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Copper and Foreign Investment: The development of the mining industry in Cyprus during the great depression

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Abstract:

This paper evaluates the impact of the rapid growth of mining on the Cypriot economy during the period 1921-1938, with special focus on the expansion of copper sulphate mining. During this period the industry was transformed by companies such as the Cyprus Mining Corporation (CMC) and this affected the whole economy and society. The island was for the first time inundated with substantial foreign direct investment, which encouraged technological adaptation and altered labour relations; as such there has been a debate on how beneficial was mining for the economy at that time. Using substantial primary data we estimated output (GDP share), employment and productivity estimates for the mining industry, as well as profit estimates for the foreign mining firms through the use of a counterfactual. The data allows us to argue that mining was very beneficial in increasing labour productivity and earning foreign exchange, but also highlights that the economic and social benefits for the economy were less than those suggested by the colonial authorities due to mass exports of profits.

Introduction

*“Mavrovouni and Skouriotissa, mountains intractable, naked.
Cursed like Prometheus; like him doomed to have their innards taken out,
For daring to give light to man, for daring to give copper, so many eons ago”¹.*

Cyprus has been associated with copper mining since the Bronze Age, with the mines of Skouriotissa and Lymni in operation in Roman times². Despite the existence of small mining interests throughout the island's British occupation, with the largest being an asbestos mine at Amiandos, the copper industry remained unimportant until the First World War. Following the discovery of significant ore deposits in 1914, the copper sulphate industry was reinvigorated by significant investment during the interwar period, and by the 1950s the industry grew so that it became the second largest exporter of copper pyrites ore in the

¹ Extract from the poem “Τα Μεταλλεία” [The Mines] by Kostas Montis, Pan-Cyprian Federation of Labour [ΠΕΟ], *Μεταλλωρύχων Μνήμες* [Miner's Memories], (DVD, Nicosia, 2007)

² Baer, L.M., *The Mineral Resources and Mining Industry of Cyprus* (Nicosia: GPO, 1963), p.1

World³. The industry remained important until 1974, whereby the invasion of Cyprus led to the division of the interests of the largest company, the Cyprus Mines Corporation (CMC) across the green line, leading to a precipitous decline in production. The mining and quarrying industry currently employs industry 585 persons and generates value of only 55.5 million Euros, which represents just 0.3% of the Gross Domestic Product (GDP) of Cyprus⁴.

The economic influence of mining and quarrying in Cyprus, specifically of the copper sulphate industry, has been debated extensively. Prior to the Second World War Cyprus was not important in military terms and became important as a British military base only after the Second World War. Hence the first major inflow of Foreign Direct Investment (FDI) began through mining. During the First World War, large copper sulphate deposits were discovered and they were exploited in the interwar period. Yet the economic effects of copper exploitation have not been previously quantified.

Valerio argues that such type of investment usually did not transform the economy and society in an all encompassing way. It created a two-tier economic system of a modern export oriented production directed to European markets, while the rest of the economy remained based on traditional working patterns⁵. In such instances the economic effect of the export enclave to the real economy can be minimal. This view is however disputed by Lewis, who has suggested that in such a dual economy, provided that the wages of modern sector workers can be contained, can lead to the transformation of the whole country to sustainable economic growth through the absorption of the rural surplus labour⁶.

Prior to the development of the copper mining industry in the 1920s, there was no modern export sector that would fit the typology of Valerio or Lewis. Copper and copper sulphate ceased to be a significant export by the middle ages. Instead, Cyprus earned its foreign exchange through cash crops for European markets that were established in the 14th century by the Lusignan Kings and the major landowners, the Knights Hospitallers; development was

³ Christodoulou, D., *Inside the Cyprus Miracle: the Labours of an Embattled Mini-economy*, (Minneapolis: University of Minnesota, 1992) p.xxi, p.127, p.74

⁴ Statistical Service of the Republic of Cyprus, Industry 2005-2010, http://www.mof.gov.cy/mof/cystat/statistics.nsf/industry_construction_61main_en/industry_construction_61main_en?OpenForm&sub=1&sel=2 (accessed 19th March 2012)

⁵ Valério, N., "Some Remarks about Growth and Stagnation in the Mediterranean World in the XIXth and XXth Centuries" *The Journal of European Economic History*, (1992) vol.21 no.1 pp.121-134, p.125

⁶ Lewis, W. A. "Economic Development with Unlimited Supplies of Labour" *The Manchester School* (1954) pp.400-449 .

restricted to the areas directly under the knights' control⁷. Cash crop agriculture remained the main exporting product of Cyprus; even after the Ottoman conquest there was a gradual re-emergence of cash crop agriculture in Cyprus⁸. The occupation of Cyprus by Britain in 1878 did not lead to a rapid modernisation of the outdated administration or economic structures: despite some improvements to the judicial system and the introduction of a limited constitution, the emphasis of the British administration was in maintaining the status quo⁹.

As a result the development of Cyprus under British occupation was not spectacular. Recent research indicates that the development level of Cyprus under the British for the period 1921-1938, needs to be revised downwards. In Geary-Khamis 1990 dollars, the GDP per capita of Cyprus in 1938 is GK\$1,260, which was substantially lower than Turkey's (GK\$1,724), and placing Cyprus in a similar income bracket than Bulgaria and Romania, which were some of the poorest areas in Southern Europe¹⁰. In addition, Cyprus was not growing fast enough to "catch-up" to its Southern European neighbours.¹¹

On first glance, it seems that the Lewis theory of development based on a modern sector rings true for Cypriot interwar mining. From 1920s onwards there was a substantial expansion of the mining industry, transforming the copper pyrites ore (also known as copper sulphate) industry from a minor player to the chief exporting industry of Cyprus. This transformation poses questions for Cypriot development: did the expansion of the industry transform the economy, or was the pattern of the modern enclave repeated, leaving the majority of the economy in backwardness?

Christodoulou argues that while some improvements to transport were effected due to mining during the period 1921-1938, "the Cyprus Miracle" lays squarely in the post-1945 period¹². Angelides argues that the standard of living remained very low since Cyprus was still

⁷ Jenness, D., *The Economics of Cyprus: A Survey to 1914*, (Montreal: McGill University Press, 1962) p.23.

