Taking off from Natural Resources: fiscal dependency in comparative perspective[1]

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Work in progress – very preliminary

Abstract

Natural resources can have a powerful impact on the public budget. They can provide revenue from direct exploitation, taxes on business activity, and indirect taxation of exports and consumption. However, it is also argued that access to income from natural resources may hinder the development of other sources of revenue, thus limiting the development of fiscal capacity in resource-rich countries. Following this line of thought, the literature has produced some studies in Latin America and Africa. However, long-term analysis are still scarce, as well as an application to the historical case of current developed resource-rich economies, such as the Nordic countries. Here lies the contribution of this paper: we compare the trajectories of public finances in Scandinavia (Finland, Sweden and Norway) and the Andean region (Bolivia, Chile, and Peru), both characterised by noticeable natural resource dependence in the late 19th century. Firstly, we assess the evolution of natural-resource revenue and non-natural-resource revenues. Secondly, we seek to explain the evolution of natural resources dependence in the different countries under study through the identification of structural breaks and the use of historical narrative. Finally, since taxation is determined by multiple factors, we seek to identify the relative importance of economic, social, political and administrative factors in fiscal dependence and fiscal transitions.

JEL codes: H20, N40, O23, Q32
Keywords: taxation, fiscal dependency, natural resources

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1. Introduction

The last "super cycle price" has witnessed a great expansion of databases regarding taxation in natural resource abundant countries. Indeed, either in Africa (Laporte et al., 2017; Smith, 2012) or Latin America (ECLAC, OECD, & IDB, 2017), there is a growing interest in measuring government's ability to take advantage of the increase of international prices. This is related to the notion that prices increases may also expand the fiscal space which, in turn, may allow investing in physical and human capital, two key determinants of long term growth that are scarce in developing economies (Hujo & McClanahan, 2009; Karimu, Adu, Marbuah, Mensah, & Amuakwa-Mensah, 2017; Mosley, 2017). Therefore, the production of fiscal data may allow measuring the potential that developing resource rich economies have in order to put the seeds of a less resource-dependent economic development.

However, the increase of fiscal revenues derived from natural resource exploitation also poses some concerns. On the one hand, there is a well developed literature which identifies a negative correlation between the relative importance of natural resources revenues and the long-term impact/quality of government investment. Several mechanisms have been identified. Firstly, according to the "rentier state hypothesis" (Ross, 1999), a sharp increase in government's revenues thanks to natural resource revenues attract political pressure from interest groups and distort state's expenditures on their own benefit. Secondly, it has been suggested the existence of a voracity effect (Tornell & Lane, 1999). Thirdly, since natural resources revenues are obtained from very specific agents in very specific locations of the economy, it is argued that resources revenues do not generate a vibrant fiscal contract by which citizens are prone to evaluate government's expenses; this lack of accountability hinder the long-term impact of natural resources revenues (Moore, 2007) (Anthonsen, Löfgren, Nilsson, & Westerlund, 2012; Collier & Hoeffler, 2005).

On the other hand, it is proposed that an expansion of natural resources revenues increases public revenues in the short-term but it also reduces the state's incentives to increase its tax base. In this context, several works have proved the existence of a negative relationship between the increase of natural resources revenues and the rest of revenues. This exercise has been done for the period 1990s-2000s for Latin American countries (Ossowski & Gonzales, 2012), for African countries (Bornhorst, Gupta, & Thorton, 2009) and for mineral and oil rich economies (Crivelli & Gupta, 2014).

The present study wants to contribute to this literature in two different ways. On the one hand, it seeks to evaluate the relationship between natural resource revenues and non-natural resources revenues in the long-term (mid-19th century onwards) by looking at both developing economies (Bolivia, Chile and Peru)

and current developed economies (Finland, Norway and Sweden). The comparison between both groups of countries has been justified and proved fruitful elsewhere (Ducoing et al., 2018).[2] Given this previous work, we seek to evaluate if tax history contribute to explain the different development outcomes in both regions. Particularly, we are interested to test if Nordic countries had lower levels of dependence in natural resource revenues and a higher ability to develop alternative ways of raising revenue.

