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Copper in Chile – when the resource "curse" becomes a blessing

Abstract

The article aims at explaining how a small opened economy can effectively deal with a resource abundance problem. The thesis of the essay is a statement that Chile has been able to cope with the resource "curse" by developing proper institutions and diversifying the structure of its foreign trade. To verify the thesis, a literature review of theoretical recommendations how to utilize resource revenues without harming economy, as well as analyses of chosen macroeconomic variables were conducted. The possible solutions on how to deal with resource abundance problem are following: investing resource revenues outside of the economy, implementing fiscal rules that will stabilize budget revenues and prevent inflation from rising, and diversifying export in terms of product and geographical structure. Consequently, these solutions have been introduced in Chile, the world leading producer of copper, several years ago and proved to be very successful. Chile enjoys stable resource revenues despite the business cycle and performance of the copper market, while its real effective rate and export competitiveness has not been eroded. This paper presents, according to author's knowledge, the first detailed case study analysis of the country from Latin America, that has been successfully dealing with the resource abundance problem over several decades.

Key words: Dutch disease, resource abundance, resource revenues, Chile
JEL: E2, E3, E6, F4, G1, H6, O1

Introduction

Resource-richness is sometimes treated as a "blessing" for an economy. Advocates of this thesis argue that such a country has a competitive cost advantage. The commodities are simply extracted and sold, which may not require substantial outlays beyond infrastructure[1]. Funds from their sales can be utilized to boost the standard of living by providing financial resources to develop (or modernize) infrastructure or improving the access to public services (education, social security etc.). Moreover, resource revenues "are not subject to the conditions that donors and lenders often impose on recipient countries" [Daban, Helis, 2010, p. 8]. That is why information about (potentially) big resource deposits is usually welcomed with enormous enthusiasm (e.g. shelf gas discovery in Poland or oil in the United Kingdom).

Despite the described above advantages, a long-term dependency on natural resource exports may be the source of numerous problems for a resource-rich countries. Labor force reallocation (in favor of resource extracting sector), real exchange rate appreciation, and fluctuations in government revenues, to name the few. That is why resource-richness is often called "curse". It is worth stressing, that not all the countries that possess big deposits are deemed to have this problem, some of them cope with it successfully. Chile, the largest world copper producer, may perhaps be numbered among them.

This article has two aims. Firstly, to show in what ways resource-richness can adversely influence economy and what are the recommended solutions to such "curse". Secondly, to discuss the Chilean approach to this problem. The main thesis of this work is that Chile is dealing effectively with resource-richness problems by developing appropriate institutional framework and diversifying its export structure and main trade partners. In order to verify it literature studies and analyses of chosen macroeconomic variables were conducted.

The resource "curse"

Some elements of this notion have been mentioned in the introduction, but they need to be discussed in more detail. The most widely discussed concept in the literature associated with the resource "curse" is so called "Dutch disease". The term coined by "The Economist" [1977] describes several economic problems which appeared in the Netherlands in the 1960s after the discovery and exploitation of natural gas deposits.

The formal model describing the source and consequences of the disease was created by Corden and Near [1982]. They assumed a small open economy with three sectors: services and two traded goods sectors. The first traded goods sector is based on an extraction of natural resources, prices of which are rising quickly (booming sector). The second traded goods sector is manufacturing or agriculture (lagging sector).

When the country becomes dependent on exporting resources, whose prices are increasing, two effects are observed. Firstly, greater profits generated by the booming sector cause reallocation of labur force. Workers start leaving the lagging sector in favour of an extraction sector due to higher real wages offered in the latter ("resource movement effect"). As a result the manufacturing sector may lose its importance in contributing to economic growth, which Corden and Near [1982, pp. 830–831] call "direct de-industrialization". As more workers are employed in the sector, where salaries are relatively higher, their demand for services rises ("spending effect"). This leads to jobs creation in non-traded goods sector and further workers leave manufacturing sector. This process is called "indirect de-industrialization". It is enough to recall the example of Trinidad and Tobago's labor market to see the effects of the "curse". In 1977 the wage index was equal to 100. 20 years later the index for the oil sector workers amounted to 1048, and for assembly-type industries employees it was nearly three-fold lesser (398) [Sachs, Warner, 2001, p. 836].

