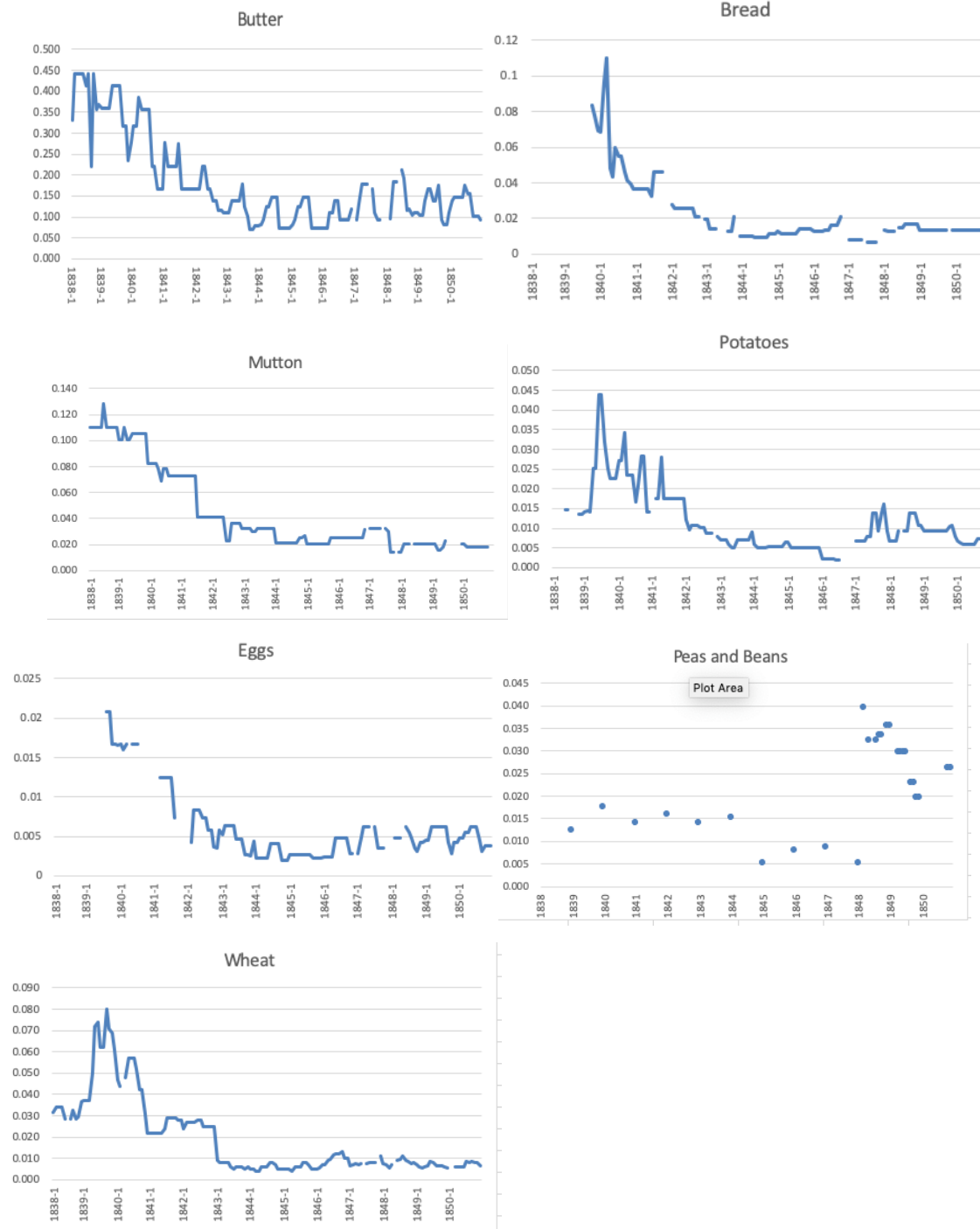


Figure 1 continued



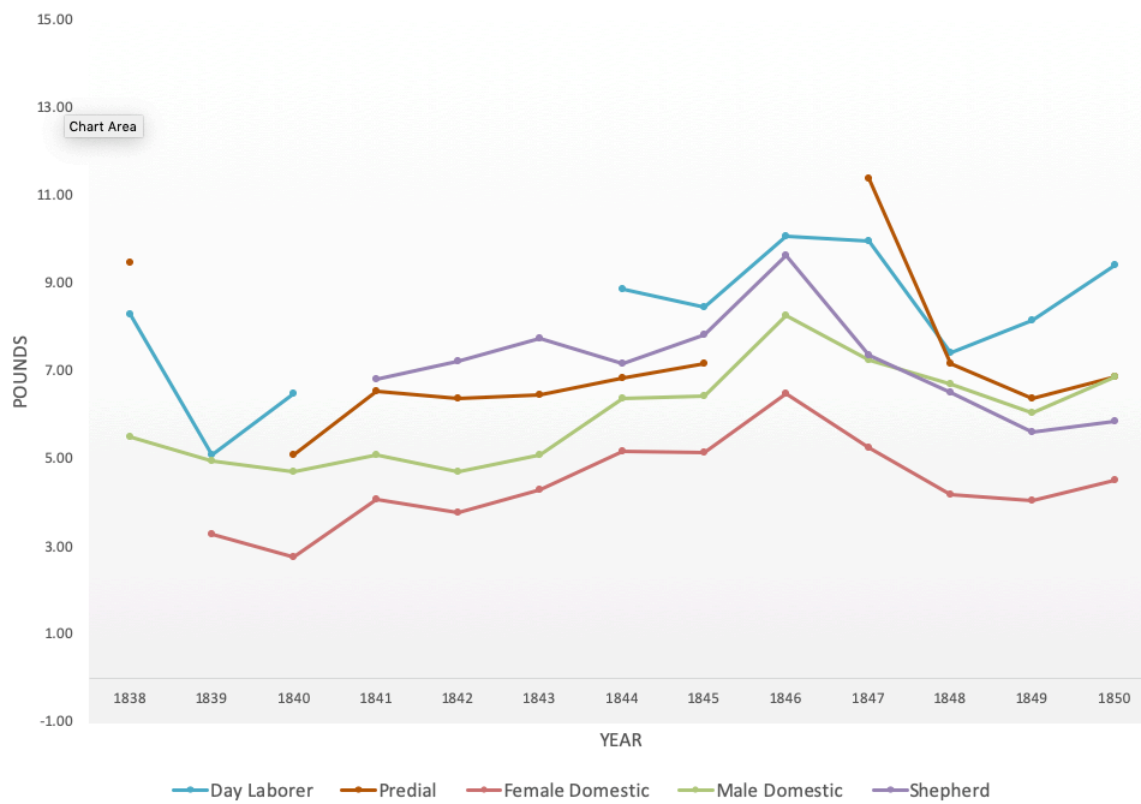
Sources: See Appendix.

Figure 2: Prices for selected locally-produced goods, 1838-1850



Sources: See appendix.

Figure 3: Average annual wages (£) for selected unskilled occupations, 1838-1850



