"Land-abundance, frontier expansion and the hypothesis of appropriability revisited from an historical perspective"

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Abstract

Settler economies –we select Argentina, Australia, Canada, Chile, New Zealand and Uruguay– are characterized for the abundance of natural resources. However, the natural capital is not homogeneous and it induces differences in terms of economic performance. The paper discusses the effect of natural resources on economic growth and income distribution in the tradition of the *curse* (and *blessing*) of the natural resources hypothesis, from the mid-19th century to WWI. We consider the interaction between natural resources that a country posses, the type of land according to the agrarian aptitude and the quality of its institutions in terms of the concept of appropriability of a resource. We propose two approaches. One of them is based on the estimation of the statistical relationship between economic performance, natural resources and institutions. The other one is based on the historical description of the distribution of land rights and the institutional arrangements related to the land property in the River Plate and Australasia. According to our analysis, we find evidence to not reject the appropriability hypothesis of the curse of the abundant natural resources on the agrarian expansion per worker and the income distribution in technical terms, although we reject it as we consider the agrarian income level (per worker). On the contrary, we do not find evidence in favour of the institutional dimension of the appropriability hypothesis. The second approach proposes to give historical context to our previous analysis and to precise our arguments. We consider the institutional arrangements related with the land property, and they seemed suitable for obtaining high levels of income but inadequate to promote more egalitarian societies. The evolution was more apparent in the Hispanic ex-colonies that those conformed in the Anglo-Saxon tradition, where "good" institutions moderate the *curse* of the (more appropriable) natural resources.

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Introduction

In recent debates in Development Theory, the study of the adverse effects of the abundance of natural resources on economic growth constitutes a main issue. Inspired by the work of Sachs & Warner (1995), new literature has emerged that focuses on the so-called "resource *curse* hypothesis", a puzzling paradox suggesting that resource-rich countries tend to grow more slowly than resource-poor ones.

However during a long period there has been a consensus among economists to identify natural resource endowments with economic strength. Natural resources (essentially coal and iron) played a central role in the emergence of the so-called "modern economic growth" since the 18th century, with Great Britain as the leader and several areas of Europe (Belgium, Germany, France) and America (US) as followers. Besides, in the 19th century wide areas of the planet were incorporated to the expansion of the world capitalism and participated actively in the international trade showing that not only mineral resources might be relevant to economic growth (not only mineral resources were a *blessing*). Second Industrial Revolution induced deep consequences in extensive regions of the world periphery (many areas of South America, Australasia and the north and the south of Africa) combining determinant technological changes (railway, refrigeration, reduction in the cost of inter-oceanic transport) with temperate climate and fertile soils especially suitable to the production of diverse commodities (meat, wheat, wool). The abundance of natural resources was understood as a blessing characterized by the possibility of some countries to participate in international trade with resources almost unexploited and that met a strong and dynamic external demand (basically from European countries).

Therefore, instead of considering the curse as a general pattern, it seems subject to the influence of supply and demand conditions, the technological advance and the institutional structure of the economies. In other words, it constitutes a process with a strong historical specificity. Settler economies, characterized as abundant-natural resources regions, represent an interesting "natural experiment" in this sense. We select six economies –Argentina, Australia, Canada, Chile, New Zealand and Uruguay[1] (the "settler club")– and evaluate a period of strong economic expansion –the First Globalization (1870-1913)– based on a dynamic participation in international trade and characterized by increasing income inequality.

One of the main analytical branches of the curse of the natural resources hypothesis is associated with the role of institutions on the economic relationships. In this sense, we use the appropriability hypothesis to consider the idea that different types of natural resources interact with the institutional quality to render dissimilar economic results. The literature usually refers to the curse (or the

[1] See a discussion about the representativeness of the selected countries in Willebald (2006).