Furthermore, greater demand for services increases their prices. However similar effect in the traded goods sector does not occur, as in case of a small open economy these are derived from international markets. It means that real exchange rates in such countries tend to appreciate, which additionally undermines the cost competitiveness of domestic manufacturing. The perfect example of the discussed mechanism is Equatorial Guinea, where cocoa and coffee production dropped from 60% of GDP to less than 9% within 11 years (1991–2001) due to expansion of the oil sector [Daban, Helis, 2010, p. 8]. Sachs and Warner [2001, p. 837] put it straightforwardly: "resource-abundant countries tended to be high-price economies and that, partly as a consequence, these countries tended to miss-out on export-led growth".

Critiques of that model may say that its assumptions cannot hold in the real world. Corden and Near [1982, p. 826] ignore monetary considerations (only relative prices) and international capital mobility. Furthermore, they assume that real wages are perfectly elastic, what means they are arbitraged across sectors and labor market is constantly in its equilibrium point (i.e., there is no unemployment). These three assumptions are strong[2]. Nevertheless, that model is frequently recalled in discussions on the problem, as it has a strong explanatory power by presenting the mechanism of an adverse impact of commodity prices boom on the economic performance of resource-rich countries in a relatively simple way.

Furthermore, deindustrialization unables developing countries, which are resource abundant, to follow a long term fast paced growth, as the faster growth in manufacturing sector gives observable greater productivity growth (Kaldor's Law). Also Rodrick [2011, p. 4] notes that manufacturing sectors are experiencing automatic-unconditional convergence and "industry is placed on an automatic upward trajectory. The trajectory is steeper the lower is the starting point".

Another dimension of the "Dutch disease" is instability of resource revenues. A commodity boom may encourage boosting government spending, whereas in periods of commodity bust politicians may find it difficult to cut excessive expenditures. Is such case they need to borrow funds against their future expected income. That was the case of Mexico between 1979 and 1981 [Daban, Helis, 2010, p. 9][3].

Moreover, several studies point out that resource richness can undermine two important sources of economic growth – human capital and savings. Some scholars [Atkinson, Hamilton, 2003, p. 1796] suggest that in resource abundant economies education sector can be insufficiently financed or even neglected as it does not contribute much to the main source of country's income – resource exploitation. That is why, without proper institutional solutions, the described problems can even lead to an actual decrease in GDP. Sachs and Warner [1997, p. 35] estimate that a 1% increase in primary exports share gives, *ceteris paribus*, a drop of GDP from 0,07% to 0,1%.

Furthermore, in case of countries rich in oil gas and other petroleum products, their prices, as locally-available necessities, are kept by politics artificially low on domestic markets. As a result they are excessively consumed. For instance, the annual oil barrels consumption per capita in Chile, the UK and the United Arab Emirates amounts to 6, 9 and 36 respectively [own calculations on the basis of CIA 2013a and CIA 2013 b]. That brings additionally a negative effect for natural environment, which is not included in GDP calculations, but effectively has a negative impact on the quality of life in such countries.

Moreover, Dutch disease hinders GDP growth by expanding the primary commodities sector (e.g. oil, gas) that do not involve high value-added processing, which could generate high-productivity employment [van der Ploeg, Poelhekke, 2008, p. 4]. Resource extraction involves low-productivity activities, which do not contribute much to the acceleration of GDP growth.

It is also worth noting, that the consequences of a development strategy based on resource extraction and exports may also have a political impact through emergence of privileged groups taking advantage of resource rents. This can pose a significant threat to economic growth as bureaucrats are afraid of losing significant source of income and political power, which can make them oppose any proposals to solve the problem set in the introduction. One of the best known papers in this field was written by Kruger [1974]. She estimates that the licenses granting system in Turkey in 1968 generated rents reaching 15% of GDP. Another dimension of politicians competing for rents in resource-rich countries is the corruption problem, which additionally undermines GDP growth [Leite, Weidmann, 1999, p. 30]. Such an uneven distribution of benefits from natural resources extraction can be a source of political instability (or even civil wars)[4] as different groups of interests are encouraged to take actions aimed at more equal participation in rents [e.g. Lujala, Gleditsch, Gilmore, 2005, and Ross, 2004].

How to cure the disease?