On the other hand, this work offers a new database on the evolution of natural resources revenues in resource rich countries. We have assembled a dataset of natural resources revenue for the period 1850-2015, with homogeneous definitions, which allows to establish the levels of fiscal dependency over time and to identify when the main tax transitions took place. Moreover, we offer a detailed database organized in different categories. This is critical given the diversity of tools that governments have to tax natural resource exploitation and the different economic and political effects that these instruments can have (Gómez Sabaini, Jiménez, & Morán, 2015). As it has been recently proved, we believe that the availability of new taxation databases may help us re-think previously uncontested relationships (Prichard, 2016).

The rest of the paper is organized as follows. Section two describes the data and methods used. In section 3, we offer some stylised facts on taxation in Andean and Nordic countries. Section 4 offers some preliminary results of our research.

2. Data and methods

The general classification of government's revenues has been reconstructed following the IMF *Government Statistics* guidelines. Natural resources revenues have been obtained following (S. S. Haber & Menaldo, 2011) and these have been obtained as the sum of all those taxes and royalties paid by either privately-owned or state-owned *mining*, *hydrocarbon* and *forest* firms, as well as dividend payments or direct transfers paid to the government by state-owned

[2] Our point of departure is related with the similarities in natural resource endowments that these economies had at the onset of modern economic growth. For instance, development of Sweden cannot be understood without the role of iron ore and the progress of Finland is intrinsically linked to its forest resources. One of the advanced hypotheses in that work stressed the effects of public sector intervention, or the lack of: while state investment in infrastructure and education has been identified as a driver of growth in Scandinavia (Schön, 2010), this is debated for Latin America (Palma, 2000; Ranestad, 2017).

firms. Specifically, natural resources revenues are composed by: a) income from direct exploitation, b) royalties, c) corporate taxes, and d) export taxes.[3]

We have used both primary sources and published works. Data for Bolivia comes from (Peres-Cajías, 2014, 2015), for Chile from (S. Haber & Menaldo, 2011; Wagner, Jofré, & Lüders, 2000), for Peru from (Portocarrero S., Beltrán B., & Romero P., 1992). The Norwegian database has been constructed from Statistical yearbooks and from Norsk Petroleum for the oil revenues from 1971-2016 (www.norskpetroleum.no). Data for Sweden is from the database of the Research Institute of Industrial Economics (IFN; (Henrekson & Stenkula, 2015), but has been complemented with other series from Gårestad (1985) and statistical yearbooks. Data from Finland is yet to be completed; in the current version it is taken from (Flora, Kraus, & Pfenning, 1987) with GDP from (Hjerppe & (Kopi-jyvä), 1996), OECD Statistics since 1965, and Juanto (2003) for the share of taxes on external trade.

In order to identify the main changes in fiscal dependence, we depart from the statistical test developed by Vogelsang (1997), which allows finding one structural break in a data series. This method is valuable because it eliminates the need to choose beforehand a year/observation by which to divide the series when using the Chow test. However, in a longer time span, such as the proposed in this article, there is a strong possibility to find more than one break. The research by (Bai & Perron, 1998) and its practical application in economic history by Ben-David & Papell (2000) gave us the tools to estimate more than one break in an endogenous way.

