

The Australian Mining Boom and its impact on Australian Employment and Welfare

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Introduction

Mineral commodity export prices increased by 41% between 2007 and 2011 (ABS, 2024). In the 10 years leading to March 2012, commodity prices more than doubled. These price changes were largely due to growing demand for raw materials in Asia, specifically India and China. Australia is the world's largest exporter of Iron ore, totalling to \$88B USD and fifth largest exporter of Coal, totalling to \$109 B USD and as such, when global prices of these products increased, firms extracting these resources were able to substantially increase their revenues. (RBA, 2014) Further, a race to increase productive capacity also ensued in order to capitalise on high commodity prices, leading to mining investment increasing from 2% of national investment to over 8%. (RBA, 2014)

This report seeks to examine the impacts of the change in commodity prices on the employment in Australia's mining and manufacturing sectors and further the welfare and living standards of Australia as a whole.

It is clear that these price changes improved the country's international competitiveness in terms of raw material and mineral exports. This paper, however, will also seek to examine the wider consequences on other sectors such as manufacturing and the net effect on welfare.

Literature Review

The existing economic literature offers key insights to the underlying mechanics in play during the mining boom. Paul Krugman (1987) analysed the effect of significant resource discovery on the specialisation of an economy's production. He found that the additional wealth generated by the resource discovery could lead to an issue called the 'Dutch Disease'. This involved an appreciation of the domestic currency, and thus a loss in international competitiveness and productive capacity in non-resource extracting industries, creating economies which are reliant on extractive industries. Further, he posits that this change can be permanent, lasting past the initial resource boom. Peter Tulip (RBA, 2014) analysed the broad macroeconomic effect of the mining boom on the Australian economy and found that the mining boom significantly increased Australia's living standards, boosted aggregate demand and supply, and increased national capital stock. However, it also led to a large appreciation of the Australian dollar, hurting trade-exposed industries and contributing to deindustrialisation. Bodenstein, Kamber

and Thoenissen examine the effect of changing commodity prices on small open and exporting economies. They found that real exchange rate appreciation plays a crucial role in transmitting these shocks to the labour market, and the effectiveness of this transmission is influenced by the level of international financial risk sharing and the outside option for unemployed workers. My paper adds value by investigating the equity and distribution of benefits of trade across sectors.

Empirical Analysis

Commodity prices and mining employment show a strong positive correlation (0.856). From 1989 to the early 2000s, both remained stable, with commodity prices decreasing slightly from 40.2 index points in 1989 to 37.1 in 2003, while mining employment marginally declined. During the mining boom (mid-2000s to early 2010s), both surged, with commodity prices peaking at 109.7 in 2010 and mining employment at ~278,000 workers in 2012. Post-boom, both declined, although mining employment was less sensitive to falling commodity prices and exhibited a lagged response.