blessing) considering the evolution of GDP per capita. However, we want to go beyond this (restricted) concept to consider an idea closer to development in a broader definition that incorporates the notions of growth and inequality in a sector approach. Then we evaluate the curse in terms of productive expansion and income distribution, considering the economic activity more intensive in the use of the main natural resource of settler economies –land– in the dynamics in the participation in the commodity international markets. The statement is important because, in a couple of previous articles, we identify an additional stylized fact within our club. While the intensity of the First Globalization and its consequences for settler economies followed a common pattern, the countries reacted in different ways, and this probably determined their economic performance in the subsequent decades. These economies based their production on primary activities but in spite of this, around the time of WWI, they achieved levels of development close to the "core". However, income per capita was higher and inequality was worsening less in ex-British possessions (Australia, New Zealand, Canada) than in the South American Southern Cone (Argentina, Chile and Uruguay), and in the former group economic specialization was relatively less concentrated on primary activities (Willebald & Bértola, 2011). In terms of the curse/blessing of natural resources, the ex-British colonies were more blessed and less damned by their abundance of natural resources than the other ex-colonies (Willebald, 2009).

According to the more extended literature, settler economies would have similar natural resources. However, it is important to consider the idea of "quality" to identify diverse "types" of natural resources. In this paper, we introduce the consideration of different types of land –according to the agrarian aptitude– to incorporate a gradient of appropriability possibilities that move from land of high quality (with higher chances to create differential rentals) to low quality. Our conclusion is that the productive application of the abundance of natural resources (as initial endowments) was, in dynamics terms, as a blessing for settler economies, but they suffered the curse of increasing inequality. Dissimilar intensity within the club of both simultaneous processes was explained by differences in the productive application by type of land. Economies that moved their frontiers by high agrarian aptitude lands welcomed the blessing of an expressive agrarian expansion, but they received the curse of concentrating agrarian rents in small and privileged classes.

However, natural resources did not perform alone but they interacted with diverse institutional arrangements as different kinds of governmental actions and, specifically, with the establishment of the ownership land rights. Institutional quality is approximated in terms of the constraints on the executive and the enforcement of property rights (that we call the "macro level"; the more used concept in the literature) and the configuration of the land ownership system (considering the

agents' behaviour, in a sense closer to the "micro level"). Methodologically, we propose two approaches. One of them is based on the estimation of the statistical relationship between economic development, natural resources and institutions. For this analysis we use panel data estimation and include the interaction between the two latter variables, studying six economies and considering data for each decade from 1860 to 1913. These exercises are not conclusive but help to identify interesting insights to advance on our issue. The other approach is based on the historical description of distribution of land rights –from the beginning of the 19th century to First War World (WWI)– and the institutional arrangements related to land property in the River Plate (Argentina and Uruguay) and Australasia (Australia and New Zealand). Our discussion is focalized on the role of national authorities (state) and the definition and enforcement of land rights, and attempt to identify two "models" –the "British" and the "Hispanic" models– that determine different distributive patterns (considering land and income related with the activity).

Firstly, we review the concept of the curse of natural resources and present the appropriability hypothesis (Section 1). Afterwards, considering our first approach, we present our analytical model (Section 2) and the statistical results (Section 3). According to the main shortcomings of the analysis, we propose our second approach and consider the notion of appropriability to guide the depiction of the historical formation of the land ownership system (Section 4). The latter analysis allows identifying two models of distribution and creation of institutional arrangements related with land property, which generate different distributive patterns of assets (land) and incomes (within the agrarian sector). We evaluate their main similarities and differences in terms of the appropriability hypothesis. Finally, we conclude and propose some final remarks (Section 5).

1. Institutional quality and the appropriability hypothesis

Since the end of the 20th century economic development is no longer considered to be only dependent on accumulation of physical and human capital. Scholars now point that there is a third form of "capital" or "economic asset" relevant to the performance of the economic system. This distinctive type of capital is the natural and environmental resource endowment available to an economy and commonly referred to as "natural capital". Despite the importance of natural capital for a sustainable economic development, increasing economic dependence on natural resources exploitation appears as an obstacle to the growth and development in the majority of low and middle-income economies in the world (Barbier, 2005). A wide literature shows a negative relationship between economic growth per capita (in general, from the 1960s to the end of the 20th century) and some measures of natural capital considered as the "curse" of the natural resources (Auty, 2001a; Gylfason, 2006, 2007; Sachs & Warner, 1995, 1999a,b, 2001).

Why the abundance of natural resources often appears related to deficient economic performance? Is the abundance of natural resources a curse to economic growth? Is the curse a general pattern or depend on technological and institutional factors? Can the blessing of certain historical circumstances moves to a curse?