Source: See Appendix. *Note:* Wages are adjusted for rations and lodging when provided.

Figure 4: Average annual wages (£) for selected skilled occupations, 1838-1850



Source: See Appendix. Note: Wages are adjusted for ratios and lodging when provided.

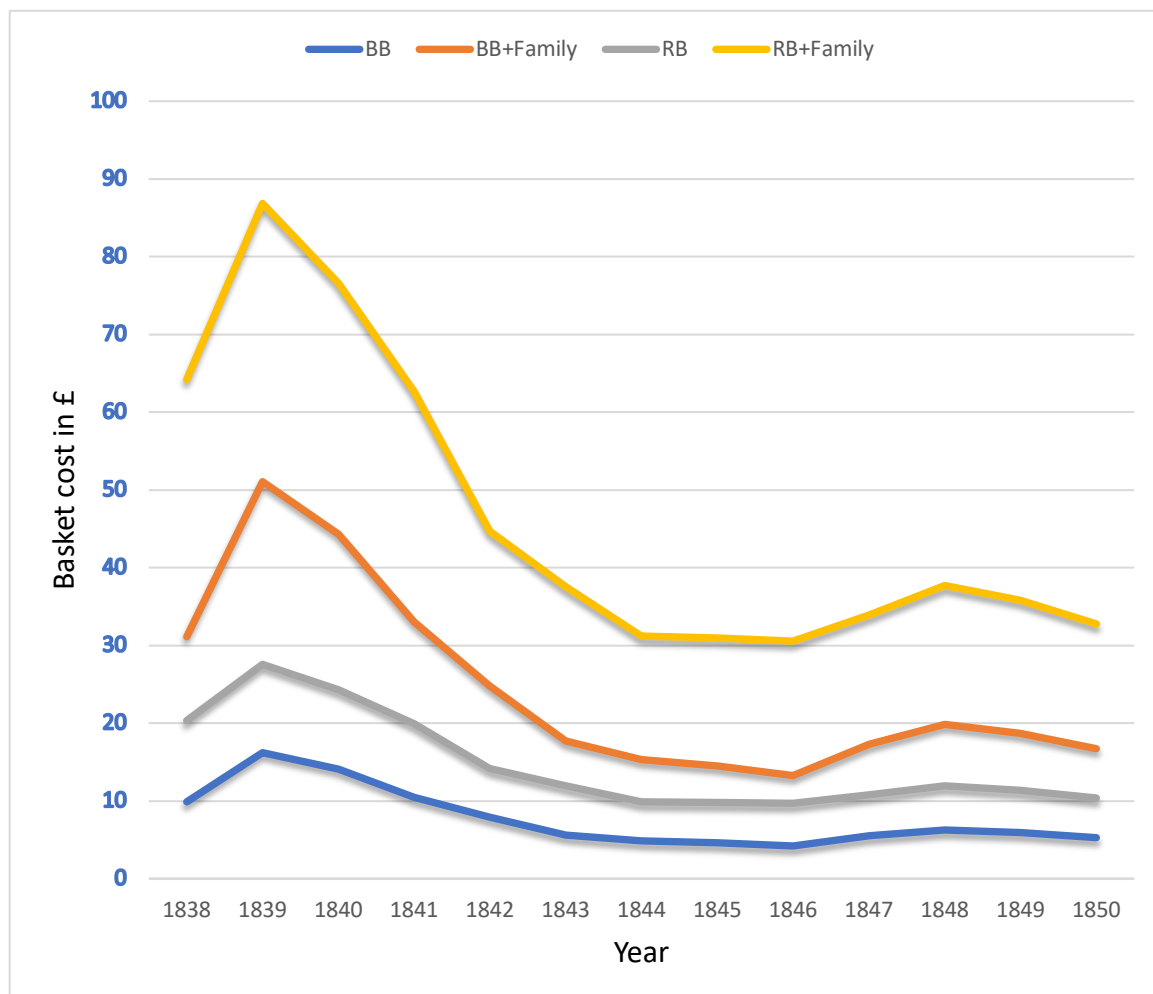
Figure 5: Annual cost (£) of bare bones (BB) and respectable (RB) baskets, 1838-1850