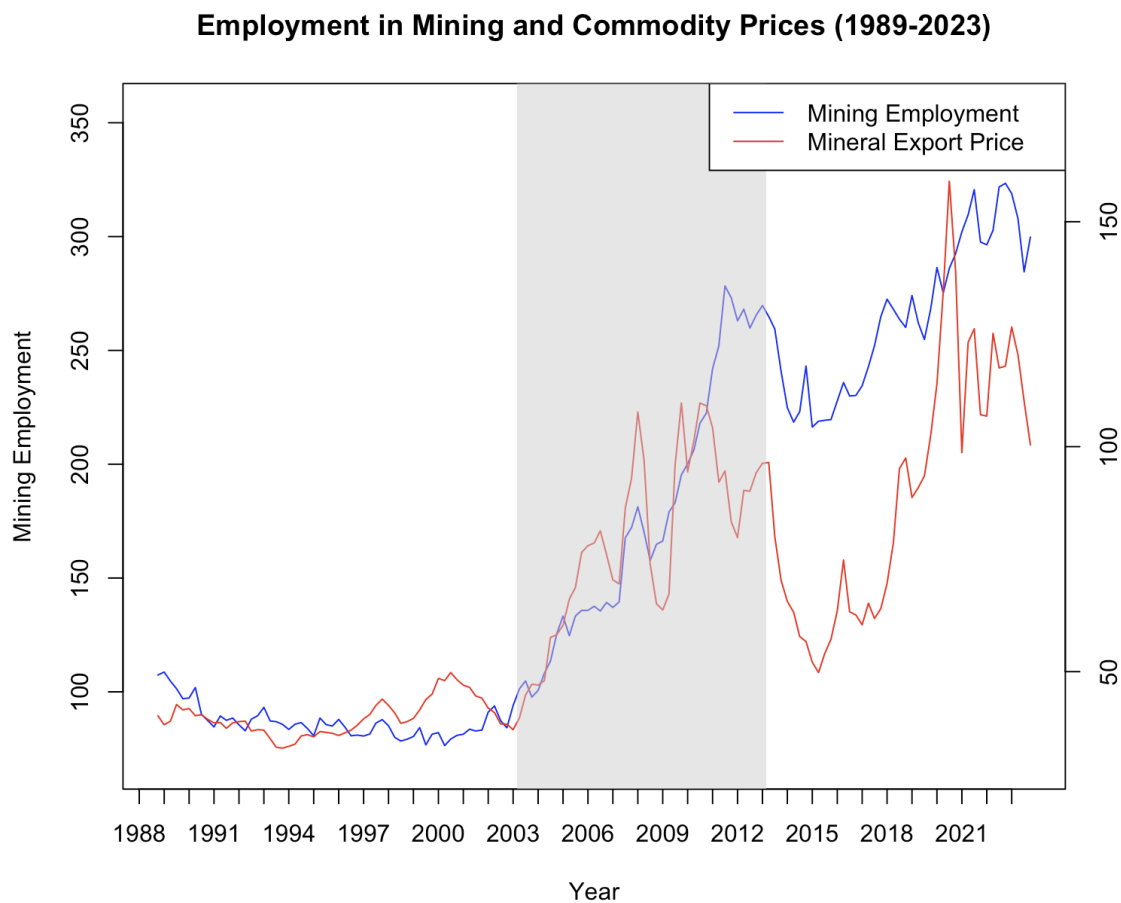


Figure 1: Title

We further want to investigate whether there is a relationship between employment in the mining sector and employment in the manufacturing sector. It is clear that there is a negative relationship between the two series with a significant decrease in manufacturing employment over the mining boom while mining employment increases over the same period (See Figure 2). The correlation of -0.879 further provides strong evidence for this. That is, an increase in mining employment coincided with a decrease in manufacturing employment and vice versa.