⁸ Hill, G., *A History of Cyprus: Volume IV* (Cambridge: Cambridge University Press, 1952), p.34

⁹ Ibid. p.35. Georghallides, G.S., *A Political and Administrative History of Cyprus 1918-1926*, (Nicosia: Zavallis Press, 1979) p.34

¹⁰ Apostolides, A. *Economic Growth or Continuing Stagnation? Estimating the GDP of Cyprus and Malta, 1921-1938*, (London: London School of Economics Thesis, 2010) p.74; Pamuk, "Estimating Growth in the Middle East since 1820", (2006) p.815, Table 1; Maddison, *Statistics on World Population, GDP and Per Capita GDP, 1-2008 AD*, <http://www.ggdc.net/maddison>

¹¹ Apostolides, A. "Economic Growth..." (2010) p.77

¹² Christodoulou, D., *Inside the Cyprus Miracle* (1992) p.127, p.74

overwhelmingly rural in nature, and hence mining did not initiate modern economic growth¹³. Brey is more optimistic, stating that changes in terms of facilities and administration transformed the Cypriot economy sometime in the 1930s¹⁴. Mayer and Vassiliou argue that the Cypriot economy was only positively transformed due to the growth of the copper mining industry. For Mayer and Vassiliou, the Cyprus Mines Corporation (CMC) put in place the necessary investment in the 1930s to allow for an impressive expansion of output during the 1950s, when copper prices were soaring¹⁵. Thus for Mayer with Vassiliou, the period 1921–1938 laid the foundation for future growth by setting in place infrastructure improvements which formed a basis for development after the end of the Second World War.

In the official book of the company, Lavender analysed the development of CMC and was positive about the British occupation of Cyprus and the role of the company in developing the country. While stressing the harmonious relationships of CMC with the colonial administration, Lavender argues that the growth of the copper mining industry and of CMC in particular lifted Cyprus out of poverty¹⁶. He indicates that the industry became the largest exporter of Cyprus as early as 1925, replacing the staple agricultural exports which had suffered price reversals due to the interruption of global trade during and after the great depression. The story provided by Lavender suggests that foreign owned companies like CMC prompted development through modernisation of the whole economy: for him copper mining saved Cypriots from a life of continued economic and social stagnation.

Lavender describes the establishment of the CMC from the discovery of copper sulphate deposits in 1914 in the ancient site of Skouriotissa, until the global expansion of the company in the 1950s, with a greater descriptive emphasis in the inter war period, and hence there will be no narrative description of the development of the copper industry here. CMC saw growth reversed during the great depression, with the large mines of Skouriotissa and Mavrovouni closed temporarily in 1931 and 1933. Despite such reversals the company survived and

¹³ Angelides, S., “The Cyprus Economy Under British Rule (1878 – 1960)” in Karageorghis, V. & Michaelides, D. (eds.) *The Development of the Cypriot Economy from the Prehistoric Period to the Present Day* (Nicosia: University of Cyprus, 1996) p. 214

¹⁴ Hansjörg, B., “The Cypriot Economy Under British Rule and the Economic Heritage of the British Period” in Faustman, H. & Peristianis, N. *Britain in Cyprus: Colonialism and Post-Colonialism 1878 – 2006* (Biliopolis: Mannheim & Möhnese, 2006) p.431–445, p.431, p.441

¹⁵ Mayer, A.J., with Vassiliou, S., *The Economy of Cyprus* (Cambridge, MA: Harvard University Press, 1962) p.11

¹⁶ Lavender, D. *The Story of Cyprus Mines Corporation* (San Marino, CA: The Huntington Library, 1962) p.60.

recovered, undergoing significant expansion until the start of the Second World War¹⁷. For Lavender, the CMC mining concerns were constantly under threat of closure due to the precarious financial problems, becoming only truly profitable after the Second World War.

This positive view of CMC and other companies is not without its detractors. The Pan-Cyprian Federation of Labour (ΠΕΟ), whose existence was placed under threat during the brutal crackdown of the 1948 strike against CMC, argued that the CMC plundered Cyprus. Following a narrative as suggested by Valerio, the company was extractive in nature, exploiting the island and its workers¹⁸. For ΠΕΟ the company was exporting large profits, while at the same time it was using its close relationship with the colonial administration to overpower the fair demands of workers; thus the CMC and other mining companies were essentially extracting wealth from Cyprus without providing benefits to the society.

This article collates and interprets primary data on the mining industry of Cyprus. Then, with the use of a counter-factual exercise, a projection of the profits of foreign mining companies will be attempted. Finally the actual role of the sector in the lives of the average Cypriot will be evaluated and the article will suggest whether mining modernised the economy or followed traditional patterns of enclave development.

Mining and quarrying output in Cyprus, 1921-1938

Methodology

There was ample information on the volume and nominal value of mining and quarrying exports in the statistical (blue) books; these were supplemented by information in the annual reports of the mining department in Cyprus. Only the output of sand in Cyprus remains unaccounted. These were used to create The Value Added (i.e. part of the Gross Domestic Product or GDP contributed by the mining sector) of mining and quarrying was estimated, and this was then divided to the various products produced in Cyprus. The estimate is in constant 1938 prices, thus it captures growth of output and not of prices (i.e. it is adjusted for inflation).

¹⁷ Ibid. p.241, 263, p.266

¹⁸ Pan-Cyprian federation of Labour [ΠΕΟ], Οι Απεργιακοί αγώνες των μεταλλωρύχων και αμιαντωρυχείων του 1948, [The 1948 Metal and Asbestos Miner strikes] (Λευκωσία, ΠΕΟ, 1979) p.8

It was not possible to estimate the intermediate consumption of the mining sector: all quarries and mines on the islands were private companies, whose business files have not been found. However, other European estimates can provide the proportion of value added to gross output. Ivanov calculated the value added to gross output ratio in Bulgaria as 71.2%, and Schulze argued that the ratio of Austrian mining activities was 82%¹⁹. Thus based on the above and other European estimates, a conservative estimate of 75% for Cyprus was used to estimate value added²⁰. The share of value added to gross output is assumed constant throughout the period.

Output of the mining sector

Table A indicates the available output data collected from the Cyprus Blue Books and the yearly reports of the department of mining. What is significant here is to indicate that the rapid growth of copper sulphate extraction also increased the growth of other non-ferrous metal mining, such as gold ore and copper particulate. This became particularly important after CMC completed a processing plant in Xeros in 1934. Ores not related with copper mining did not expand as quickly and did not recover after the general fall of output during the great depression. Asbestos mining also increased its output during the 1920s, but failed to keep up with the rapid growth of the copper sulphate mines during the 1930s.