Figure 6: Bare bones baskets for unskilled single workers, 1838-1850

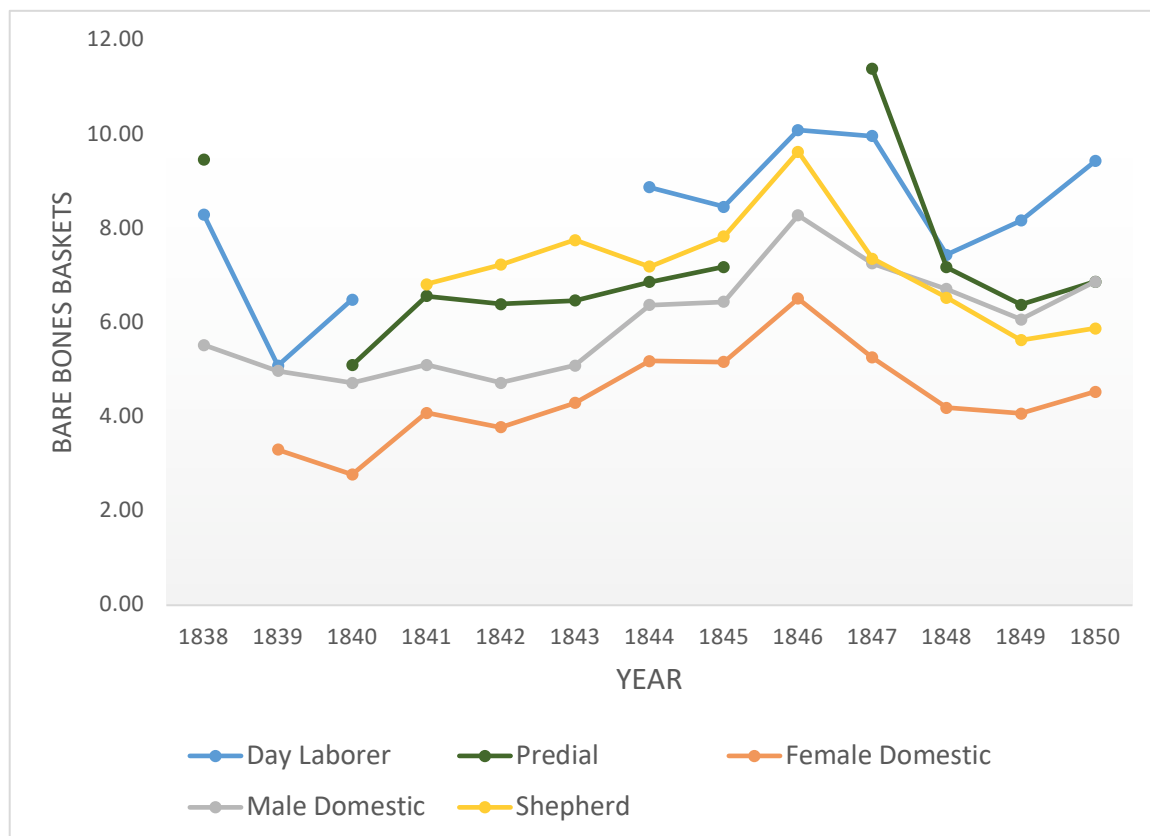


