

## MACRO-ECONOMIC IMPORTANCE OF COAL INDUSTRIES IN AUSTRALIA, CHINA AND MONGOLIA; THE EXAMINATION OF THE GREGORY EFFECT IN THE THREE COUNTRIES

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**Abstract:** This paper outlines the coal industries in Australia, China and Mongolia and examines of their economic importance, describing a range of developments. Because this industry is an indispensable part of these three countries' economies, the report compares and calculates its performance with the macroeconomic indicators such as GDP, foreign trade, and mining industry figures.

The report is based on one of the expressions of the natural resource curse known as the "Gregory effect" and the information of these three countries' coal industries, to analyze features of the Gregory effect in their economies. The findings show that some apparent evidence of the Gregory effect has been observed in the Australian and Mongolian cases, such as the fluctuations in their current accounts the value of their national currency. In the case of China, however, these macroeconomic indicators could not apply as evidence related to the Gregory effect.

**Key words:** economics, macroeconomic indicators, the Georgy effect

### Introduction

Coal has been used globally since the 1880s because of its valuable energy content to generate electricity, and plays important roles in some economies such as Australia, China and Mongolia. This valuable mineral may also be either a resource blessing in these nations. The report, therefore, aims to offer insight about the industry's importance and impact on these countries' economies.

The method used to assess the economic importance of the coal industry in these three countries is the same and considers indicators such as profitability,

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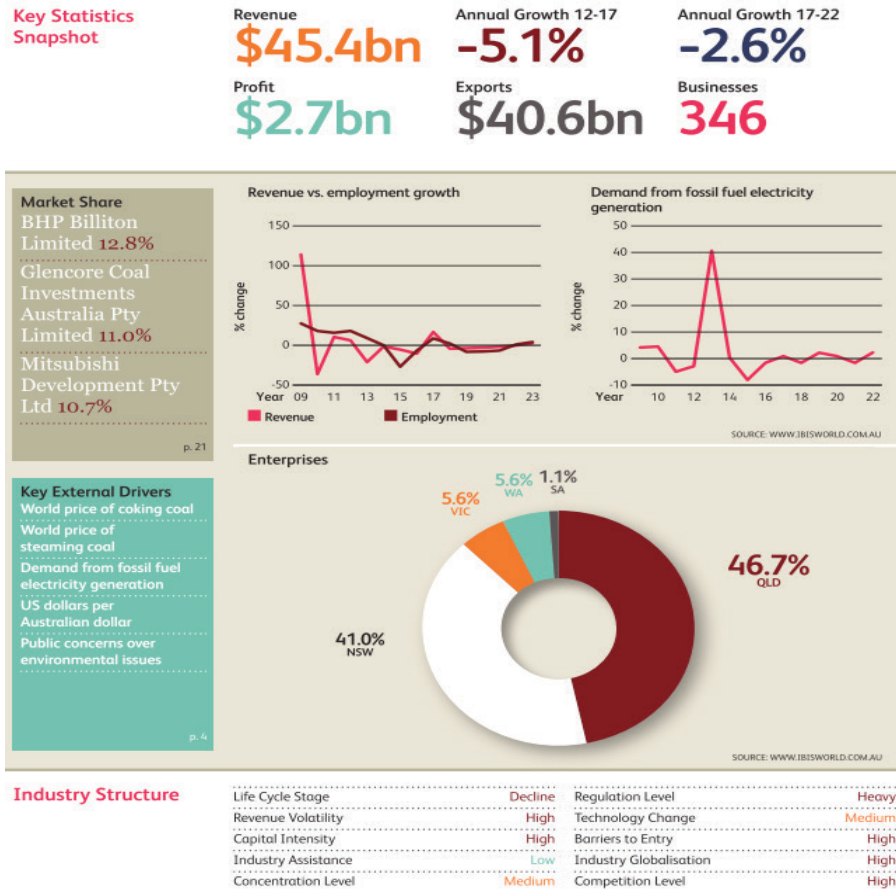
international trade, employment and so on. To outline the industry importance, the basic calculations are used to compare the sizes of indicators with the total GDP, mining industry figures, and turnover of exports and imports. They are the parts of a macro model, so it is plausible to outline how they contribute to the economies, while explaining the figures.

It is noted that the report adheres to the Gregory thesis rather than the “Dutch disease”, which focuses more on the decline of the manufacturing sector, and especially its unemployment. Even through these expressions seem quite similar regarding the main concept, the ways to reach the outcomes are different. Hence, in order to investigate the evidence of the Gregory thesis in these three economies, aspect of the thesis that balance of payments - through its effect on exchange rates and relative rates of inflation in Australia and overseas — links together exports and imports, has been considered.