Before I discuss the solutions to the problem of resource richness provided by scholars, I need to stress that having big resource deposits does not automatically lead into the "Dutch disease". It is important to note that effective resource richness depend not only on available deposits, but also on the effect of non-remoteness of deposits on the effective cost of extraction.

First, there is no ideal solution to the problem. The literature is rich in recommendations to be taken into consideration while designing the economic policy in such countries. One way to deal with the problem is to invest resource income outside the economy. This may ease the resource movements and spending effects. Furthermore, a proper wage negotiating system may help to avoid inter-sectoral gap in salaries. A perfect example of a practical implementation of these recommendation is Norway with highly centralized wage negotiating system, which enabled to maintain the wage parity of manufacturing to extraction industries in favor of the first [Larsen, 2006, p. 636].They have also created an oil fund, which manages the revenues from oil export and is now one of the biggest investors in the world with assets under management worth GBP 450 billion [BBC, 2013]. The main aim of the fund is to amass savings to cover future pension expenditures.

World Bank [Canuto, Cavallari, 2012, p. 5] highlights the necessity of increasing transparency in resource revenues management beginning from scrutinizing the terms of contracts and ending on the use of the tax income. This should diminish the risk of an establishment of privileged groups, which are interested in the resource-rent management. Other economists stress that diversification of exports structure and production is an effective way of dealing with the problem [Gelb, 2010 or Kozeibayeva, 2008].

What is more, the International Monetary Fund pays attention to the absorption of the resource revenues without fuelling inflation. It recommends to implement fiscal rules "commonly anchored by some form of non-resource primary budget balance" [IMF, 2012, p. 26]. They should also be supplemented by some form of strengthening fiscal discipline introduced by additional fiscal responsibility laws, which may help to prevent exchange rate from appreciating [IMF, 2012, p. 42].

The role of institutions in managing resource rich economy has been explored by Atkinson and Hamilton [2003]. In a cross-section study they show that quality of institutions is a statistically important variable explaining the economic development of the country. The conclusion from their work is that resource abundant countries, with higher quality of institutions (e.g. lower corruption rates), tend to have greater savings (and investments) rates and, as a result, better economic performance. Further research conducted by Boschini et al. [2007, p. 614] revealed that the positive effect of "good" institutions on management of resource deposits may be increased. This multiplication

will depend on the resource type. The strongest positive (when institutions are well functioning) and negative (with "poor" institutions) effects will appear in case of precious metals and diamonds[5].

Chilean economy and copper

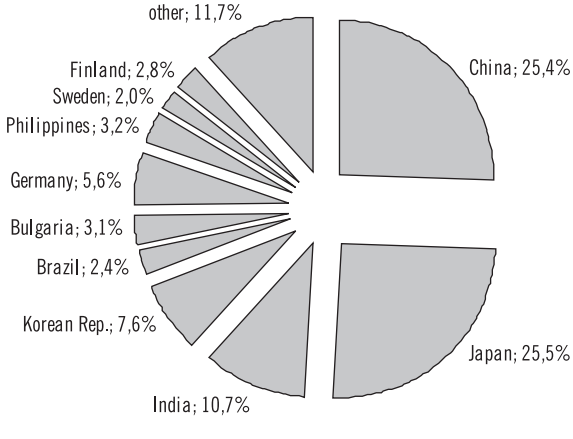
Chile is a resource rich country, as it has large copper deposits. It is also the leading copper producer having 35% share of world production (see Table 1). That is why it is worth to describe the ways in which the country deals with its potential "Dutch disease".

TABLE 1. **Top five copper mine producers, by countries, 2008**

Rank	Country	Mine production level (thousand tons)	Share of world production (%)
1.	Chile	5,328	35
2.	United States	1,335	9
3.	Peru	1,268	8
4.	China	951	6
5.	Australia	883	6

Source: [IISD, 2010, p. 10].

CHART 1. **Leading importers of copper, 2008**



Source: ICSG [2010, p. 32].

Before I do this I permit myself to briefly describe the specific features of the copper market. Firstly, it is worth adding that its supply side is relatively concentrated with the top 5 exporters having a 64% share in the global copper market [IISD, 2010, p.10]. Likewise, the demand side is also concentrated. The biggest four importers (chart 1) are Asian countries with a 70% share in the market[6].