Figure 7: Respectable baskets for unskilled single workers, 1838-1850

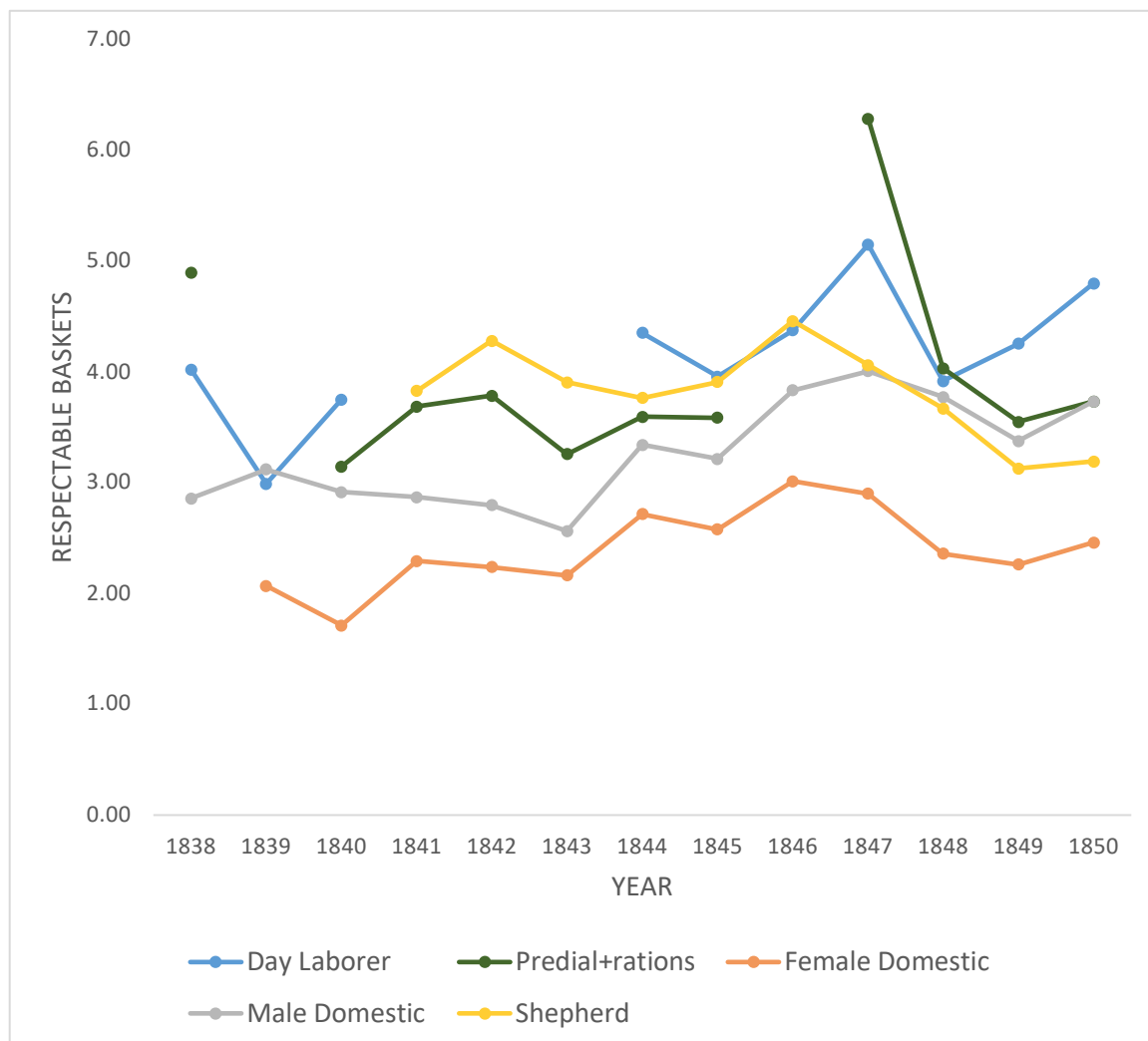


Figure 8: Bare bones baskets