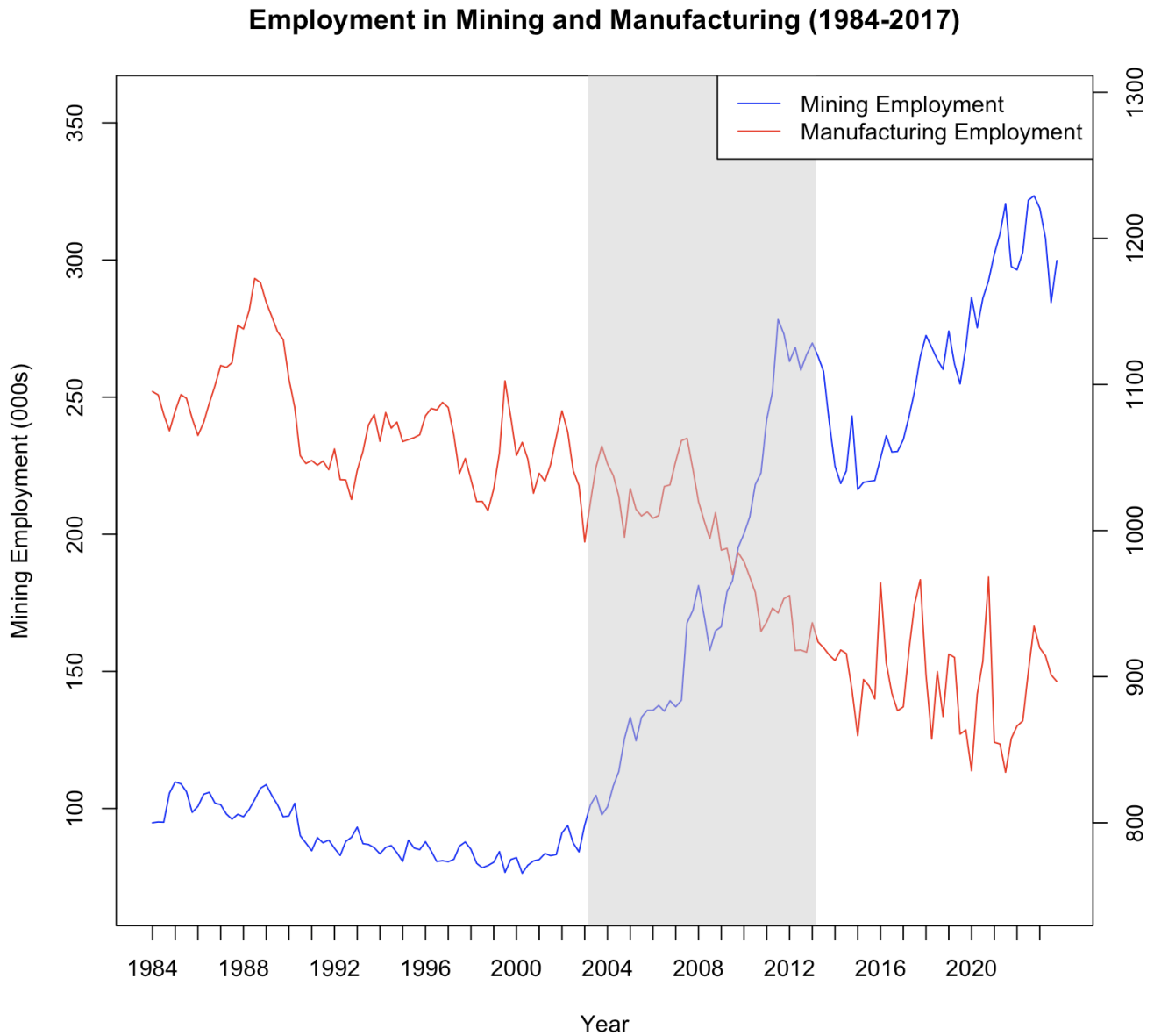


Figure 2: Title

The mining boom's impact on living standards was reflected in disposable income. A temporary decline in mining employment and disposable income occurred during the 2008 downturn. From 2012 to 2016 (See figures 3&4), falling commodity prices and mining employment coincided with reduced disposable income. Cross-correlation analysis reveals that commodity price changes affect mining employment after 1–3 quarters (correlation ~ 0.4) and disposable income after 2–3 quarters (correlation ~ 0.3). (See Appendix, Figure 9) The moderate correlations align with the noise created by the influence of other economic factors on disposable income.