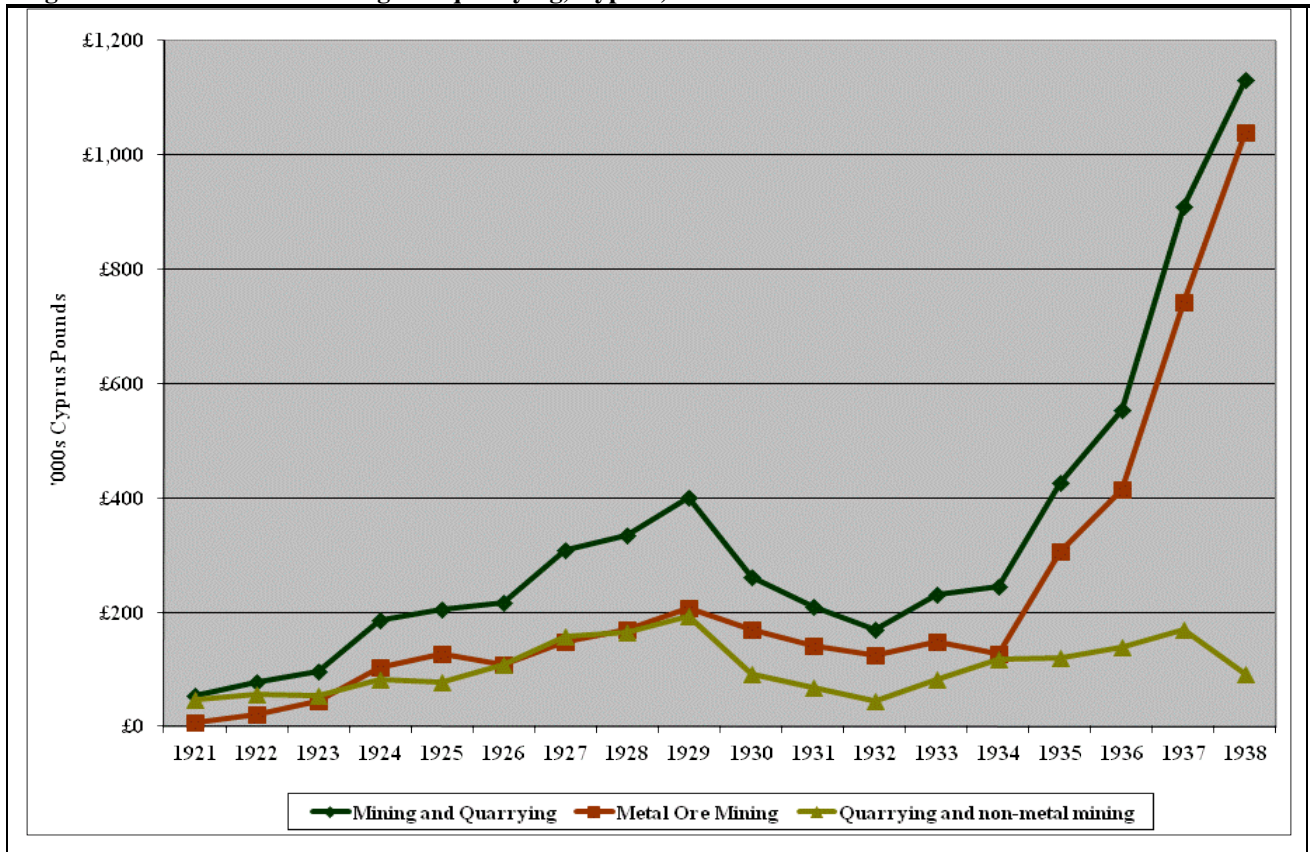
Table 1 and the Appendix indicates how dramatic the growth of the mining industry was during the interwar period. In 1921, despite the presence of Limni and the beginning of the CMC Skouriotissa copper sulphate mines, the mining sector was still very small part of the economy. The rapid growth of mining was really a growth of copper mining. Hence, growth was intractably linked to the rise and development of the Cyprus Mines Corporation (CMC), an American free-standing company based in California, whose sole concern (in the beginning) were mines in Cyprus. The extraction of copper on an industrial scale is linked to

¹⁹ Schulze, "Re-estimating Austrian GDP 1870-1913..."(1997), p.6; Ivanov, *Bulgarian National Income...* (Unpublished) Appendix Table W.

²⁰ Kauppila, J. *The Structure and Short-Term Development of Finnish Industries in the 1920s and 1930s: An Input-output Approach* (Helsinki: Statistics Finland, 2007) pp.234-235. Schulze, "Re-estimating Austrian GDP..." (1997) p.6; Kostelenos *et al.*, *Ακαθάριστο Εγχώριο Προϊόν* (2007) pp.80-85; Hjerpe, *Finland's Historical National Accounts...* (1996), Appendix p.32; Prados de la Escosura, "Spain's Gross Domestic Product" (1993) pp.26-28

the growth of the CMC, with the company becoming a catalyst for the technological and social transformation of the island²¹.

Figure 1: Value added of mining and quarrying, Cyprus, 1921-1938.



Source: Apostolides, A. *Economic Growth or Continuing Stagnation? Estimating the GDP of Cyprus and Malta, 1921-1938*, (London: London School of Economics Thesis, 2010)

The sector became a substantial source of growth for the economy throughout the 1920s, but underwent a severe reversal during the great depression. The rapid growth of copper mining meant that the sector reached the peak of its importance relative to the economy in 1938; as table 1 indicates, the mining share of GDP underwent a relative decline from that point onwards. Mining and quarrying grew from a small sector of the economy, producing 1.4% of GDP (i.e. it was 1.4% of the added value to the total GDP), to being 17.2% of the total economy of Cyprus in 1938. This suggests that mining value added (the numerator), was growing faster than the economy (GDP the dominator), and hence mining was one of the main drivers of economic growth in the period. Without the development of mining the GDP of Cyprus would be growing much slower. Hence as a first level it must be admitted that the

²¹ Christodoulou, *Inside the Cyprus Miracle...*(1992), p.70.

Cypriot economy benefited from the increase in mining, if only in macroeconomic terms. From then on there was a relative but not an absolute decline in importance to the economy: After the Second World War other sectors were growing faster than mining, reducing its relative importance.