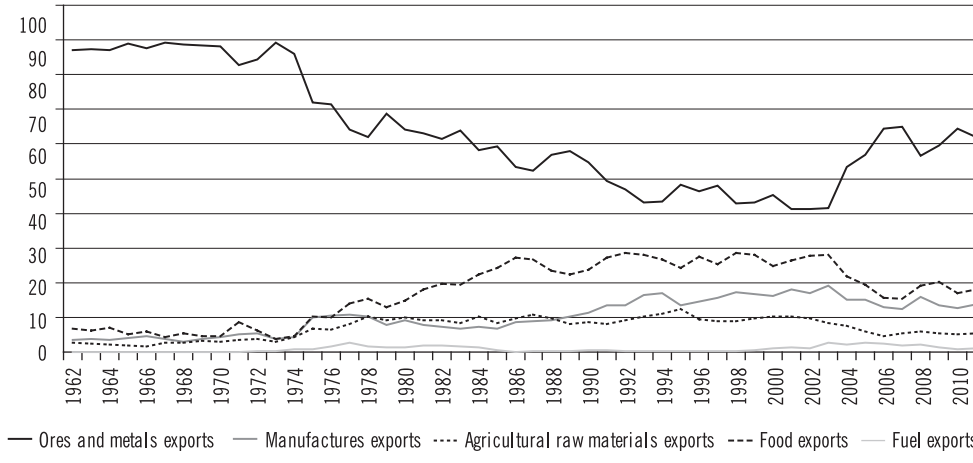
Secondly, China, one of the two leading importers, has been growing with an impressive two-digit pace for the last 2 decades (1991–2010) and its demand for natural resources has increased respectively. Furthermore, its further dynamic growth perspectives suggest its share may substantially increase within the next few decades. Thirdly, the copper market is a highly speculative one, which means that trading activity on the financial markets can substantially divert the price of the ore from its fundamentals. That has been the case for the last few years, when world economy faced a sharp slowdown (in many developed countries recessions occurred) and the price of copper has gone through the roof (an increase of 29,3% between January 2008 and December 2010 [Index Mundi, 2013])[7].

Export diversification

In order to comply with the recommendations presented in the previous section of the essay, Chile has strived to diversify its exports structure. This attempt is quite a successful one, as the share of the ores and metals export dropped from nearly 90% in the early 1960s to 60% in the late 2000s (chart 2). However, we shall note that this refers to value terms in volume or constant-price terms diversification has become even greater. The increase in the share of the ores and metals export in the Chilean merchandise export, observed in the late 2000s, is not driven by the expansion of the ores and metal sector in Chile. It is associated with a statistical effect as in that decade world prices for metals were rising very fast to historical heights. Despite the fact that the sold quantities (metric tons) of the metals could be constant or growing very slowly, their prices went through the roof (which is shown on chart 4 for the copper market), the nominal value of their export and its share in the Chilean merchandise export rose respectively. However, this did not mean that Chile changed its economic policy and decided to be more dependent on the copper export.

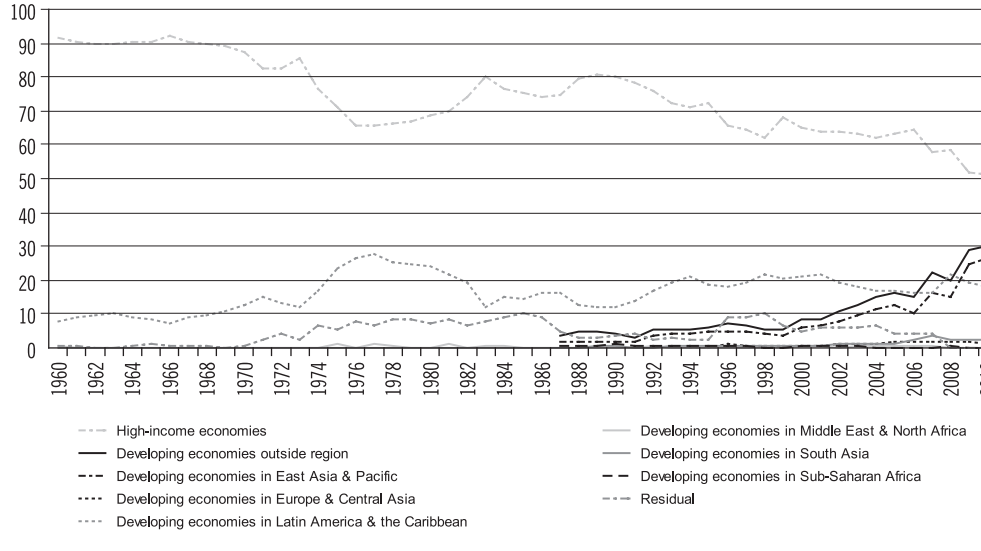
What is more, the Chilean exports have become more geographically diversified (chart 3). The share of the high-income countries has declined by 40 percentage points since 1960. However, this is basically associated with a dynamic expansion of Asian countries (especially China) and, to a lesser extent, other countries in Latin America and the Caribbean region. Nevertheless, this change makes Chilean exports more diversified and exposed to fast growing and opening economies, which is a positive thing in the current period of economic slowdown in high-income countries. This diversification