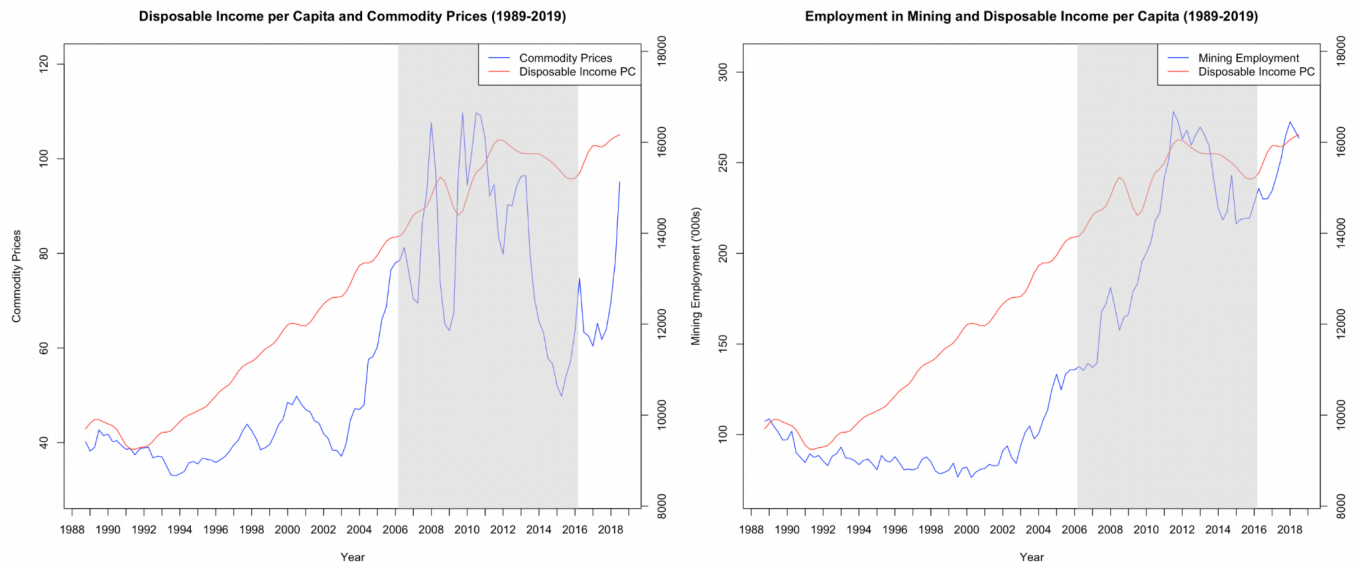


Figure 3&4: Titles

Modelling Employment in Australian mining and Manufacturing Sector

Empirically, it is evident that mining employment is positively correlated with commodity prices while manufacturing employment is negatively correlated. We can use the Specific Factors Model to explain this finding causally.