Table 1: Mineral Production and the economy.

Year	Number of Employed	Share of Economically active population (%)	Share of GDP (%)	Mineral Exports as a share of all exports (%)
1921	>1,000*	>1	1.4	8
1938	9,200	5.8	17.2	62.7
1952	6,585	3.1	16.7	56.9
1961	5,300	2.2	9.3	47.1
1971	4,203	1.5	4.6	22.6
1976	2,332	1.1	2.3	7.7
1981	1,511	0.6	1.2	3.8
1989	700	0.2	0.3	0.9
2010	585	0.14	0.3	0.8

*The 1921 data is in shift days hence an approximation only is possible²².

It is also worthwhile to point out that as an export industry copper mining in Cyprus was very sensitive to global prices and global demand. Hence the industry's growth was not linear to Cypriot development. A slump in global trade, especially during the great depression (1929-1934) checked the great growth achieved in the latter half of the 1920s. The majority of interwar mineral value added growth took place after 1934 as Cypriot copper ore proved essential to German re-armament²³. Cypriot ore provided crucial raw materials in which Germany was not self-sufficient: copper and sulphur. Before 1934, Germany imported most of its ore from the biggest European producer of copper sulphate, the Spanish mines of the Rio Tinto Company²⁴. Yet Rio Tinto was facing an increasingly difficult situation in Spain, with constant labour unrest and threats of violence from the early 1930s. This led to the decision of Rio Tinto to reduce its investment in its Spanish mines, leading to a reduction of their output and creating a large supply-gap in the European copper sulphate market²⁵. With the outbreak of the civil war in Spain in 1936, the demand for Cypriot copper ore was increased further, leading to the exponential growth shown in figure 1.

²² Sources: Apostolides, A. *Economic Growth or Continuing Stagnation? Estimating the GDP of Cyprus and Malta, 1921-1938*, (London: London School of Economics Thesis, 2010); Christodoulou, *Inside the Cyprus...* (1992), p.75. Statistical Service of the republic of Cyprus, Industry 2005-2010, http://www.mof.gov.cy/mof/cystat/statistics.nsf/industry_construction_61main_en/industry_construction_61main_en?OpenForm&sub=1&sel=2 (accessed 19th March 2012); Labour 1985-2010 http://www.mof.gov.cy/mof/cystat/statistics.nsf/labour_31main_en/labour_31main_en?OpenForm&sub=1&sel=2; Foreign Trade 1960-210 http://www.mof.gov.cy/mof/cystat/statistics.nsf/externaltrade_41main_en/externaltrade_41main_en?OpenForm&sub=1&sel=2

²³ Christodoulou, *Inside the Cyprus Miracle...*(1992), p.70.

²⁴ Harvey, C.E., *The Rio Tinto Company: An Economic History of a Leading International Mining Concern 1873-1954* (Penzance: Alison Hodge, 1981) p.273

²⁵ *Ibid.* p.259, 261

Table 2: Value added of Cypriot mining and quarrying, in constant and current prices

Year	Constant Prices (Real)	Current Prices (Nominal)	Mining deflator	Year	Constant Prices (Real)	Current Prices (Nominal)	Mining deflator
1921	£60,176	£38,527	156	1930	£284,825	£244,761	116
1922	£71,570	£60,854	118	1931	£206,609	£194,145	106
1923	£105,447	£81,578	129	1932	£154,163	£153,877	100
1924	£209,899	£170,742	123	1933	£192,028	£215,237	89
1925	£158,021	£188,184	84	1934	£267,881	£228,990	117
1926	£232,058	£200,671	116	1935	£375,030	£411,150	91
1927	£320,159	£292,454	109	1936	£530,793	£538,248	99
1928	£370,487	£320,112	116	1937	£838,878	£894,803	94
1929	£443,891	£385,669	115	1938	£1,115,446	£1,115,446	100

Note: Constant 1938, PPP, pounds sterling.

It is clear from the output data that the expansion of interwar mining was a copper ore affair, and in this the importance to the CMC should not be underestimated. The discovery of new copper sulphate ores by CMC did result in the rapid explosion of output and completely transformed the economic structure of the island. Table B in the Appendix captures the dramatic rise, as in the period 1921-1938 the mining value added expanded by a factor of 20.8:1, implying a staggering annual average growth rate of 19.6%. In addition island reached its peak dependence on copper ore related exports in 1938 as the rearmament of Europe reached its peak. Thirdly the increase of output was much faster than the increase of employment. This suggests two things: the company had less impact on population than in terms of output and that the productivity of its workers was higher than in the economy as a whole.

This increase of productivity should not be an underestimated achievement of the FDI investment in mining: any sustained economic growth necessitates an increase in the productivity per labour, and hence a rise in productivity, if undertaken through an increase in the amount of capital invested per worker, can lead to rapid rates of economic growth²⁶. Hence the role of the mining sector, through copper mining (out of which the biggest concern was CMC) in terms of GDP, earning foreign currency and in increasing labour productivity were very important and positive in the interwar period. Without the copper mining iFDI Cyprus would have had an even worse interwar income performance.

Yet there is a valid criticism of the copper ventures: besides the formation of copper concentrates that was initiated in 1934 by CMC, there was no further attempts to retain a

²⁶ Solow, Robert, M, "A Contribution to the Theory of Economic Growth" *The Quarterly Journal of Economics*, Vol. 70, No. 1 (Feb., 1956), pp. 65-94

greater part of the copper value chain in Cyprus. For example, although there was no domestic consumption of mining output in Cyprus, the derivatives of the copper smelting process could produce much needed fertilizer, but not such venture was attempted.

The sector's ability to procure foreign exchange was very important in preventing a reduction of money supply in Cyprus. A reduction in the money supply would increase the rates of interest for loans in the economy and hence further stifle the economic life of the island. The Cypriot pound was tied at par to sterling through a sterling currency board²⁷. This meant that in the event of a trade deficit the government would withdraw domestic currency from circulation, since the currency board required one pound sterling to be deposited in London for every Cypriot pound issued. The net exports of the mining companies eliminated the possibility of a large trade deficit becoming a drain to the Cypriot money supply²⁸. Thus, the development of the mining sector had real tangible benefits for Cypriots in terms of productivity, technological catching up and in securing foreign exchange.