### **Economic importance of the coal industry Coal Industry in Australia**

The world’s lowest cost coal producers and major exporters are in Australia. The coal resources in Australia are high-quality, economically accessible to extract and in excess of domestic demands. Subsequently, exports take up a considerable share of total industry revenue, whereas imports are insignificant because local demand for coal is below total local supply. IBISWorld (2016a) indicates that the depreciation of the Australian dollar is anticipated to remain over the next half decade, which means that Australian black coal is likely to be affordable in international export markets and take advantage of the industry’s competition.

Figure 3.1-1 Australian coal industry at a glance in 2016-17



The coal industry’s key statistical snapshot (Figure 3.1-1) indicates that the industry profitability has been volatile due to the inconsistent coal prices, and the number of industry employees has also decreased from 45,000 to 39,000 over the past five years IBISWorld (2016a). Refer to [1] for the indicators of profitability and employment.

Overall, regarding the macroeconomic importance, the Australian coal industry accounts for approximately 1% of the GDP and 15% of the mining industry gross value in turn [2]. The coal industry’s share of the economy was over 1% during the mining boom, exceptionally, it peaked at 3.12% in 2008-09, and then there has been a gradual downward trend after the boom and over the next five years [5].

IBISWorld (2016a) also reported that the coal industry's share of the economy is ranked third out of 22 regarding the sector, and 39th out of 844 in terms of economy rank, in turn.

### **Coal Industry in China**

IBISWorld (2016b) reported that *“the driving force behind coal demand is China's economic development. Coal accounts for about 70% of energy consumption in China, making the domestic coal market an important component for economic growth and energy demand”*. As can be seen, the coal industry is taken into account regarding the economic importance of China.

The revenue of the coal Industry in China is set to reduce at 11.3% annual rate over the half decade to 2016, including a 12.3% reduction to \$280.5 billion in 2016 [11]. The reasons behinds the revenue fell are the substitution of primary energy from coal for cleaner energy sources, declining coal prices, and competition from lower-priced imported coal [5]. The industry performance is also affected by the government policies like taxes, safety and environmental concerns on coal mining. However, for the major coal consumers, particularly thermal power plants [6], coal is not likely to be substituted by alternative energies or more expensive oil.

With respect to the foreign trade, coal exports and imports mainly act as adjustments to balance domestic demand and supply. What we can clearly see from the overseas trade in this industry is that exports are low and decreasing, and imports are low and increasing.

The increase in the value of the Chinese yuan makes exporting goods more expensive, and discourages export trade. As a consequence, imported coal has obtained a larger share of the Chinese market in recent years [5]. In addition to this, there is no remarkable discrepancy between imported and local coal products. Even if China has a substantial amount of coal mines, demand from downstream industries, particularly power plants, is likely to fluctuate considerably.

### **Coal Industry in Mongolia**

As a result of the geological explorations, there are over 300 identified coal deposits which have approximately 152 billion.tn coal resources in Mongolia, and this figure accounts for around 10% of the world's inferred coal resources [8]. According to the Statistical Review of World Energy by BP (2016), the proven coal reserve in Mongolia accounts for 0.3% (2.5 billion.tn) of the global coal reserve [1], which means there should be more exploration to improve resources classification into proven.

As for the economic importance, the contribution of the mining industry to the GDP has been increasing considerably since the mid 2000's. For instance, the proportion of the mining industry in the GDP has ramped up from one quarter to over 40% for the past five years [2]. To be more specific, the coal industry used to make up roughly one quarter of gross industrial output during the mining boom, and then it started to decline due to the low commodity price.

If we look at the ratio of exported main commodities [9], coal was the leading commodity of exports during the boom, which used to take nearly a half of all exports. After that it moved into the second place and was overtaken by copper concentrate.

In terms of employment in this industry, the MongolianCoalAssociation (2012) reported that a total of 8138 people were employed in 2012, and it has not found any updated since that time. This figure illustrates that the number of coal industry employees accounts for over 13% of the whole industry workforce and approximately 42% of the mining industry staff, respectively.

All in all, it is possible to say that coal is an integral part of Mongolian economy.