3. Some stylized facts

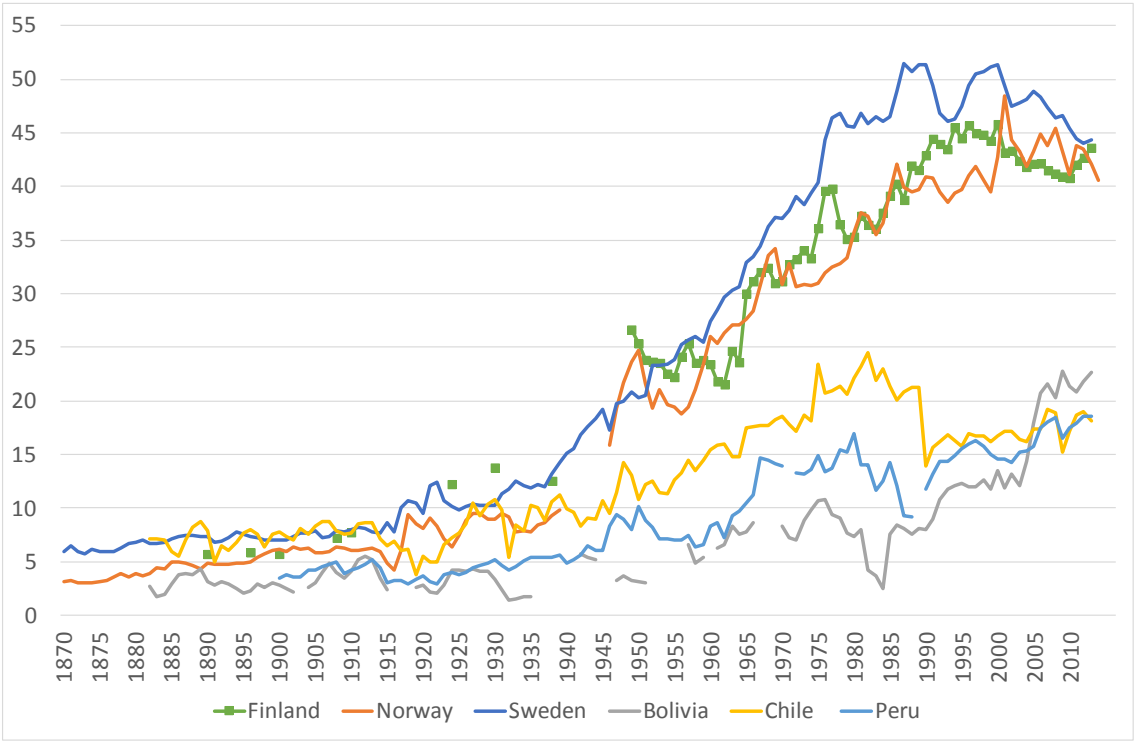
Before presenting the relevance of natural resources revenues, it is important to bear in mind some basic stylized facts concerning the fiscal history of our countries under scrutiny. This is done through a comparison of tax revenue levels and tax structures. The former informs about the government's size and its potential to affect the economy through tax instruments. The latter helps understanding the economic base as well as the implicit fiscal contract which supported the expansion of taxes. In this context, as the tax literature suggests, it is crucial to identify the timing of two critical tax transitions: the decrease in the share of taxes on international trade and the increase in the share of direct taxation.

[3] Notice that not all of these components are found in all countries throughout the period (for example, Sweden abolished its export taxes in the last third of the 19th century, and they were never important sources of revenue; see Gårestad, 1985).

3.1. Tax levels

To begin with, we measure the relative importance of total taxes on GDP. Certainly, this measure does not shown total government's revenues given that non-taxes revenues are not considered. However, it shows the government's ability to extract resources from the economy through a bargaining process with society. Figure 1 shows that the lowest tax ratio (less than 5% of GDP) was in Bolivia and Peru since the late nineteenth century. In the case of Chile, it presented similar levels to those of Nordic countries (around 10% of GDP, which was the regular figure for developed economies at the time) until the First World War. A clear divergence between both groups of countries took off during the 1930s, when the ratio started to increase persistently in Nordic countries and a clear tax/GDP gap emerged. This gap has somehow stabilized since the 1990s, when the tax/GDP ratio is, on average, around 20% in Andean countries and 45% in Nordic countries. This stresses a clear divergent government's ability to tax societies.