The Cyprus Mines Cooperation (CMC)

The CMC was an American free standing company, which meant that although its legal presence was in the United States, all of its (original) business was done in Cyprus. It is not clear how much US capital was invested in their first mine in Cyprus, Skouriotissa. There is no doubt that by the 1930s the company was investing heavily in technology never seen before in Cyprus, but there seems that in the 1920s the venture was expected to be financed mainly through retained profits. Thus in the 1920s the lack of funding led to a shortage of capital investment that slowed the exploitation of the orebody. Excavation, transport, refining and loading were done by hand, and it was not until 1924 that candles were replaced by carbide lamps in the underground tunnels²⁹. In addition the additional creation of value was minimal due to limited processing, and thus the company failed to garner more of the value added chain of copper production. This held back the development of Skouriotissa mine until the construction of the Xeros processing plant in 1934. Hence we remain unclear about the level of the initial foreign investment in the mining industry, although it appear to have been minimal until the 1920s.

²⁷ Phylaktis, K. *The Banking System of Cyprus: Past, Present and Future*, (London: Macmillan, 1995), p.43

²⁸ The mining companies also expropriated profits abroad, thus the positive contribution to balance of payments was positive but less than the total mining goods exported.

²⁹ Lavender, *The Story of...*(1962), p.193, p.195

By the late 1920s the CMC managed to successfully increase output by undercutting the price of the European Pyrites Producers Association (EPPA), a copper ore cartel, but had reached a ceiling on what it could sell without direct access to the large German chemical market, which was effectively controlled by the EPPA³⁰.

By the 1930s it was clear that the CMC did contribute to the Cypriot economy by importing machinery that reduced the island's technological backwardness. The firm had to import machinery and then set up workshops to maintain even the most basic equipment. The CMC imported the first oxyacetylene torch and the first x-ray machine increasing the technological capacity of the island³¹.

The presence of the company also brought permanent changes in Cypriot labour relations. Being by far the largest industrial employer in Cyprus the company unwittingly enabled the creation of the dynamic labour movement. The workers, with the aid of the emerging communist movement, began organising the first strikes over pay and conditions, the first affecting Mavrovouni in 1936³². Unionisation was fiercely resisted by the company who had the full support of the colonial administration until 1939. After the Second World War, the miners union became pivotal in the growth of the pan-Cyprian federation of labour (ΠΕΟ) and the communist party of Cyprus, with important political consequences in the history of Cyprus. This was not unusual; the same process took place in Spain as strikes against the Rio Tinto Company, a copper ore producer, were pivotal in the development of the Spanish labour movement³³.

The breakthrough of CMC and of Cyprus in the global copper market coincided with the discovery of the Mavrovouni ore. Mavrovouni was near the existing CMC concern of Skouriotissa, allowed the company to invest in processing facilities at Xeros, which would increase the value added of the exported material. This discovery was deemed so significant that the Rio Tinto Company attempted to purchase a majority share in the CMC in order to

³⁰ Harvey, *The Rio Tinto Company* (1981) p.208. In 1936 alone, the Rio Tinto mine in Spain had twelve major strikes between February and July: p.265-266

³¹ Christodoulou, *Inside the Cyprus Miracle...* (1992) p.80

³² *Ibid*, p.82

³³ Harvey, *The Rio Tinto Company* (1981) p.177

restrict its output³⁴. Although the buyout did not go ahead, Rio Tinto agreed to allow CMC's copper sulphate to be marketed through the EPPA, on the condition it would restrict its marketed output. Although the CMC agreed in 1928 to limit its output to below 225,000 tons in order to be accepted by the European Pyrites Corporation, the CMC broke its promise in 1928, 1937 and 1938³⁵.

The discovery of Mavrovouni and its entry into EPPA released the company from the marketing constraints that prevented its penetration in the German market³⁶. Cypriot ore was high in copper content, and for technical reasons it was ideally suited to the German industry; the only smelter in Europe capable of treating the company's copper concentrate was in Hamburg³⁷. Thus the CMC was able to capitalise on the changing demand for copper sulphate: previously low grade copper sulphate was used mainly in the production of acid for sulphur related products and the copper content was seen as an auxiliary material. The introduction of the brimstone processes in acid manufacture meant that the CMC's copper sulphate, which contained a high concentration of copper and iron and had no other metal impurities, became much more attractive to copper and iron manufacturers³⁸. Mavrovouni began intensive production in 1929 and reached full capacity in 1934. Unlike the slow growth of Skouriotissa, the discovery of Mavrovouni led to a massive investment programme which ensured that the new mine could rapidly increase its production; once again more research is needed to know if investment was through retained profits or by foreign capital inflow. The company's was further aided in its growth after discovering complex deposits containing silver and gold: prospecting unearthed small deposits of gold and silver near Apliki, Agrokipia, Kokinopezoula, Mathiatis and Troulli. The export of gold and silver ores was very profitable due to the high prevailing price of these metals in the late 1930s and the ability of the company to process them in the Xeros processing plant.

Following the success of the CMC, other companies backed by foreign interests were also established in Cyprus, such as the Hellenic Mining Company, which extracted copper, silver and gold at Kalavassos and Mitsero. From 1929 to 1938 the number of active mines doubled, but the CMC remained by far the largest in terms of output and employment.

³⁴ Harvey, *The Rio Tinto Company* (1981) p.209

³⁵ Source: Cyprus, *Statistical (Blue) Books* of 1928, 1937 and 1938. The volume of exports of copper sulphate mined by the CMC was above the limit agreed with Rio Tinto.