Literature about this issue is very extensive, varied and with mixed results. Nowadays, before to think about the curse, scholars prefer proposing the relationship as a conditional articulation and considering that the curse is not an inevitable result. In a previous paper (Willebald, 2010a), we propose a classification of the different analytical perspectives to characterize the debate. Four interpretations were identified: the abundance of natural resources as a blessing; the abundance of natural resources as a curse –with two approaches, the "productive structure approach" and the "crowding out approach"–; and finally the "factor endowment and the institutional change hypothesis". We work with the third and fourth approaches to discuss the incidence of weak institutions on the economic development in terms of the appropriability hypothesis but, according to our study object, we will pay attention on the first explanation as well.

1.1. The curse of the natural resources abundance: the institutional explanation

Large natural resource rents, especially in combination with property rights wrongly defined, imperfect markets and permissive legal structures may guide to uncontrolled rent seeking behaviour among the producers. These actions divert resources away from economic activities more fruitful in social terms and affect the economic growth. Economic and political power concentration may be explained by bulky rental incomes in hands of the elites that, once in power, use these resources to act in their favour and secure their permanence. Persistence of high levels of inequality, poor democracies and political instability are the usual results. Besides, abundant natural resources may induce a false sense of security for people and governments and miss the opportunity to construct good economic management and institutional quality. Governments are tempted to spoil markets by granting enterprises, privileging the access to common-property natural resources, offering tariff protection or other prerogatives to producers, creating competition among the rent seekers to obtain such favouritisms. Extensive rent seeking may generate corruption in private and public sectors, distort the resource allocation, weaken the investment, increase the public spending and reduce the economic efficiency as well as social equity. Abundant natural capital may crowd out social capital through corruption, inequality and the absence of political liberties, all factors that hinder economic growth and lead to the persistence of poorness (extensive literature review in Willebald, 2010a).

Auty (2001b) indicates that different kinds of endowments of natural resources may present different effects on economic performance. It is interesting to distinguish between "point resources" (activities with intensive use of capital as mineral and energy resources,) and "diffuse resources"

(activities with a less concentrate development as cropland and livestock). “Point resources” generate larger opportunities for rent-seeking and corruption and the consequences on economic growth are more adverse. In a similar sense, Isham, et al. (2005) state that export concentration in point resources is strongly associated with weak public institutions which are, in turn, robustly related with slower economic growth. Woolcock, et al. (2001) show that natural resources-rich economies and different types of resources place diverse kinds of pressures on community structures, institutional capacity and state-society relations. With natural resources more easily captured and controlled by a narrow elite being most likely undermine economic growth. Bulte et al. (2005) propose similar exercises but evaluating the curse in terms of several indicators of human welfare. They show that resource-intensive countries tend to suffer lower levels of human development. This implies that the resource curse is a phenomenon that occurs at a broader scale than just economic growth, and countries that rely on “point resources” tend to perform worse.

This institutional explanation of the curse has focused on the intrinsic characteristics of the natural resources (the incidence of the abundance differs according to the type of natural resource) but, additionally, other related issue has arisen. Scholars are concern of the quality of the institutions according to their capacity to open appropriability possibilities of incomes generated by natural capital.

1.2. The appropriability hypothesis

Institutional explanations offer interesting predictions about why different resource-rich economies may be affected distinctly by their natural wealth. In general terms, countries with extensive plantation crops (sugar, bananas) or very valuable minerals (oil, diamonds) are more likely to obtain unfavourable results that those with wheat, rice or livestock. However, why do some economies seem to gain relative more from their endowments and others obtain bad outcomes when we contrast countries with comparable natural resources? Boschini, et al. (2005) propose a framework that gives arguments to answer this question. They show that the effect of the natural resources on economic development is not determined by resource endowments alone, but rather by the interaction between the type of resources and the quality of the institutions. This combination of factors represents the so-called “appropriability” of a resource. In general terms, this concept alludes to the environmental factors that control the innovator’s ability to get returns generated by an innovation. In the case of natural resources, the concept captures the probability that they lead to rent-seeking, corruption or conflicts which, in turn, damage economic development. In economies where resources are highly appropriable, the abundance of resources may difficult the economic growth, while in countries where resources are less appropriable, its abundance may contribute with the economic development in the long-run.