Fig. 1: Tax revenue as a percentage of GDP, 1870-2010

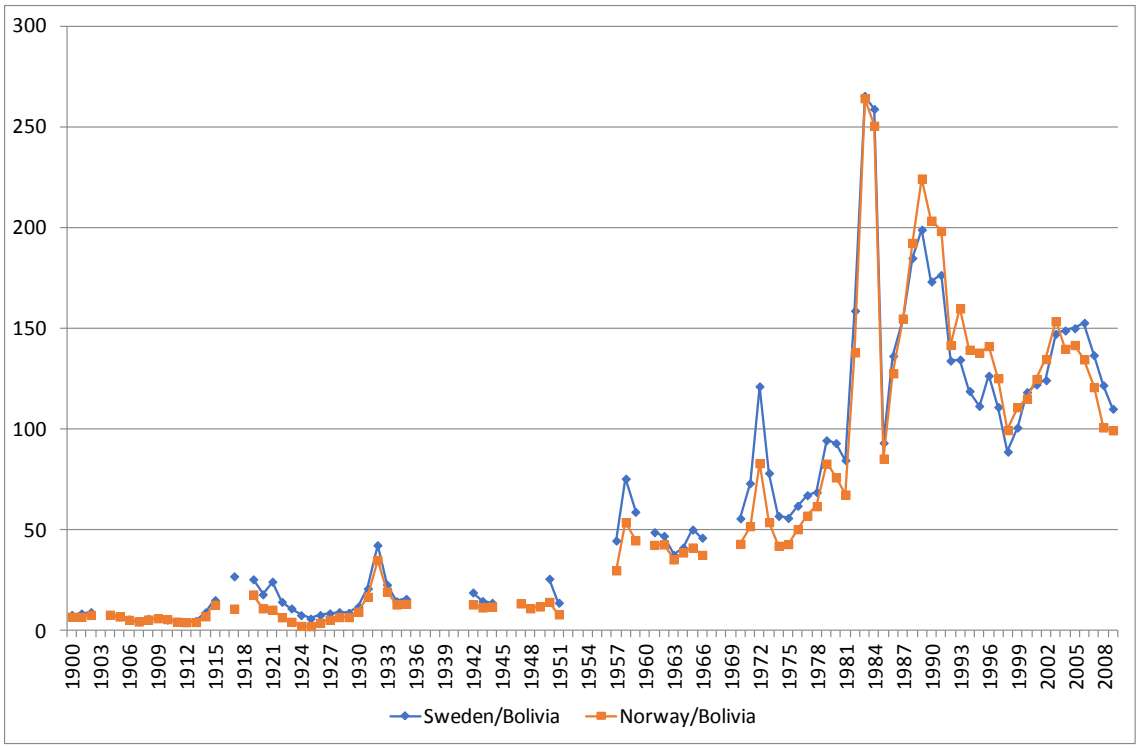


Sources: See text.

Differences are even more acute when we analyze taxes in per capita and current dollars. We offer this comparison in Figure 2 which shows the ratio between taxes in per capita and US$ terms in Norway and Sweden to the Bolivian figure from 1900 to

2009. At the beginning of the 20th century, the difference between taxes per capita in Nordic countries and Bolivia was 7:1; this increased to 10:1 in 1950, to 50:1 in the early 1960s and is around 100:1 today.

Fig. 2: Tax revenue per capita (US$), 1900-2010



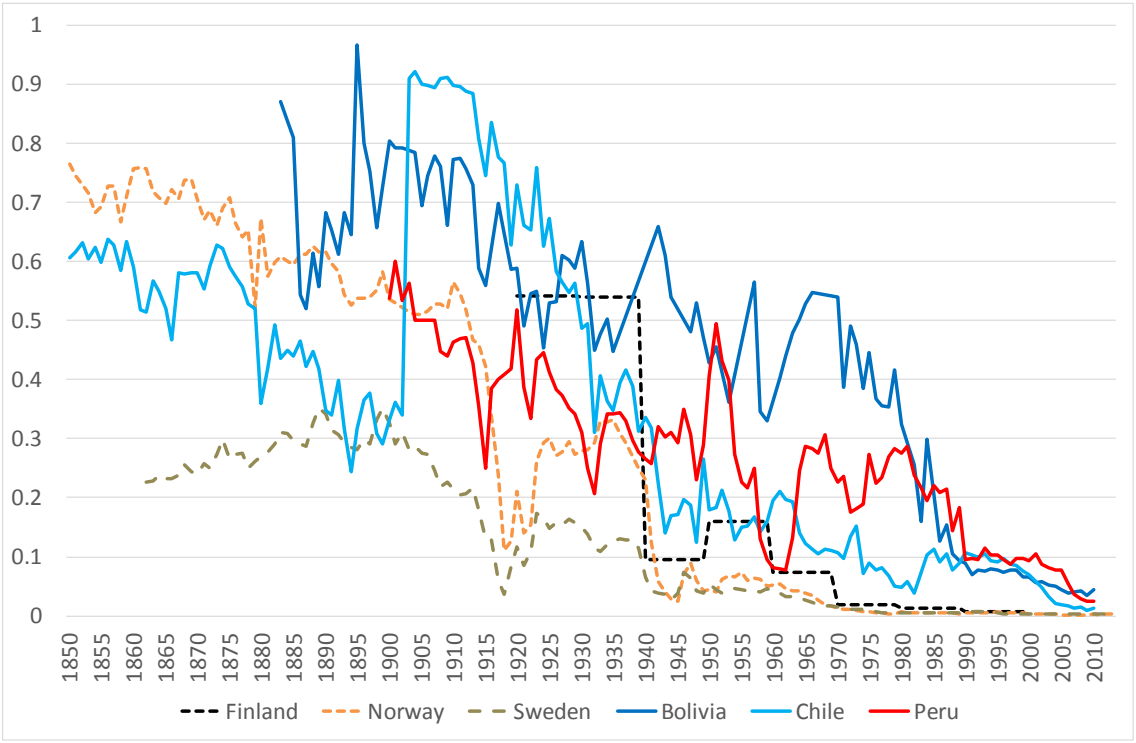
Sources: See text.