³⁶ *Ibid.* p.210

³⁷ Lavender, *The Story of...* (1962), pp.265-266

³⁸ Harvey, *The Rio Tinto Company* (1981) p.167, p.210

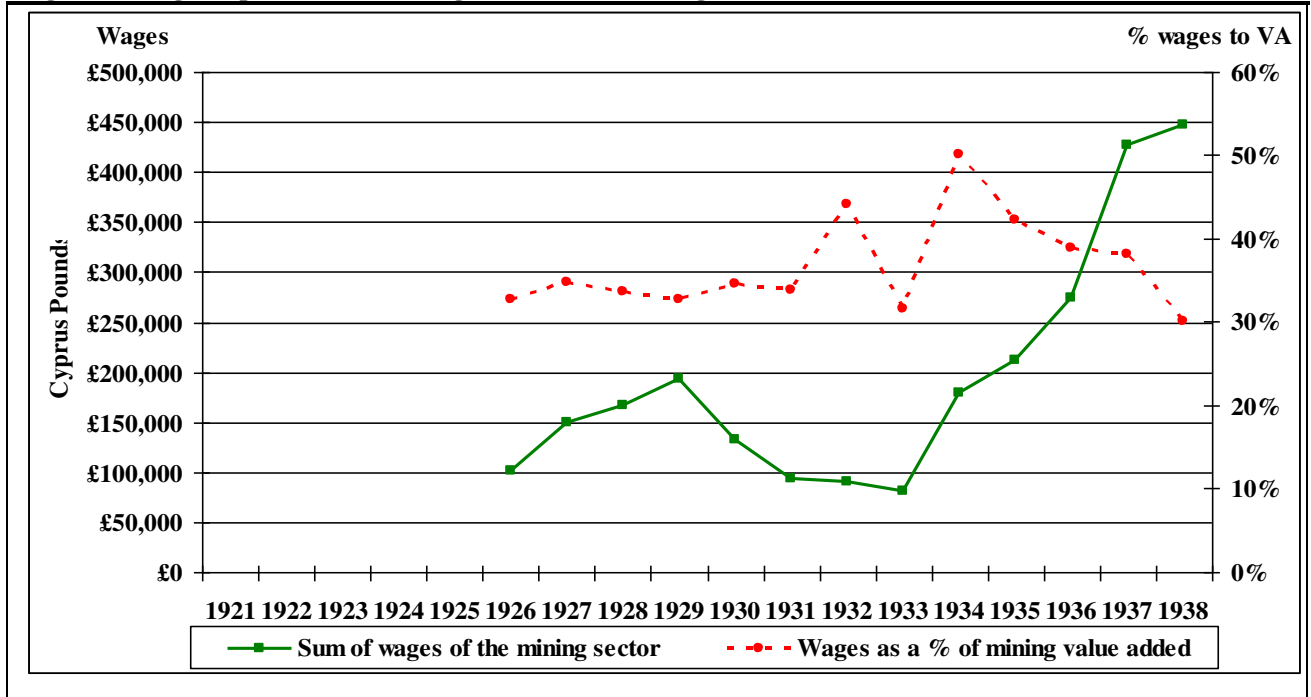
Despite the industry's impressive increase in output there is debate on the contribution in terms of national income. GDP counts income produced within an area, yet National Income takes into account the possible withdrawals of income in terms of profit/wages earned by foreigners. For Christodoulou, mining had a limited National Income effect, "since mining, being practised as an enclave economy, had no multiplier effect of any significance on the island's wider economic activity"³⁹. In contrast, the British colonial authorities were very positive about the mining companies, considering Mavrovouni and Skouriotissa as the "the island's most valuable assets... being exploited in the most efficient way possible by a first-class organisation"⁴⁰. Here we attempt to provide an answer, through the aid of a counterfactual: How much of the value added calculated remained in Cyprus, benefiting Cypriots?

In terms of employment, the CMC and the Cyprus Asbestos Corporation (CAC) were the largest employers on the island. Data on employment prior to the establishment of the inspectorate of mines before 1926 are not robust, but the figures are more reliable from 1926 onwards. The proportion of total wages to total value added was estimated, by multiplying the average number of daily workers in each mine by the daily wage, and then multiplying the outcome by the total days on which the mine was active. The total wage was then divided by the value added at current prices in order to evaluate how much of the value added was spent on wages, and how much was either capital investment or profits. The results are shown in figure 2.

³⁹ Christodoulou, *Inside the Cyprus Miracle...* (1992) pp.77-78

⁴⁰ Oakden, *Report on the Finances* (1935) p.21

Figure 2: Wages expenditure in mining and the share of wages to value added, 1926-1938.



Source: Appendix; Cyprus, *Statistical (Blue) Book* (1921–1938).

It indicates that in terms of wages, value added remained largely constant or falling even at times of great demand, thus releasing substantial amount of income to account for machine depreciation, rent and profit. If the mines were well managed, a substantial profit should have been expected because of the low share of wages to total value added. Labour wages remained less than half of the produced income in the mining sector. Figure 4 also indicates that the mining companies, like other large foreign companies in British colonies, were quite successful in pushing the burden of the depression on its employees by containing the share of total wages to total value added⁴¹. This means that the mining companies were successful in reducing the wages of the miners, even though the miners were becoming increasingly more productive. This is in part due to the mass underemployment in rural Cyprus, which helped to keep the wages of the miners down throughout the interwar period.

It was not possible to calculate the profit of mining companies, but there is enough information on the activities of the companies in the annual reports of the government inspectorate of mines and labour to estimate the possible magnitude of net profits though a counterfactual. Using primary information on payment of tax, wage payments and capital expenditure, an estimation of potential net profit is estimated as a residual.

⁴¹ Rothermund. D., *The Global impact of the great depression 1929-1933* (New York: Routledge, 1996) p.128

The mining companies spent their earned income on capital goods (machinery), purchasing intermediate consumption goods (goods used up in the production of ore), paying for wages, paying rent and on taxes. The cumulative value added in current prices for the period from 1926 to 1938 was £7,320,356 Cyprus pounds. As seen in figure 52, the cumulative sum of wages of Cypriots in the sector for the same period was £2,545,942. Georghalides and Oakden provide estimates of imported capital expenditure by the CMC totalling £750,000 Cyprus pounds⁴². Since the CMC constituted 80% of the market in terms of output and employment, an additional 20% was assumed to be invested in capital by the remaining companies.

The construction of buildings was recorded for the years 1930–1932 in the annual reports of the inspectorate of mines and labour. The average expenditure in building construction for the three year period is assumed to have been constant for the years with no information for this counterfactual exercise. Additional capital expenditure was necessary to open Mavrovouni and on that basis an additional 20% was assumed to have been invested for the Hellenic Mining Company to open the much smaller Kalavassos mine. The total amount invested for the years 1926–1938 was estimated as £1,433,345 Cyprus pounds in the counterfactual exercise. The cumulative royalty payments to the government were £177,345. Thus by subtracting the total wage, total investment and total taxes on production from the cumulative value added, the potential net profit of the foreign mining firms for the period 1926–1938 was estimated as £3,163,724 or 43.2% of the total value added.