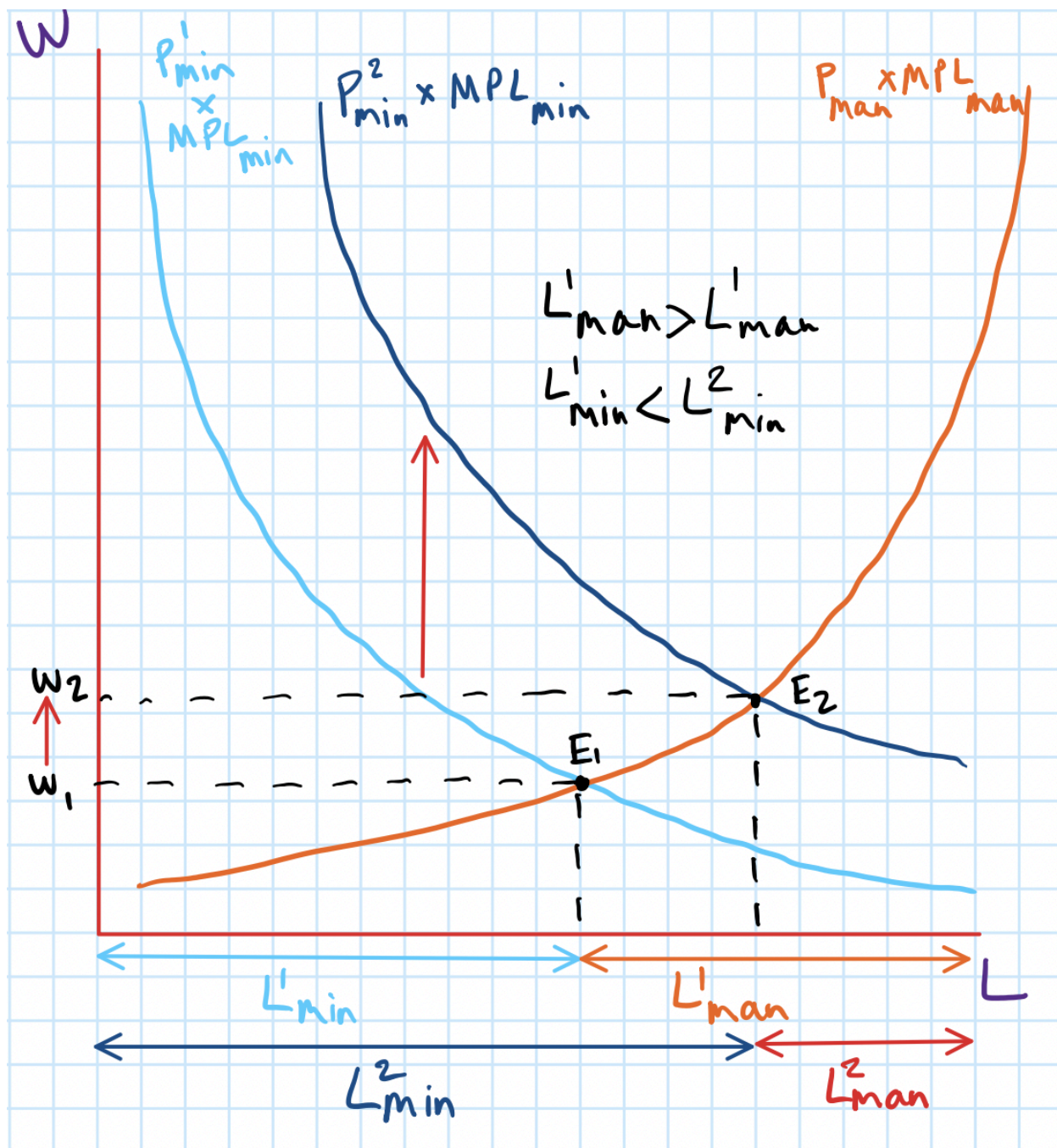


Figure 5: Increase in commodity prices modelled by the Specific Factors Model

We assume that there are 2 sectors, mining and manufacturing and both use labour (L) and capital (K) and that labour is mobile. When commodity prices increase, for a given unit of labour, the value of the marginal product of workers increases, and because markets are competitive (no economic profits) real wages must also rise. Workers in the manufacturing sector (which now have lower wages) will seek employment in the mining sector, reducing labour supply in the manufacturing sector while increasing it in the

mining sector. This puts downward pressure on mining wages until the wages are equal in both sectors. Critically, this implies that there is a net migration in workers from the manufacturing sector to the mining sector which is precisely what is seen in the data. (See figure 2). Theoretically, mining employment will shift from $L1_{min}$ to $L2_{min}$, while manufacturing employment shifts from $L1_{man}$ to $L2_{man}$. (See Figure 5).

Fundamentally, this occurs because the value of the marginal product of labour is higher in the mining industry compared to the manufacturing industry. The SFM predicts that in the long run, labour will migrate from the import competing sector (manufacturing) to the exporting sector (mining). If imported goods are cheaper than domestically produced goods, it is not allocatively efficient to use scarce labour to produce those goods.

To explain why Australia is an exporter in minerals and natural resources is relatively straightforward; because it was endowed with large deposits of these natural resources and further had strong enough institutions to incentivise their extraction. To explain why manufacturing became an imported industry is more complex. We can take the example of cars. Until the late 2010s, Australia had at least four large car brands manufacturing within its borders, including Ford, Holden, Mitsubishi and Toyota. (ABC, 2017) Large scale production of light vehicles ended with the departure of Holden in 2017.

Domestically produced cars could not compete with imports from, for example, Japan. The first reason for this is that labour is relatively expensive in Australia (OECD, 2024) and thus, foreign countries can have cheaper input costs when producing cars, thus allowing for cheaper final prices. Secondly, as foreign countries, such as Japan, established themselves as large exporters of cars, they were able to benefit from global economies of scale, spreading large fixed costs over large production quantities. Local plants in each market/country were no longer justified. In simple terms, Australia did not have a comparative advantage in the production of cars.

Effect on welfare

Ultimately, the net effect on Australia's welfare is clearly positive. The SFM predicts that increases in commodity prices will result in an ambiguous change in worker welfare, because although wages have risen, commodity prices have risen by more, while the price of manufactures have remained the same. However, it should be noted that Australia does not actually consume much of the final product of the mining industry. Taking iron ore as an example, relative to international competitors, Australia produces a minimal quantity of steel using iron ore at just 5.5 million tonnes in 2023 compared to China's 1019.1 million tonnes. (World Steel, 2024) Comparatively, Australia consumes many manufactures, such as cars, whose price has stayed the same while wages have increased. This is supported by the sharp increase in disposable income between 2004 and 2012 from ~\$12000 to ~\$16000.

It is important to note that there are alternative explanations for the increase in disposable income 2008 through 2012, specifically in the aftermath of the global financial crisis as spending on welfare expenditure and transfer payments had a sharp increase. Further, the GFC may have had shock effects on multiple series, thus artificially increasing correlation between them. Nonetheless, the RBA consensus is that the mining boom resulted in a 13% increase in disposable income per capita by 2013 (RBA, 2014). This would suggest that approximately 40% of the increase in disposable income could be attributed to the mining boom.