3.2. Tax transitions

Figure 3 depicts the share of taxes on international trade in total current revenue. The general trend, as indicated by the theory on tax development, is decreasing over time. The highest levels are found in the early 20th century near 80%, while in the early 21st century all countries obtained less than 10% of their public incomes from these taxes. However, some differences between countries can also be highlighted. The series for Sweden and Norway do not attain the high levels reached in all the others at some point, over 50%. In Sweden the share of customs in tax revenue increased in the late 19th century, as a result of increasing international trade in presence of protectionist arrangements (Gårestad, 1985), but it never surpassed 40% and dropped subsequently quite early to under 20%. In Norway, these taxes were slightly more important at the turn of the century, with around 40%. They then decreased intensely with the First World War and display a similar evolution since. Finland and the three Andean countries have shares around or over 50%

in the early 20th century, and experience a much slower and irregular retreat during the following decades. While Chile and Finland dropped under 20% by 1940, the dismantling of tariffs took place in the 1980s in Bolivia and Peru.

Figure 3: Indirect external taxes as a share of total current revenue



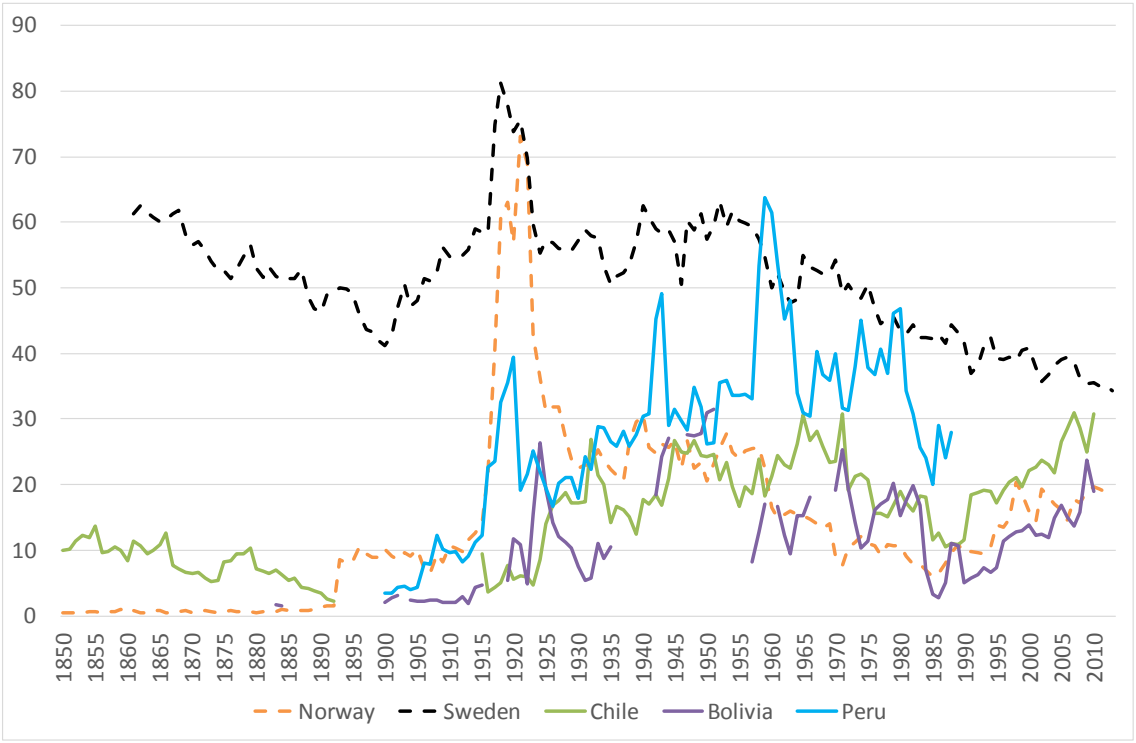
Sources: see appendix.