CHART 2. **Structure of the Chilean merchandise export revenues (% of total), 1962–2011**



S o u r c e: World Bank, [2013].

CHART 3. **Geographical structure of the Chilean merchandise exports (% of total), 1960–2010**



S o u r c e: World Bank, [2013].

encompassed not only new markets, but also greater number of non-copper product-categories being traded. Moreover, the market concentration of top ten non-copper

export markets dropped (Herfindal-Hirschman Index declined from over 0,1 to nearly 0,07) [Berthelon, 2011, pp. 13 and 18, Figure 3]. This proves Chile's success in the export diversification strategy.

Copper and the Chilean budget

As it has been mentioned earlier, boom in the ore price tends to lead to real exchange rate appreciation. As a result, inflation pressure drops and real wages rise. In the wake of a low inflation central bank cuts interest rates, which stimulates investments activity (particularly in construction and residential assets) and consumption. However, Chile faces relatively moderate fluctuations of economic activity induced by boom and bust cycle on the copper market due to a proper mechanism introduced in 1985 – the Copper Stabilization Fund [Spilimbergo, 1999, p. 29].

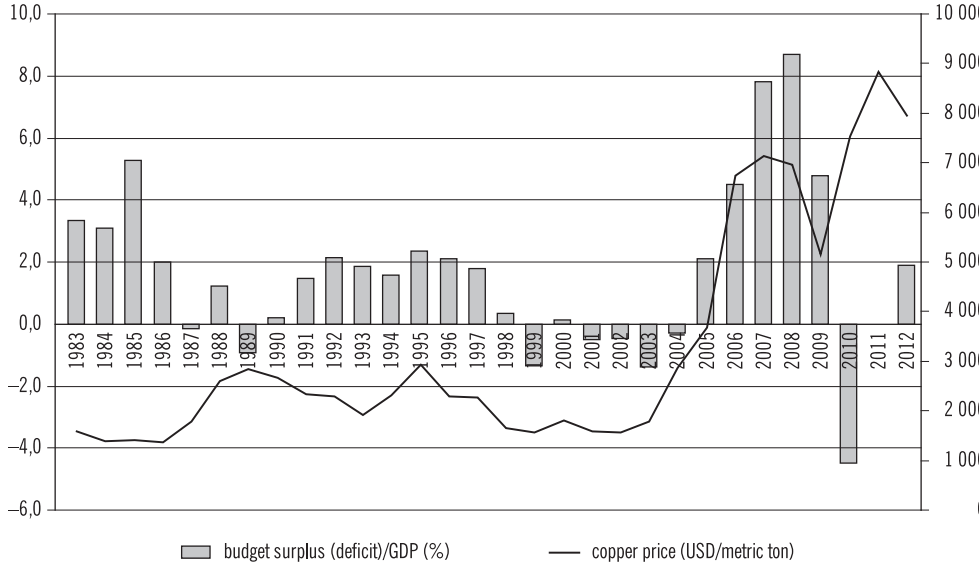
The fund was established in order to stabilize exchange rate and government revenues associated with the boom-bust copper price cycle[8]. When the current copper price was greater by USD 0,1 per pound than the estimated long term equilibrium price, the whole difference was deposited with the fund [Fasano, 2000, p. 7]. If this positive gap was between USD 0,04 and USD 0,1, only 50% of the difference was deposited, and in case of the gap being lesser then USD 0,04 there was no deposit. When the copper price drops below the long-term estimated equilibrium symmetric mechanism operates and the difference is transferred to the state budget.