The appropriability hypothesis may be conceived in terms of the technical and the institutional dimension. On the one hand, the natural resources abundance affects the economic development under weak institutions and, on the other hand, the impact of the institutional quality and the abundant natural resources is more pronounced when the natural resources are technically more appropriable. Technical dimension refers to the "intrinsic" character of natural resources and the institutional dimension refers to the capacity of the institutions, in the interaction with natural resources, to reinforce the blessing or counteract the curse.

The model to test their hypotheses present the following specification for the country *i*:

$$g_i = X'_i\alpha_0 + \alpha_1 NR_i + \alpha_2 Inst + \alpha_3 (NR_i \, x \, Inst_i) + \varepsilon_i \qquad (1)$$

Where *g* is the average yearly growth rate of GDP (1975-1998), *X'* is a vector of control variables, *NR* is a measure of the natural resource wealth, and *Inst* a measure of the institutional quality. *NR x Inst* represents the interaction between natural resources and institutional quality.

Authors use four different measures of natural resources to capture a gradual increase in physical and economical appropriability (the technical dimension). From the broadest to the narrowest measure, they propose: the share of primary exports to GNP (as Sachs & Warner, 1995); the share of ores and metals exports to GDP; the share of mineral production in GNP (as Sachs & Warner, 1995); and the value of production of gold, silver, and diamonds as a share of GDP. To capture institutional quality, they employ the (unweighted) average of indexes for quality of the bureaucracy, corruption in government, rule of law, the risk of expropriation of private investment, and the repudiation of contracts from Knack & Keefer (1995, 2002). They show that whether natural resources are good or bad for a country's development depends crucially on the interaction between institutional setting and the type of resources possessed by the country. Some natural resources are, for economical and technical reasons, more likely to cause problems such as rent-seeking and conflicts than others. However, this potential problem can be countered by good institutional quality. In contrast to the traditional resource curse hypothesis, they show that the impact of natural resources on economic growth is non-monotonic in institutional quality. Countries rich in minerals are cursed only if they have low quality institutions, while the curse is reversed if institutions are sufficiently good. Mehlum et al. (2006) and Robinson et al. (2006) also present concepts in terms of non-monotonic relationship between natural resources and economic development in institutional quality terms.

Mehlum et al. (2006) develop a model where entrepreneurs choose between becoming "producers" or "grabbers". The relative payoff from these activities depends on how "grabber friendly" the institutions are, which also determines the effect of natural resources on the economy. More natural resources raise the national income if institutions are "production friendly", but reduce

it if they are "grabber friendly". Robinson et al. (2006) develop a model with similar predictions but where political incentives generated by the resources are the key explicative factor. In countries with good institutions resources are positive because the perverse political incentives are mitigated, but in countries with bad institutions resources remain a curse.

With different analytical options it is possible to arrive at similar and compatible conclusions through other channels. This is the case of a recent working paper of García-Jimeno & Robinson (2009) (see García-Jimeno & Robinson, 2001, as well) that shows a renewed interest in the land frontier expansion. As this concept is associated with the incorporation of land (natural resource) to the production and it constitutes a process that is accompanied by the constitution of a new system of property rights (institutional arrangements), the relationship with our issue is immediate. They analyse the classical view corresponding to F.J. Turner as the "Frontier (or Turner) Thesis" for North, Central and South America from the middle of 19th century to 2007. They suggest *"that if political institutions were bad at the time of frontier settlement, the existence of such frontier land might actually lead to worse development outcomes, probably because it provides a resource which non-democratic political elites can use to cement themselves in power"* (García-Jimeno & Robinson, 2009:18). In other words, if institutions were bad when the natural resources were abundant (that is, when the "open" frontier was extensive), it might lead to lower economic performance.