The next tax transition we discuss is the emergence and growth of direct taxation. Figure 4 depicts direct taxes as a percentage of total current revenue. As can be seen, these were much higher in Scandinavia (Sweden and Norway) already at the beginning of our period. Their share decreased slightly in Sweden over the last decades of the 19th century (when customs revenues were growing).[4] The great expansion starts after 1890 and has to do with the introduction of the first forms of modern income taxation. In Sweden, this is particularly intense after the reform of 1910 (Rodriguez, 1980). The First World War brought maximum levels, something that the literature has related to increasing marginal rates in the presence of a military threat and changes in social solidarity (Scheve & Stasavage, 2016), and also recently to the effects of inflation in expanding the tax due to growth in nominal incomes (Sabaté and Torregrosa, 2018). After the war period, the share of direct taxation has been

[4] When evaluating these trends, the reader should keep in mind that 19th-century direct taxes were not necessarily progressive, and most likely not (often capitation taxes, or rigid with respect to income growth).

falling in Sweden and Norway. At this time, they were being progressively substituted by internal general consumption taxes (VAT), and also by social contributions.

Figure 4: Direct taxes as a percentage of total current revenue



Sources: see appendix.

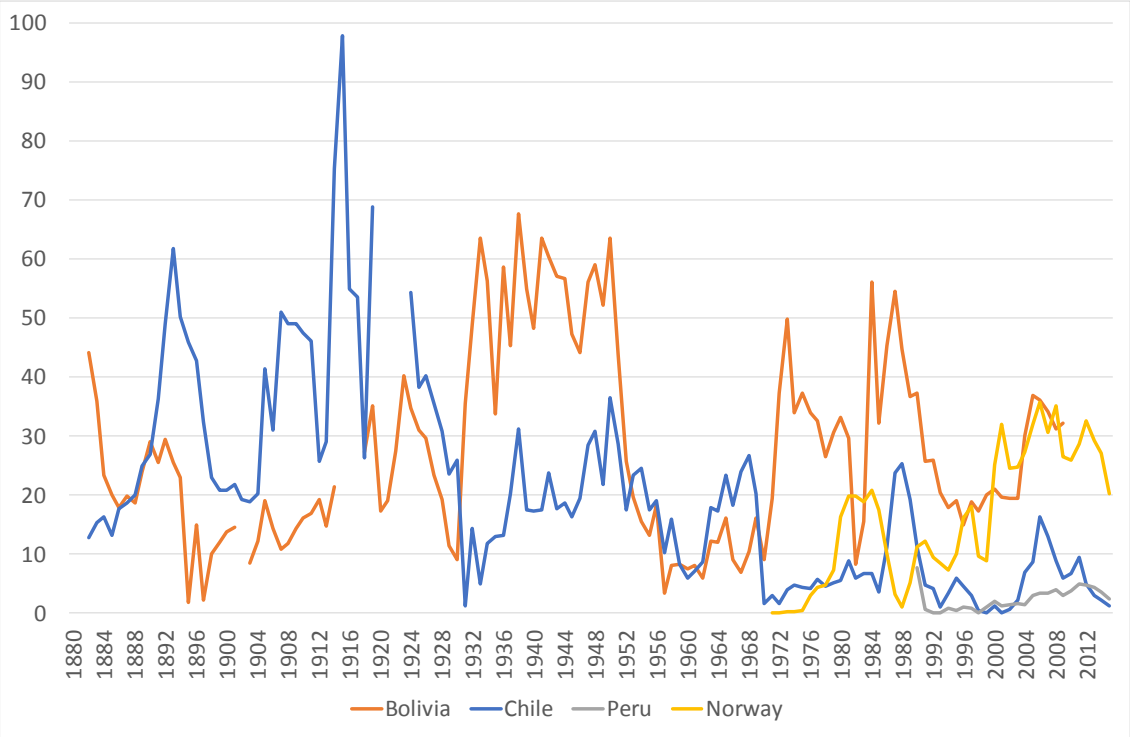
In Andean countries this transition took place later, and starting from very low levels. Maximum shares of direct taxation were found in Peru in the late 1950s to late 1970s (around 40%), and in Chile and Bolivia in 1950-1970 (some peaks at near 30%). The levels subsequently decreased, but then started growing again since the early 1990s. Anyway, it must be noticed that, in contrast to Nordic countries, direct taxation in Andean countries comes mostly exclusively from corporate taxes.