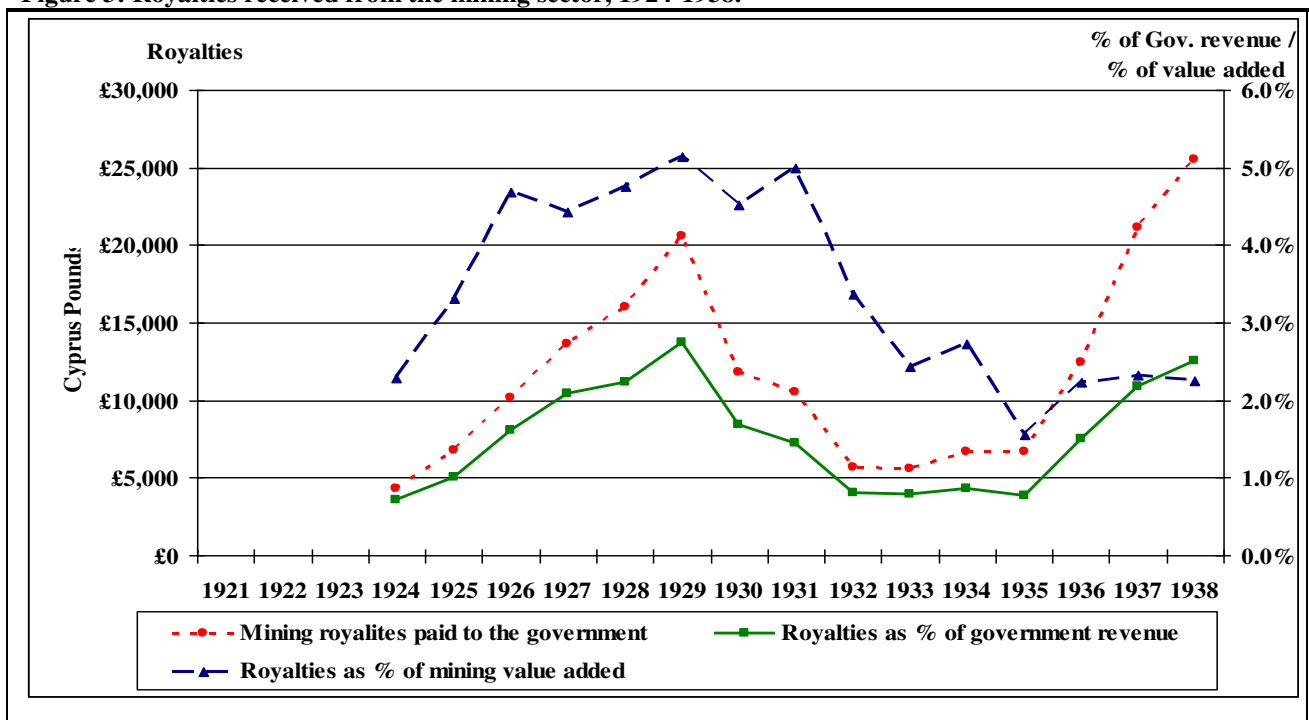
Although this is a counterfactual exercise, it indicated that if the mines were well managed, there would be significant residual profit. This does suggest that there is merit to the claim that the foreign companies mainly extracted income without substantial investment in their workers or in the country through taxation. The value added sent abroad as profit must have been significant. Thus, even if the growth of output was helpful to Cypriots in GDP terms, it was less helpful in National Income terms, reducing the impact of the great mining boom on the Cypriot economy. The answer is somewhere in between Christodoulou and the colonial government's assertions: although the mines aided the Cypriot economy during the period

⁴² Georghalides, G.S., *Cyprus and the Governorship of Sir Ronald Storrs: The Causes of the 1931 Crisis*, (Nicosia: Cyprus Research Centre, 1985) p.120, Oakden, R., *Report on the Finances and Economic Resources of Cyprus*, (London: Crown Agents for the Colonies, 1935) p.21

1921-1938, the owners of the foreign mining companies must have been copiously rewarded for their investment.

The very low royalties given to the colonial authorities does not explain why the colonial government was so keen to aid the mining concerns. The taxation imposed was clearly limited and it is clear that the mining companies were successful in minimising their contribution to the government revenue. Figure 3 indicates that the cumulative amount of taxation collected by the Cypriot government was a very small percentage of the income generated, while the government was eager to provide assistance to the mining companies in every way possible.

Figure 3: Royalties received from the mining sector, 1924-1938.



Source: Appendix; Cyprus, *Statistical (Blue) Book* (1921–1938).

Yet despite this, government support was given at all times and from all levels. Fatal accidents in the mines were common, with Skouriotissa mine having a particularly serious fire in 1925⁴³. Under Cypriot law, mining fatalities initiated a government inquiry, which could force the company to pay compensation if the coroner deemed that the company was to blame. Yet from 1926 to 1938, there was not a single case where the company was found to

⁴³ Varnanva, P., General Secretary of the local Greek Labour Union of the CMC, *Μεταλλωρύχων Μνήμες* [Miner's Memories], DVD, (2007). The numbers of dead were unknown as the company failed to keep an accurate check on the employees working underground.

be at fault. In addition the government co-operated to such a degree that the police would imprison workers in cases of gross neglect of their duties in the mines⁴⁴. The British colonial government saw the foreign mining companies as natural allies against local intransigence: when the colonial office considered replacing the troublesome legislative council with a new body, the government considered placing an unelected official chosen by the mining companies to sit in the Cypriot assembly⁴⁵. When the Cyprus Asbestos Company asked for a modification of the companies' law in July 1931, the government took the unprecedented step of calling both the executive and legislative council up to the summer quarters on the Troodos mountains in order to pass the law during the summer recess⁴⁶.

Yet it seems the mines managed to keep the taxation payment for such support to a minimal level and extracted favourable treatment in most matters. Capital goods and some other goods considered essential to the industry were not subjected to any taxation or duties; the only taxation levied on mining companies were fixed, pre-agreed mining royalties. The royalty was paid at a variable rate on the amount of ore that was exported. Yet, as figure 3 shows, the royalties were on average just 1.5% of the total government revenue and royalties were suspended during the great depression, when the Cyprus government was in urgent need of revenue⁴⁷.

Mining: a positive move forward?

The mining concerns did absorb some surplus agricultural labour as suggested by Lewis, and it might have remained in part an enclave economy as Valerio suggests, but neither explain fully the benefits and costs of the mining concerns in Cyprus. The development of mining in the interwar period released the economy for macroeconomic constraints (growth, balance of payments) that were the problem of many economies in the interwar period. Mining was positive for Cyprus, even if the absorption of agricultural workers was incomplete and that an enclave economy still persisted.