### **Evidence of the gregory effect in the three countries investigated**

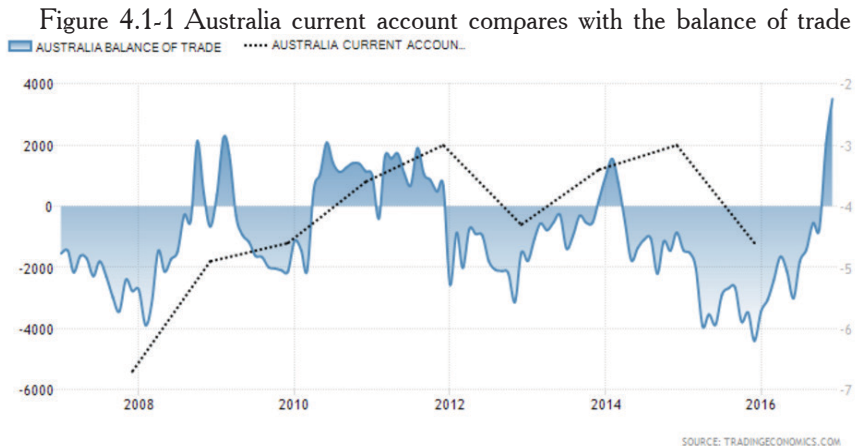
It is asserts that "*the balance of payments-through its effect on exchange rates and relative rates of inflation in Australia and overseas-links together export and import competing industries so that the import competing sector is vitally affected by export developments*" (Gregory 1976, 89). To illustrate this, his model emphasizes that mineral discoveries have had a far-reaching consequence on the rural (which exports) and manufacturing (which competes with imports) sectors than the 25 per cent general reduction of tariffs across the board.

### **The Gregory Effect in Australia?**

As a result of the mining boom, some apparent evidence applied for the Gregory thesis has been observed in Australian economy with respect to the fluctuations in the balance of payment links with balance of trade, exchange rates and inflation. As well as this, there are two stages of the "Dutch Disease" in the economy - during the boom and after the boom.

**During the boom:** the balance of payments is to be higher than expected because of the immense amount of income from the mineral exports (Figure 4.1-1). An increase in the global demand for Australian coal, iron ore, and gold results in

the national currency appreciating (Figure 4.1-2). How does the mechanism work? *“the increased income generated by sales of natural resources makes the nation’s currency stronger”* (Karasinski 2017). This can encourage people to consume more importing goods rather than the domestically produced, and the inflation rate then tends to be higher (Figure 4.1-3).



**After the boom:** the current account deficit starts to deteriorate due to the faster growth in imports than exports and the increased value of Australian dollars. Once the boom has become less intensive, the real exchange rate and inflation rate returned to pre-boom levels, see the Figure 4.1-2 and Figure 4.1-3.



Figure 4.1-3 Australian Inflation rate



**The Gregory Effect in China?**

It is disputed as to whether or not the Chinese economy experiences the Gregory effect. China imports more mineral commodities, especially coal, instead of exporting. The balance of payments has performed well over the period, with the exception of some declines due to the trade deficit (Figure 4.2-1). The exchange rate does not depreciate dramatically and started to appreciate in recent years (Figure 4.2-2). The inflation rate does not increase drastically, except for the global economic downturn in 2008-2009 (Figure 4.2-3).

Figure 4.2-1 China current account compares with the balance of trade



Figure 4.2-2 Exchange rate U.S dollar VS China yuan



Figure 4.2-3 China inflation rate



### **The Gregory Effect in Mongolia?**

There is some evidence to apply the Gregory thesis or Dutch disease to the Mongolian economy. Although exports, especially coal, which used to comprise a substantial amount, surged during the mining boom, the current account and the balance of trade declined significantly because of the increasing imports (including mining equipment weights large proportion) and the external debt. Post the boom, the balance of trade started to increase due to the reduction in imports, the value of national currency and the inflation rate (Figure 4.3-1 - Figure 4.3-3).



Figure 4.3-1 Mongolia current account compares with the balance of trade

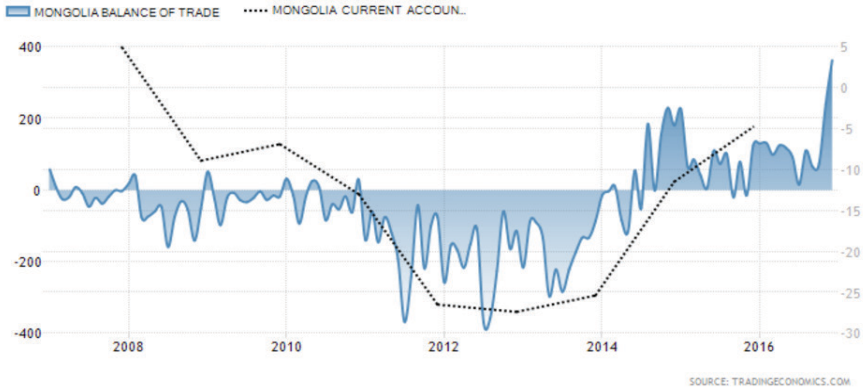


Figure 4.3-2 Exchange rate U.S dollar VS Mongolian Tugrik



Figure 4.3-3 Mongolia inflation rate



## Conclusion

It can be clearly seen that the coal industry in Australia, China and Mongolia carries the main contribution to their economies. A similar structure has been found in the coal industries of Australia and Mongolia regarding the market performances, especially the exports which are much greater than imports, and their fluctuation related to the mining boom.