4. Natural resource dependence

The following section shows preliminary results on the fiscal dependence from natural resources revenues, and performs a structural break analysis on the series that are complete (Bolivia and Chile). Figure 5 shows the estimated levels of fiscal dependence on natural resources. The long series for Bolivia and Chile allow an approximation to fiscal dependence in the long run – to be complemented with the other countries in future versions of the paper. In both cases the trends are highly irregular. In Chile, the highest rates are found in the

early 20th century due to the extreme dependency on saltpeter exports. In Bolivia, a dependency of over 60% is found in the period 1930 to 1950, and then again near 40-50% in 1970-1990. Today, Norwegian fiscal dependence from oil lies at 20-30%, a level very similar to the one in the Bolivian public sector. However, it is clear that the economic and political implications of this coincidence are not necessarily similar given the tax increase and transitions described in the previous section.

Figure 5: Fiscal dependency: resource revenue as a percentage of total current revenue

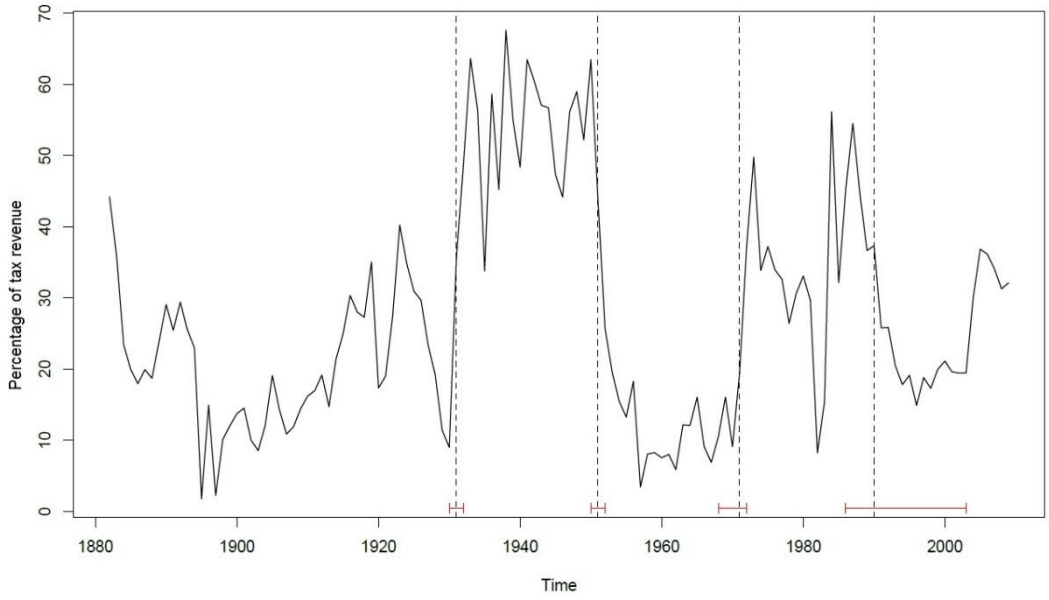


Sources: see appendix.