Policy decisions

Ultimately, it is clear that overall, welfare has been increased by the mining boom. Given that this was attained by growth in employment in the mining sector while employment in other sectors such as manufacturing decreased, it is fair to say that, in the short run, gains from trade have not been equitably distributed. An optimal economic policy would be one that uses excess tax revenues from the mining sector to fund retraining schemes for furloughed workers from industries that are, in the long run, not internationally competitive. This minimises the time that workers spend with a skills mismatch for the workforce and aids with the efficient allocation of labour to the sector where their marginal product is the highest.

APPENDIX

Pearson's product-moment correlation

```
data: min_emp and man_emp
t = -23.196, df = 158, p-value < 2.2e-16
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 -0.9102015 -0.8384268
sample estimates:
      cor
-0.8792098
```

Figure 6: Simple correlation between mining employment and manufacturing employment

Pearson's product-moment correlation

```
data: min_emp and exp_price
t = 19.5, df = 139, p-value < 2.2e-16
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.8042067 0.8945190
sample estimates:
      cor
0.8557509
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Figure 7: Simple correlation between mining employment and commodity prices

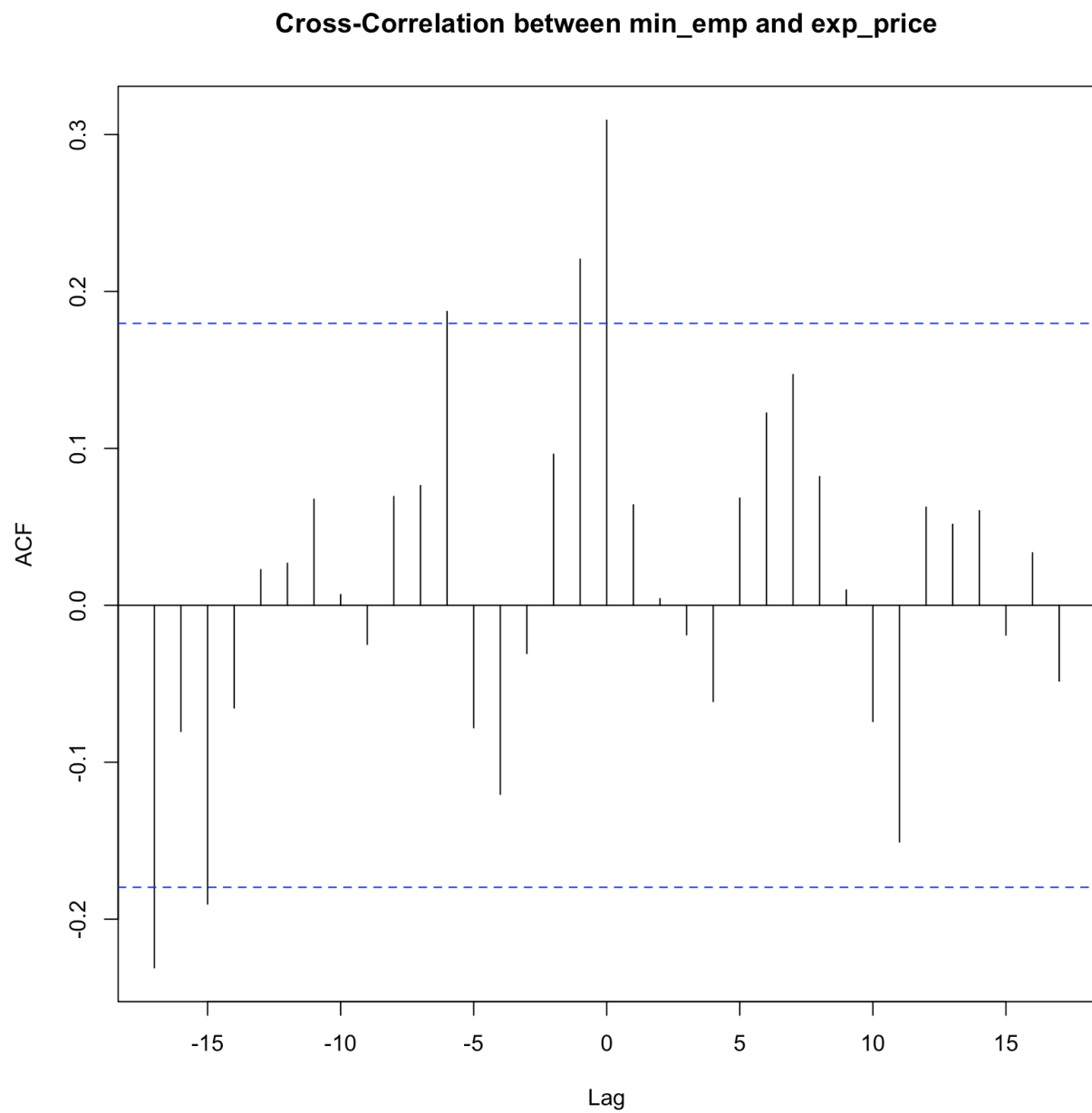


Figure 7: Crosscorrelation analysis between mining employment and commodity prices

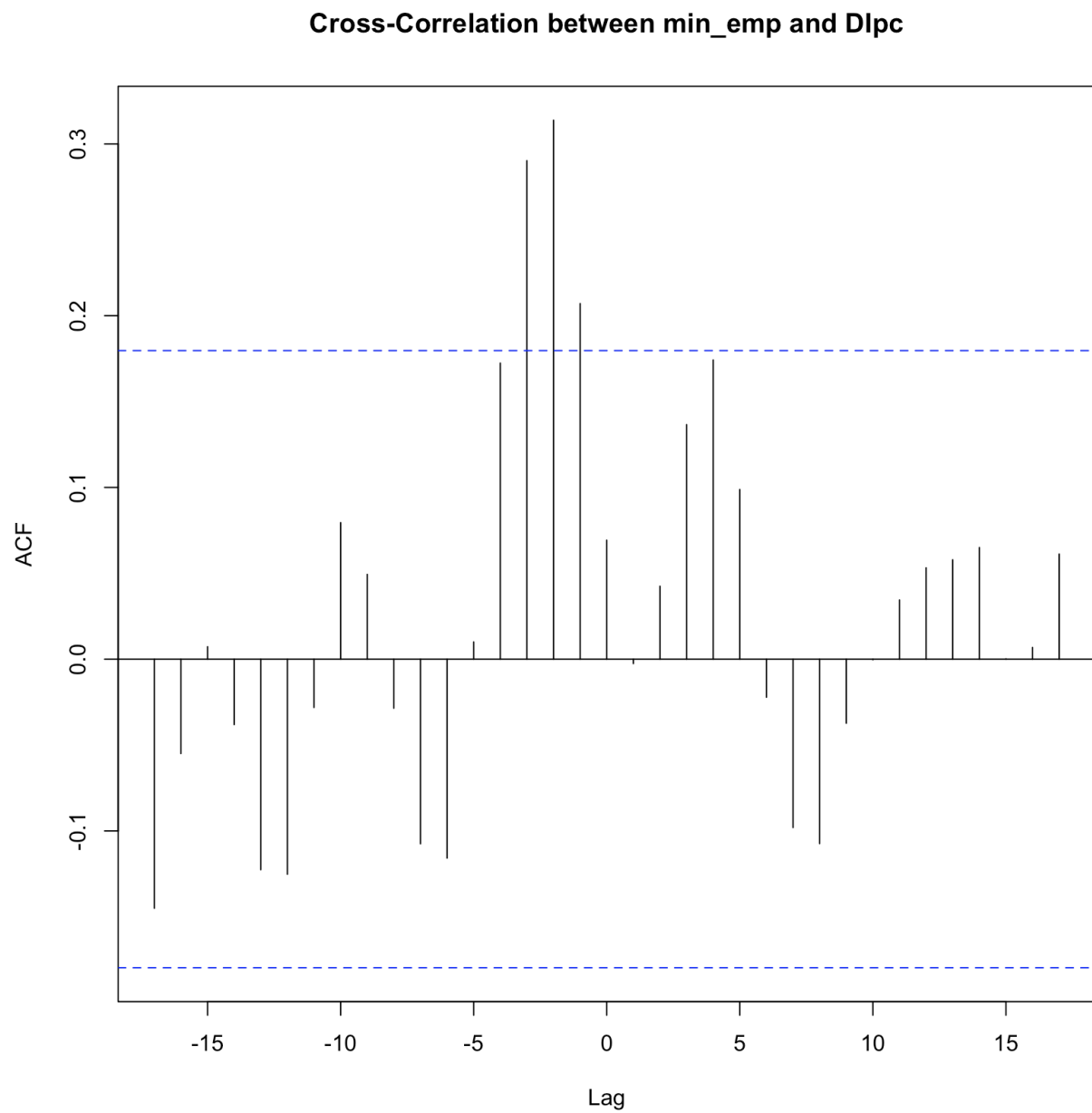


Figure 8: crosscorrelation analysis between mining employment and disposable income

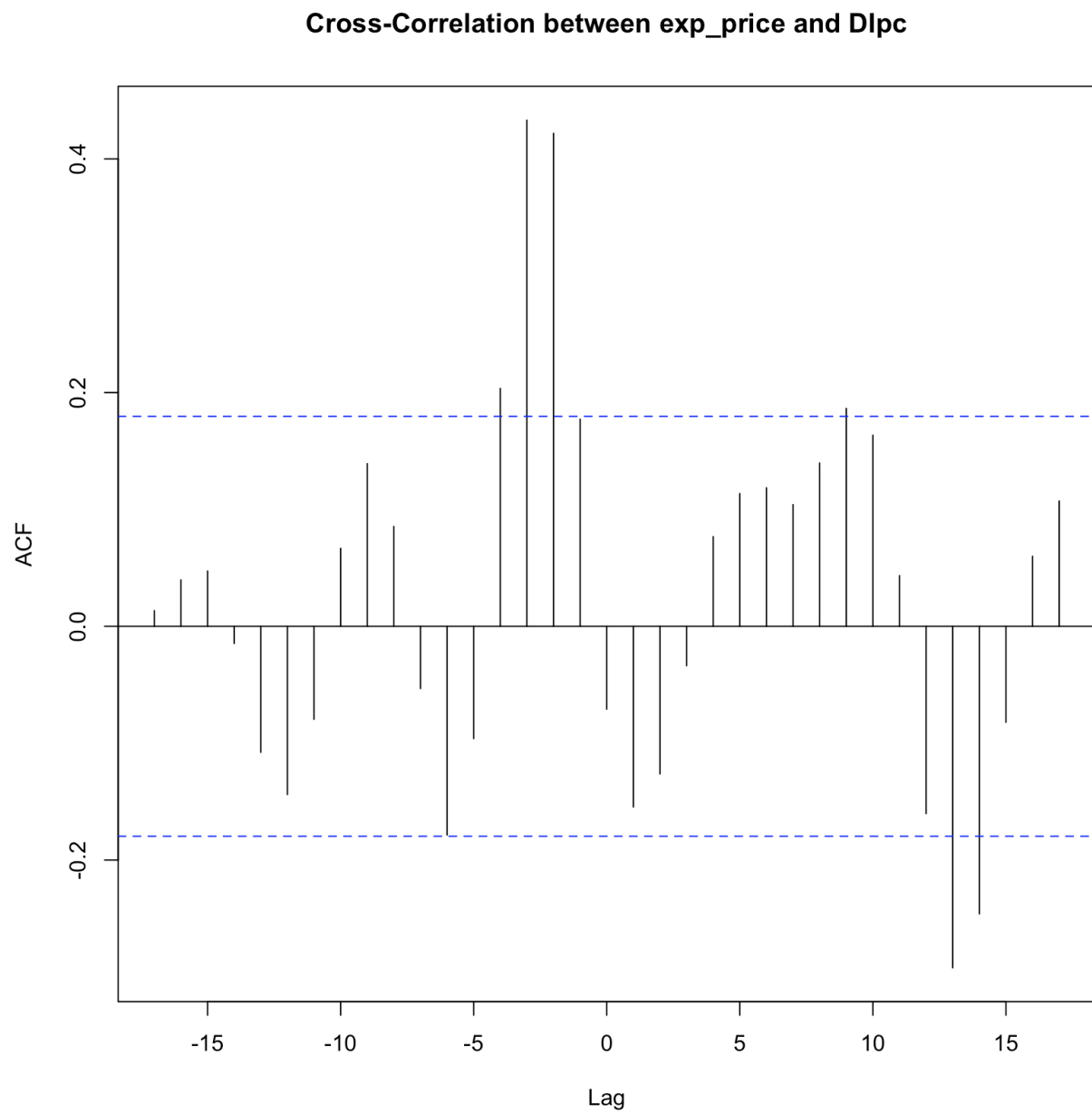


Figure 9: Cross correlation analysis between commodity prices and disposable income

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