for skilled single workers, 1838-1850

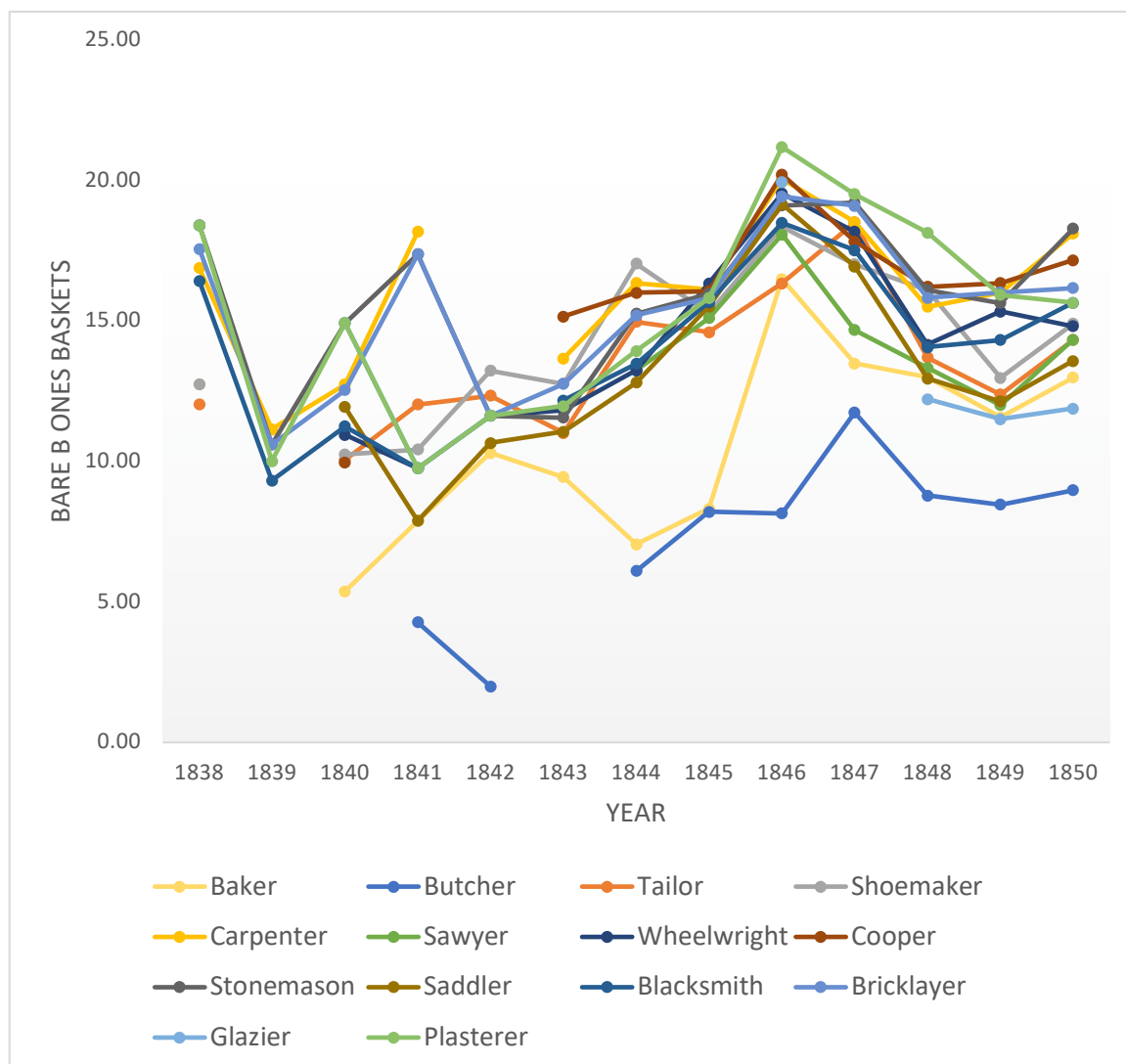
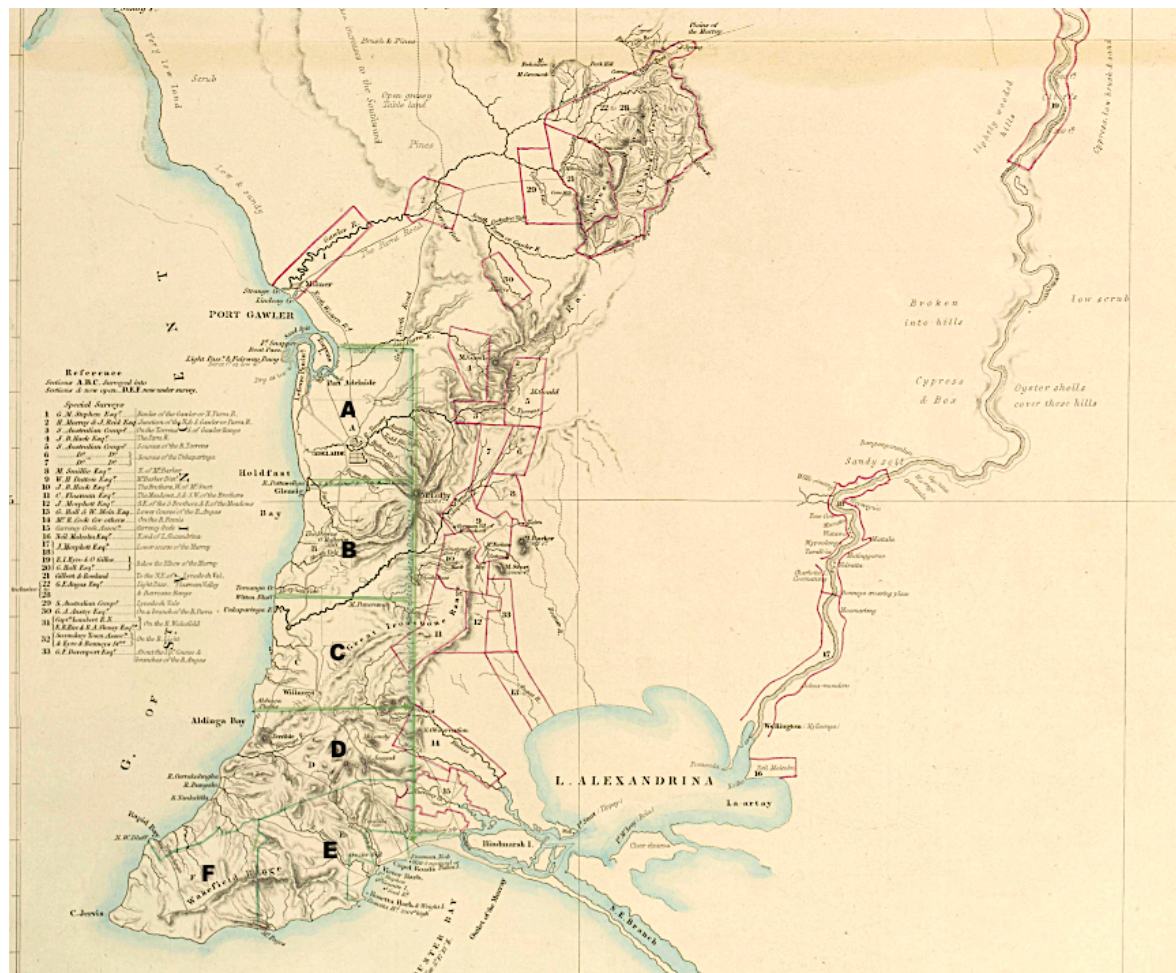