The fund manages to successfully stabilize resource revenues. It was perfectly clear in 1989, when the copper price reached its 6-year-height, and the budget deficit appeared. Also in the early 1990s when price of copper was dropping, budget surpluses were generated. It is worth stressing that Chile managed to show budget surpluses for 20 out of 30 years included in chart 4, and even when it had deficits, they were relatively small, not exceeding 2% of GDP (not mentioning 2010).

Despite of described above successful attempts to cope with resource-richness problem in Chile, IMF suggests to create an independent Fiscal Council in the country. The main aim of the body would be the further reduction of the pro-cyclical impact of fluctuation of commodities prices by adjusting current resource revenues to the estimated long-term prices[9] and introducing more transparent calculation rules of the structural balance [IMF, 2011, p. 12]. Nevertheless, the overall assessment of the Chilean fiscal framework is positive, as the proposed changes are rather aimed at enhancing, not essentially changing it.

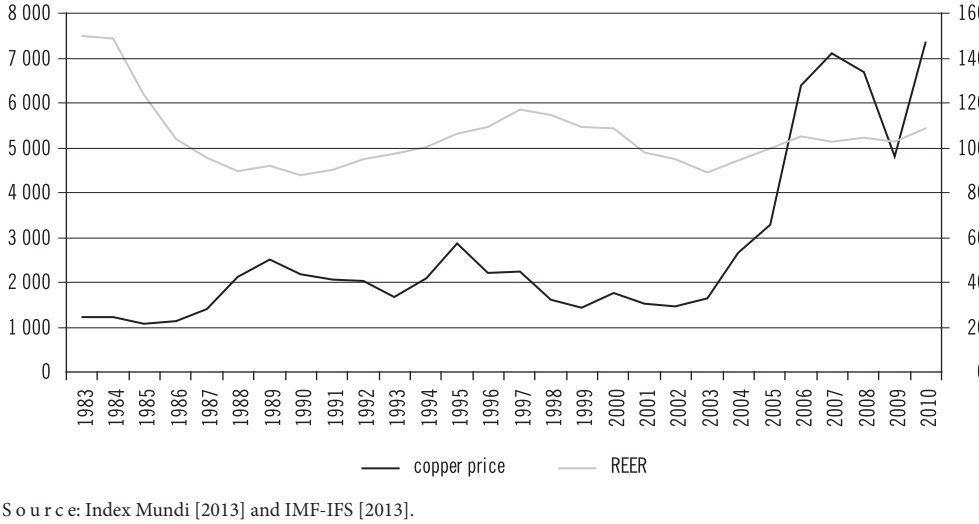
The Chilean mechanism of copper revenues management proved to be successful also in preventing the real effective exchange rate (REER) from appreciating. Copper price stayed fairly stable between the late 1980s and the early 2000s, as compared to the late 2000s, when it went through the roof (three-fold growth within a 5-year period).

CHART 4. Government budget surplus (deficit) to GDP (%) in Chile (left axis) and price of copper (USD/metric ton) (right axis), 1983–2012



S o u r c e: World Bank[2013] and Index Mundi[2013].

CHART 5. Chile's REER (right axis) and copper (real) price (USD/metric tonne) (left axis), 1983–2010



S o u r c e: Index Mundi [2013] and IMF-IFS [2013].

Surprisingly, the volatility of the REER has substantially declined in the 2000s, as compared to the 1980s and 1990s. What is more, since the mid-2000s the REER has actually remained unchanged. This clearly shows that copper price boom in the late 2000s, contrary to Corden and Near [1982] model conclusions, did not eroded Chile's export competitiveness, as the REER did not appreciate (chart 5). This is another evidence of Chile's success in dealing with resource riches problem.

We shall however remember that Chile learnt about dealing with resource abundance by paying the price of political difficulties (like the 1973 coup)[10], as well as massive economic fluctuations up to the mid 1970s. This proves that it takes time and painful experience to get to the proper institutions[11].