⁴⁴ National Archives, London. File: CO69/42 "Annual Report of the Inspector of Mines 1931" p.5.

⁴⁵ Georghallides, *Cyprus and the Governorship...*(1985) p.167; the suggested changes were never attempted since the constitution was permanently suspended in 1931.

⁴⁶ Georghallides, *Cyprus and the Governorship...*(1985) p.637

⁴⁷ The royalties paid to the government fell faster than the drop in output in the period 1930–1935, since the government reduced some royalties and suspended those for asbestos and gypsum. Oakden, *Report on the Finances* (1935), p.22

Taking everything into consideration, the introduction of CMC and other mining corporations was a positive development for the Cypriot economy. At a period when agriculture was in great distress, mining provided substantial increases in GDP. As a result the island did experience a recovery after the great depression in terms of income. Although there was a great increase in employment, it is clear that employment did not rise as fast as output, hence having great increase in the labour productivity per worker. This increase in labour productivity, combined with the increase in more technologically advanced capital than what was seen in the island before, meant that the island's development prospects were fundamentally changed for the better. The ability to earn foreign currency eliminated the balance of payments constraints to the economy that the system of currency board had imposed, enabling the import of necessary products that Cyprus needed and removing the need for a reduction in the money supply. Cyprus was placed in a different growth trajectory with the development of copper mining during the interwar period. There is no doubt that the "growth miracle" that occurred after the Second World War was clearly based on the benefits provided by the the development of the copper mining industry: it created skilled workers, with technological knowhow and higher capital per person available to them, which was essential for an economy to "catch-up" to the developed world.

However such positive developments were not without their drawbacks. The colonial administration and the foreign mining companies had a very close relationship that was undoubtedly unhealthy. The revenues from mining in terms of direct government taxation were surprisingly low, while the rights of workers and their safety were sacrificed. In addition there was no attempt to extend further up the copper value chain, and hence completely transform the development of the island through the creation of an industrial copper and fertilizer industry. Finally the counterfactual exercise indicates that there was substantial revenue extraction away from the island in terms of profits. A more responsible government could have ensured that more of the revenue would remain on the island and hence ensure a higher multiplier of benefits of to the local economy. Yet despite such negative influence mining development in the interwar period set the basis for the transformation of Cyprus after the Second World War, and this would not be possible without the intervention of foreign companies such as the CMC.

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Table A: Total Volume of Produced Mining and Quarrying products, 1921-1938

Unit of Measurement		1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	
Tons	Cuprous Pyrite	11552	29198	61555	138822	173255	150363	208122	240060	291100	238488	199786	177630	209970	150195	207789	220367	388835	515303	
Tons	Asbestos	896	2285	1929	4372	3290	6331	10904	11579	13796	5400	3571	1600	4567	7590	7513	9506	11709	5578	
Tons	Gypsum	7114	11873	11029	14296	24123	19138	13789	11048	12219	9338	9777	8116	10644	7843	6010	4911	4637	3529	
Cubic Feet	Gypsum stone			222	0	0	1272	1361	378	337	949	2195	2706	2034	1228	8606	11430	8725	6046	
Tons	Terra Umbra	8204	4080	5102	4831	5969	5361	5566	5792	6587	4405	3097	2477	4168	4459	6126	4541	7498	4097	
Tons	Terra Verta			29	3	1	4	16	6	13	18	16	12	7	19	22	14	12	5	
Tons	Magnesite		881	280	220	0	82													
Tons	Chrome Iron / Chrome ore				2811	1989	516	700	0	829	0	3					5	481	7442	
Tons	Ochre				53	2	0	0	49											
Tons	Oxide of iron				5															
Tons	Shingle and Sand				884	786	719	754	605	571	557	808	829	447	829	430	374	440	369	
Tons	Manganese						82	16											19	
Tons	Copper precipitate							70	10	54	10						37170	64029	111547	146550
Tons	Quarrying and mining products unmanufactured not elsewhere specified													99		1	5			
Tons	Pumice stone														1286	2443	312	2	74	
Tons	Gold ore														311		1	0	54	
Tons	Yellow ore														3150	2034	763	3894	1151	
Tons	Metallic residues and waste														5	4	11	13	190	
CWT	Zinc ore and concentrates																		1809	

Source: Cyprus, *Blue Books*, 1921-1946; Cyprus, *Annual reports of the Mines Inspector of Service* (1926-1938)

Table B: Value added of Mining and Quarrying in Constant 1938 Cyprus Pounds.

Total: MINING AND QUARRYING	54315	76642	97366	186530	203972	216459	308242	335900	401457	260549	209932	169665	231024	244777	426937	554036	910591	1131233
Mining of other ferrous metal ores (Chrome, Cuprous Pyrite, Copper Precipitate and Residues, Manganese, Gold Ore, Yellow ore)	8192	20706	43652	103878	126707	107756	149242	170277	208247	169162	141683	125966	148900	128021	306505	415391	741541	1040323
Subtotal: Metal Ore Mining	8192	20706	43652	103878	126707	107756	149242	170277	208247	169162	141683	125966	148900	128021	306505	415391	741541	1040323
Quarrying of ornamental and building stone, limestone, gypsum, chalk and slate (Including Asbestos)	13677	31864	27423	56927	49251	81918	131735	137967	163910	66494	45990	22716	57782	91715	92042	113520	137922	66732
Operation of gravel and sand pits; mining of clays and kaolin	0	0	0	113	101	92	97	77	73	71	103	106	57	106	55	48	56	47
Extraction of salt	15788	15788	15788	15788	15788	15788	15788	15788	15788	15788	15788	15788	15788	15788	15788	15788	15788	15788
Other mining and quarrying n.e.c.	16658	8284	10503	9824	12125	10905	11381	11790	13439	9033	6368	5089	8498	9148	12548	9290	15284	8344
Subtotal: Quarrying and other mining	46122	55936	53714	82652	77265	108703	159000	165623	193210	91386	68249	43699	82125	116756	120433	138645	169050	90911

Source: Apostolides, A. "Economic Growth or Continuing Stagnation? Estimating the GDP of Cyprus and Malta, 1921-1938", London School of Economics Theses, September 2010, Appendix B.