Figure 10: Locations of Special Surveys, Preliminary Districts, and Adelaide



Note: Special survey areas demarcated with red outline and preliminary order districts demarcated with green outline.

Source: Arrowsmith (1841). Digitized version taken from National Library of Australia at <http://nla.gov.au/nla.obj-231888370>.

Appendix 1: Data, sources, and substitutions

The sources we utilized to compile the price and wage data in order to calculate the welfare ratios presented above are listed here.

1A. Sources for estimating prices

To create our price series for the welfare baskets we utilized reports in Blue Books, Australian newspapers, and secondary sources. A couple of issues with price reports from newspapers need to be addressed. First, from 1838 to 1843, most prices reported in newspapers do not state whether they are wholesale or retail. We assume they are retail prices because the headings state the prices are from the Adelaide market. In 1841 reports show both wholesale and retail prices and we use the retail price. Where prices are recorded as a range over this early period without stating whether they are wholesale or retail, as was the case for 1842 and 1843, we assume these are retail prices and use the median value to estimate the price of the relevant products for each basket. Second from 1844 to 1850, we have retail prices for domestically-produced goods. This was the case for mutton, milk, cheese, and wheat. For imported items (lamp oil, candles, rum, soap, sugar, and tea) during this period only, wholesale prices were reported. This is similar to the approach taken by Allen et al. (2011: 22) which relied on wholesale prices for agricultural goods produced in China's province of Zhili, an area that included Beijing. Further, for Suzhou, they also relied on what they suggest were likely wholesale rice prices from the Yangzi Delta without including any allowance for a retail mark-up (Allen et al., 2011: 22).

What effect will the use of wholesale prices for imports during the later years in our data have? Assuming retail prices include a markup over wholesale then for the imported goods that we use wholesale prices the average cost of a basket will be bias downward. As a result, the welfare estimates will be, to some extent, overestimated between 1844 and 1850. For almost the entire period for nearly every product included in the bare bones and respectable baskets the SA Blue Books and newspapers report monthly prices so our data set was fairly complete using those sources alone. For missing prices, we substitute as follows:

- 1) For the prices of eggs and bread in 1838, we use data reported by Coghlan (1918: 470).
- 2) Over the 1838-1847 period, pea and bean prices are from Hobart. This series was compiled by Lindert and Sansani (2006) and is available at the University of California-Davis Global Price and Income History Group website (<http://gpih.ucdavis.edu>). For 1848 and 1849 split pea prices are from NSW while in 1850 we use SA prices.