It is also significant that Australia and Mongolia both export coal to China which accounts for a substantial amount of the aggregate exports, and heavily depends on the China market. Therefore, some apparent evidence of the Gregory effect has been observed in the Australian and Mongolian cases such as the fluctuations in their current accounts and the value of the national currency.

Conversely, China imports more coal than its exports, so there is no evidence about the impact of increasing mineral exports. Instead, the fluctuation in China's balance of current account, exchange rate and inflation rate may relate to external market factors like volatility in mineral commodity prices.

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## Appendix

### Appendix 1 Total proved coal reserves at end 2015

#### Coal

##### Total proved reserves at end 2015

Million tonnes	Anthracite and bituminous	Sub-bituminous and lignite	Total	Share of total	R/P ratio
US	108501	128794	237295	26.6%	292
Canada	3474	3108	6582	0.7%	108
Mexico	960	351	1211	0.1%	84
<b>Total North America</b>	<b>112835</b>	<b>132253</b>	<b>245088</b>	<b>27.5%</b>	<b>276</b>
Brazil	–	6630	6630	0.7%	*
Colombia	6746	–	6746	0.8%	79
Venezuela	479	–	479	0.1%	*
Other S. & Cent. America	57	729	786	0.1%	244
<b>Total S. &amp; Cent. America</b>	<b>7282</b>	<b>7359</b>	<b>14641</b>	<b>1.6%</b>	<b>150</b>
Bulgaria	2	2364	2366	0.3%	66
Czech Republic	181	671	1052	0.1%	23
Germany	48	40500	40548	4.5%	220
Greece	–	3020	3020	0.3%	63
Hungary	13	1647	1660	0.2%	180
Kazakhstan	21500	12100	33600	3.8%	316
Poland	4178	1287	5465	0.6%	40
Romania	10	281	291	*	11
Russian Federation	49088	107922	157010	17.8%	422
Sarbia	1	13410	13411	1.5%	352
Spain	200	330	530	0.1%	173
Turkey	322	6380	6702	1.0%	192
Ukraine	15351	18522	33873	3.8%	*
United Kingdom	228	–	228	0.2%	27
Uzbekistan	47	1853	1900	0.8%	481
Other Europe & Eurasia	1388	5494	6882	0.8%	192
<b>Total Europe &amp; Eurasia</b>	<b>92557</b>	<b>217981</b>	<b>310538</b>	<b>34.8%</b>	<b>273</b>
South Africa	30156	–	30156	3.4%	120
Zimbabwe	502	–	502	0.1%	121
Other Africa	942	214	1156	0.1%	122
Middle East	1122	–	1122	0.1%	*
<b>Total Middle East &amp; Africa</b>	<b>32722</b>	<b>214</b>	<b>32936</b>	<b>3.7%</b>	<b>123</b>
Australia	37100	39300	76400	8.6%	158
China	62200	52300	114500	12.8%	31
India	56100	4500	60600	6.8%	89
Indonesia	–	28017	28017	3.1%	71
Japan	337	–	337	*	298
<b>Mongolia</b>	<b>1170</b>	<b>1360</b>	<b>2520</b>	<b>0.3%</b>	<b>193</b>
New Zealand	33	538	571	0.1%	168
Pakistan	–	2070	2070	0.2%	*
South Korea	–	126	126	0.1%	71
Thailand	–	1239	1239	0.1%	82
Vietnam	150	–	150	*	4
Other Asia Pacific	713	1075	1788	0.2%	37
<b>Total Asia Pacific</b>	<b>157803</b>	<b>130525</b>	<b>288328</b>	<b>32.3%</b>	<b>53</b>
<b>Total World</b>	<b>403199</b>	<b>488332</b>	<b>891531</b>	<b>100.0%</b>	<b>114</b>
of which: OECD	155494	229321	384815	43.2%	206
Non-OECD	247705	259011	506716	56.8%	85
European Union	4893	51199	56092	6.3%	112
CIS	86524	141309	227833	25.6%	435

\*More than 500 years.

†Less than 0.05%.

Notes: Total proved reserves of coal – Generally taken to be those quantities that geological and engineering information indicates with reasonable certainty can be recovered in the future from known reservoirs under existing economic and operating conditions. The data series for total proved coal reserves does not necessarily meet the definitions, guidelines and practices used for determining proved reserves at company level, for instance as published by the US Securities and Exchange Commission, nor does it necessarily represent BP's view of proved reserves by country. Reserves-to-production (R/P) ratio – If the reserves remaining at the end of any year are divided by the production in that year, the result is the length of time that those remaining reserves would last if production were to continue at that rate. Reserves-to-production (R/P) ratios are calculated excluding other solid fuels in reserves and production.

Source of reserves data: World Energy Resources 2013 Survey, World Energy Council.

Source: BP Statistical Review of World Energy June 2016