Conclusion

Resource abundance is often viewed as an "economic blessing". Yet despite revenues generated from exploration and exporting natural resources countries with such deposits are frequently underperforming economically. This phenomenon is also known as the "Dutch disease" – resource export tends to lead to exchange rate appreciation, which undermines the competiveness of the domestic manufacturing industry and leads to artificially inflated real wages. As a result, public finance sector is exposed to fluctuations of resources prices, which favors rent-seeking of politicians.

The proper institutional framework and revenue diversification strategy in Chile played a significant and, at the same time, positive role in fighting the "Dutch disease" symptoms. Firstly, copper revenues are transferred to the state's budget or saved and invested on financial markets depending on the current and expected long-term ore prices. This significantly diminishes public finance's exposure to the performance of copper market and enhances stability of resource revenues. Secondly, Chile has substantially changed the product structure of its export. The share of ores and metal exports declined by 30 percentage points between the early 1960s and 2010. Also the export partners structure has become far more diversified, which can be at least partly attributed to a shift in world economy towards greater importance of the East Asian countries (mainly China).

The discussed above actions enabled Chile to have a stable budget policy, which is proved by 20 years of budget surpluses in the period 1981–2010. What is more, even if deficits occur, they usually do not exceed 2% of the GDP, which is a remarkable result. Furthermore, the REER remains stable, and does not undermine the Chile's export competitiveness. We shall however remember, this success came with the price (e.g. the 1973 coup). Nevertheless, it shows that with proper institutions you can cope with the resource abundance problem in a very effective way.

Notes

[1] By definition, resource abundance is associated with low unit-cost of extraction. Once infrastructure is in place, unit-cost, which determines competitiveness, declines as production increases.

[2] Corden and Near created their model in 1982, when international capital flows were more restricted; today, capital mobility is much greater. Furthermore, there is no country with no unemployment, i.e. there is always a certain level of natural unemployment.

[3] More detailed discussion on the link between public debts and resource abundant countries can be found in [Manzano, Rigobon, 2001].

[4] The resource-fuelled conflicts took place, for instance, in Angola (1992–2002), the Niger Delta (1990s), the Democratic Republic of Congo (1998–2004), the Central African Republic (2002–2003), the Republic of Congo (1997–2000), the Republic of Cameroon (1990s) and the Republic of Chad (2005–2007). What is more, many interstate disputes had resource related sources, e.g. the Cameroon-Nigeria dispute over the Bakassi Peninsula, Equatorial Guinea-Gabon dispute over Corsico Bay [Halleson, 2009, pp. 49–69].

[5] This finding may however depend on a handful of cases: success in Botswana [Meijia, Castel, 2012] versus failure in Liberia [Economywatch, 2012].

[6] Nevertheless, we shall remember that major importers can become major exporters in recessions, because copper is a recoverable resource.

[7] This copper price boom cannot be explained by macroeconomic fundamentals as the accumulated growth of GDP for China, Japan, India and Korean Republic between 2008 and 2010 amounted to: 36%, -2,4%, 15,9% and 12,5% respectively [own calculations on the basis of World Bank, 2013]. If we calculate the weighted average accumulated GDP growth for this group (proportionate weights to their share in the world copper market as in the Chart 1) we will get 15.9%, which is in fact substantially lower than the copper price appreciation (29,3%) in this period.

[8] Similar, but much earlier, mechanism was introduced in Iceland for fishing revenues management [Gylfason, Weitzman, 2002].

[9] In case of a substantial change in the estimated future prices "the government should use partial adjustments mechanisms to smooth the convergence towards a new long-run equilibrium" [IMF, 2011, p. 13].

[10] 1973 coup was caused by significant economic and political problems. The economic reforms implemented by socialist governments in the late 1960s and early 1970s did not resolve problems of high inflation, inequality in income distribution, as well as stagnation of economic growth. Among the political problems we can enumerate pro-socialist policy of president Salvadore Allende and lack of political support for his reform proposals in the Chilean parliament. As a result of military coup (10/11 September 1973) Allende was killed and chief commander gen. Augusto Pinochet was appointed to be the president of Chile.

[11] Likewise, we may say that Norway learnt a lesson from the banking crisis (1988–1992) [see details in: Steigum, 2011].

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