- 3) From 1838-1850, there were no reports of domestic linen prices in Adelaide. For 1838-1840 and 1845-50 we follow Panza and Williamson (2017), and use British linen prices reported in Allen (2009). For 1841-1844 we substituted linen prices with cloth prices reported in Sydney, NSW.
- 4) Wheat prices in Adelaide were unavailable for 1838 and 1840. We substitute the price of wheat imported from Hobart as reported in SA newspapers.
- 5) Tea prices were reported by the chest rather than in pounds. In order to convert the quantity of tea reported into pounds, we assume that each chest contained 268 pounds of tea (British Parliamentary Papers, 1830: 246).
- 6) Monthly milk prices are missing through 1843 as well as for 1847-1849. We use quarterly prices from the SA Blue Books.
- 7) We use Panza and Williamson's (2017) annual prices for fuel (wood) in Sydney for 1838-1845. For 1846-1849, we use SA prices for Port Adelaide coal. In 1850 no coal prices for SA were reported. We substitute VDL coal prices for the months available.
- 8) There were no candle prices reported for SA in 1849. We substitute import prices for candles in NSW.
- 9) SA prices for imported lamp oil in 1850 could not be found. We substitute import prices for lamp oil from Sydney, NSW.

1B. Sources for estimating wage series:

For the wages data, we first looked to official records published as SA Government Blue Books. The Blue Books were published quarterly in January, April, July, and October of each year from 1838. While the reports recorded wages for various occupations from 1838 to 1850, one limitation is that the categories reported tended to change overtime. For example, in 1838 the Blue Books reported wages for domestic servants (not gender specific), predial (agricultural workers), and trades. However, the specific occupations that comprised the general term 'trades' were not defined until 1841. In that year, the Blue Books included a note that trades were comprised of bricklayers, cabinetmakers, carriage makers, glaziers, masons, plasterers, painters, and wheelwrights. We use these categories to record wages for each of these occupations between 1838 and 1850. Two other drawbacks of the Blue Books series are that wages were only reported quarterly, leaving only four observations per year, and only reported for a limited number of select occupations. We supplement the Blue Book data with details from local newspaper reports. Occupations for which wages were reported in newspapers include, shepherds, day laborers, brick makers, blacksmiths, bakers, butchers, carpenters and joiners, saddlers, shoemakers, tailors, and coopers. The exact sources we employed for each

year and occupation in our data set, including the number of monthly observations out of a possible twelve for each year, are detailed below.

Bluebooks

- 1) For 1838, we have one observation of annual wages for domestic servants and predial labor. In 1838 the occupations that comprised the broader term ‘trades’ were unspecified. We use information from the 1841 Blue Book that defined ‘trades’ as including bricklayers, cabinet makers, carriage makers, glaziers, masons, plasterers, painters, and wheelwrights. For 1838 to 1841 we assume that the per diem wages listed for trades applied to these eight occupations.
- 2) For 1839, no wages were reported, so we relied on the newspaper sources described below.
- 3) For 1840, the Blue Books report quarterly observations of annual wages for domestic servants and predial labor as well as quarterly observations for per diem wages paid to the trades listed in point (1).
- 4) For 1841, the Blue Books provided quarterly observations of annual wages for male and female domestics and predial labor. There were two quarterly observations reported in July and October for trades and some other skilled occupations. These other skilled occupations are bakers, blacksmiths, butchers, carpenters, coopers, saddlers, shoemakers, and tailors. Wages for three of the occupations in the ‘other skilled’ group – blacksmiths, carpenters, and coopers—were not reported. The data also reported quarterly observations for one further occupation: shepherds.
- 5) For 1842, we found one observation for annual wages of male and female domestics and predial. All four quarterly observations were reported for the trades listed above as well as most of the workers in our ‘other skilled’ category. Much like the data for 1841, the ‘other skilled’ wages did not report data for blacksmiths, carpenters, and coopers. Three out of the four quarterly observations were recorded for shepherds.
- 6) For 1843, we collected quarterly observations of annual wages for male and female domestics and predial labor. All other occupations listed in trades and other skilled were also included except butchers.
- 7) For 1844, the data we collected was the same as for 1843 with the exception of painters (which was excluded from the trades listed) and butchers (which was excluded from the other skilled workers category). Wages for day laborers and shepherds were also reported.
- 8) For 1845, the wage data collected was exactly the same as in 1844.
- 9) The 1846 data was similar to that published for 1845 but this time butcher was included. Wages for male domestic servants were reported for three out of the four quarters while predial laborers were excluded altogether.
- 10) For 1847, we have three observations for male and female domestic servants and predial labor. For our trades and other skilled workers, the occupations reported were similar to 1845

with omissions of glazier and painter. Shepherds were omitted in the 1847 data, despite their inclusion in most other Blue Books during the 1840s.