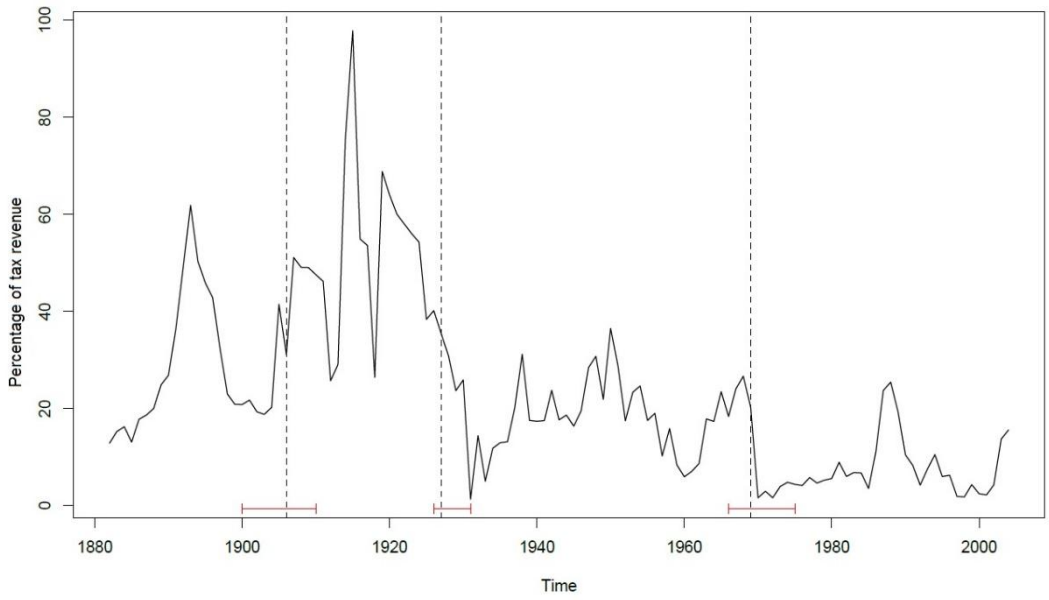
Currently, we have two series with comparable data and in the long run, for Bolivia and Chile. In the first case, the fiscal dependency of Bolivia presents four breaks: 1931, 1951, 1971 and 1990. These breakpoints can be seen in Figure 6. In the second case, Chile has three breakpoints, in the years 1906, 1927 and 1969. In the case of Chile, the year 1906 represents a noticeable increase in its fiscal dependency, from an average of 25% in the period 1880 – 1900 to more than 40% in the period 1906 – 1927. Surprisingly, the decreasing break of the series is in 1927 instead of 1929 or 1930. The year 1969 is the last break; this points towards the change of the Chilean economy to a more diversified exploitation and also wider tax revenue bases.

Figure 4: Structural breaks in fiscal dependency from natural resources

a) Bolivia



b) Chile



Sources: authors' calculations.

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Appendices

A1. Structural breaks in fiscal dependency on natural resources

Bolivia

Optimal (m+1)-segment partition:

Call:
breakpoints.formula(formula = ts ~ 1)

Breakpoints at observation number:

m = 1 33
m = 2 50 70
m = 3 50 70 90
m = 4 50 70 90 109
m = 5 31 50 70 90 109

Corresponding to breakdates:

m = 1 1914
m = 2 1931 1951
m = 3 1931 1951 1971
m = 4 1931 1951 1971 1990
m = 5 1912 1931 1951 1971 1990

Fit:

m	0	1	2	3	4	5
RSS	32196.7	28347.7	15028.6	10956.5	9743.4	9130.2
BIC	1080.5	1073.9	1002.4	971.6	966.3	967.7

Chile

Optimal (m+1)-segment partition:

Call:
breakpoints.formula(formula = ts ~ 1)

Breakpoints at observation number:

m = 1 47
m = 2 25 46
m = 3 25 46 88

m = 4 25 45 70 88
m = 5 25 45 69 87 105

Corresponding to breakdates:

m = 1 1928
m = 2 1906 1927
m = 3 1906 1927 1969
m = 4 1906 1926 1951 1969
m = 5 1906 1926 1950 1968 1986

Fit:

m	0	1	2	3	4	5
RSS	40729.0	22267.4	16254.3	13716.4	13564.8	13687.2
BIC	1072.4	1007.7	978.7	967.4	975.7	986.4