11) For 1848, the Blue Books reported quarterly figures for male and female domestic servants, predial labor, and shepherds. Most occupations in our trades and other skilled categories were reported with the exception of glaziers, millers, and painters. In addition, there were no records of wages for day laborers.

12) For 1849, we have similar data as for 1848. In our trades and other skilled categories, wages are completely missing for glaziers, millers, painters, plasterers, day laborers, and stonemasons.

13) For 1850, we have quarterly data for male and female domestic servants, predial labor, and all other occupations listed in our trades and other skilled categories but for shepherds and day laborers.

Newspapers:

To complete the database of wages, we supplemented Blue Book data with monthly reports from the following newspapers.

South Australia Gazette and Colonial Register

Southern Australian

Adelaide Chronicle and SA Advertiser

South Australia Register

Adelaide Observer

South Australian

Adelaide Times

South Australia Gazette and Mining Journal

South Australia Record and Australasian and South African Chronicle.

Sydney Morning Herald

Shipping Gazette and Sydney General Trade List

The number of monthly observations reported for each year and occupation are listed below.

- 1) For 1838, we have one monthly observation for bakers, blacksmiths, and plasterers, two monthly observations for tailors, and four monthly observations for bricklayers, masons, and shoemakers. Carpenters and day laborers had the most consistent reporting over the year, with five monthly observations recorded.
- 2) For 1839, we have one monthly observation for painters and plasterers, two monthly observations for male and female domestics and four for blacksmiths. The most complete series of wages were reported for bricklayers, carpenters, and day laborers with bricklayers

and carpenters having five monthly observations each while day laborers had six monthly observations.

- 3) Between 1840 and 1842, newspaper reports containing wage data became more sporadic, perhaps because of the financial crisis gripping the colony. Nevertheless, the exact cause of the limited records is unclear. In 1840, we have one monthly observation for bakers, cabinetmakers, carriage makers, coopers, day laborers, and saddlers, and two monthly observations for carpenters, shoemakers, and tailors.
- 4) For 1841, we have only one monthly observation for bricklayers, carpenters, and male and female domestics. No other data are reported for 1841.
- 5) For 1842, our newspaper sources provided no information on wages.
- 6) For 1843, relatively more consistent reporting re-commenced, but there were still large gaps in the records. We have one monthly observation for wheelwrights and two monthly observations for bakers, blacksmiths, carpenters, cabinetmakers, painters, plasterers, saddlers, shoemakers, tailors, and shepherds.
- 7) For 1844, newspapers recorded one observation each for blacksmiths, bricklayers, butchers, carpenters, cabinetmaker/carriage makers, coopers, painters, plasterers, shoemakers, tailors, and wheelwrights. No wage details for any other occupation were reported.
- 8) For 1845, wage reports once again became more regular and thorough. Coopers have just one monthly observation, while there are two for male and female domestics, bakers, and saddlers. Three monthly observations each were recorded for cabinetmaker/carriage makers, day laborers, plasterers, and wheelwrights while four monthly observations were reported for blacksmiths, bricklayers, carpenters, masons, painters, shepherds, shoemakers, and tailors.
- 9) For 1846, we obtained one monthly observation for millers, two for coopers and tailors, and three for male domestic servants, day laborers, stonemasons, painters, and saddlers. Female domestic servants, bakers, blacksmiths, bricklayers, cabinet maker/carriage makers, carpenters, plasterers, shoemakers, tanners, and wheelwrights were the most complete, each with four monthly observations.
- 10) For 1847, newspapers provided us with one monthly observation for painters. Predial labor, shepherds, bakers, cabinet maker/carriage makers, saddlers, and tanners had two monthly observations while wages for male and female domestic servants, coopers, day laborers, plasterers, tailors, and wheelwrights had three monthly observations. We have four monthly observations for blacksmiths, bricklayers, carpenters, stonemasons, and shoemakers.
- 11) For 1848, we recorded one monthly observation for coopers. Two monthly observations were reported for male and female domestic laborers, shepherds, bakers, blacksmiths, bricklayers, butchers, cabinet maker/carriage makers, day laborers, glaziers, stonemasons, millers, painters, plasterers, saddlers, shoemakers, tailors, tanners, and wheelwrights.

- 12) For 1849 we have two monthly observations for shepherds and three monthly observations for male and female domestic servants, bakers, blacksmiths, bricklayers, butchers, cabinet maker/carriage makers, carpenters, coopers, day laborers, glaziers, millers, plasterers, painters, saddlers, shoemakers, tailors, tanners, and wheelwrights.
- 13) For 1850, there are two monthly observations for bakers and bricklayers and three monthly observations for male and female domestic servants, shepherds, blacksmiths, butchers, cabinet maker/carriage makers, carpenters, coopers, day laborers, glaziers, millers, plasterers, painters, saddlers, shoemakers, tailors, tanners, and wheelwrights.