Authors propose a model similar to the following:

$$g_i=\beta_0+ \beta_1 F_{i,t}+ \beta_2 C_{i,t}+ \beta_3(F_{i,t} x\, C_{i,t})+\varepsilon_i \qquad (2)$$

Where g_i is the dependent variable of interest for country *i*. This is, respectively, GDP per-capita in 2007; the average democracy score of *Polity IV* over the periods 1950-2007 and 1990-2007; and the average Gini coefficient of income inequality over the latter period. $F_{i,t}$ is the proportion of the country which was frontier land in period *t* and $C_{i,t}$ is the constraints on the executive from *Polity IV* in period *t* , considering *t=1850* (or some year around). The particularly interesting point with this specification is that if we reinterpret the analytical relation considering that the non-occupied territory represents a measure of the natural resources available to productive application in the future, the model is comparable with that used in Boschini, et al. (2005) (see equation *(1)*)

We have reviewed theories that offer interesting issues about why different resource-rich economies may be affected differently by their natural wealth. However, why do within our club of settler economies some of them seem to gain relative more from their endowments than other considering that they present similar natural resources? Our proposal gives the first steps to answer this question.

2. Our model

Historically, settler economies are characterized by the abundance of land and excellent conditions for a competitive production of primary commodities. Some of them presented, as well, significant mineral deposits that meant important effects on the social-economic context and the population dynamics. However, we focus the analysis on the land abundance as we want to emphasize the land as a productive factor in the generation of agricultural products (foods and raw materials).[2] In a previous paper (Willebald & Riaño, 2010), we estimated the land frontier expansion of the settler economies taking into account the agrarian aptitude as a proxy of the "land quality".[3] Therefore, we can introduce these indicators to our model as our proxy of natural resource wealth (land wealth) and then controlling for the effect of institutional quality on the natural resources.[4] In this sense, we differ from Boschini et al. (2005) as we understand the technical dimension in terms of the land quality and its potential productivity instead of "point" and "diffuse" natural resources. On the other hand, we apply the formulation of García-Jimeno & Robinson (2009) but we differ from their proposal because we work with a more accurate concept of frontier[5] and, in addition, as we consider several benchmarks, we introduce the dynamism that characterized the process (an element absent in their analysis).

We use panel data to estimate the following equation:

$$y_{it}=\beta_0+\beta_1 NR_{i,t-1}+\beta_2 Inst_{i,t-1}+\beta_3 (NR_{i,t-1} x\ Inst_{i,t-1})+\varepsilon_i \qquad (3)$$

where y_{it} is the dependent variable of interest for country *i* (six settler economies) in the period *t* (with *t* representing decades from the 1870s to the WWI) considering the economic performance –annual output per worker growth rate (*AGDPpwG*) and output per worker (*AGDPpw*) in constant dollars of the 1910s)[6]– and the income distribution within the agrarian activity, which constituted the more important economic sector of the period. Our indicator of inequality is the relation between income components (functional income distribution in the agrarian sector)[7]; specifically, the ratio of the total mass of land rents to wages (*RW*), which higher values correspond to increasing

[2] Even in the case of Chile, the evolution previous to the incorporation of mineral wealth –from the mid-19th century to the 1880s– presented several features common to economies that produce food and raw materials. Related with this point, Denoon (1983) argues that Chile and South Africa constitute *"limit cases"* of settler economies.

[3] We will include the influence of the distance on the land "quality" in next stages of the research.

[4] García-Jimeno & Robinson (2009):18 admit that "[t]*here are many caveats with these findings. For example, we did not control for variation in the 'quality' of the frontier. For instance there may be a big difference between Oklahoma in the United States and the Atacama Desert in northern Chile, both of which were frontiers in 1850."*

[5] Instead of using the area of the current national territory as reference, our indicators contemplate the area suitable to allocate grassland and different kinds of land (see Willebald and Riaño, 2010, for a discussion).

[6] Boyce & Emery (2006) and Bravo-Ortega & De Gregorio (2005) propose and test models with the growth rate and level of income per capita as dependent variables, and our exercises follow a similar idea.

[7] The functional income distribution is a depiction of how the income (in the national or sectorial level) is distributed between different groups involved in the production. As a result, it represents how the incomes earned by the owners of the various factors of production (labour, land and capital) are shared in terms of remunerations (or wages), land rents and profits (dividends or interests).

inequality (as the Gini Index) and a "rentist" profile of the productive activity.[8] Besides, following the discussion above, we include the interaction between natural resources and institutional quality to understand the join action.

2.1. Explicative variables: institutional quality

As García-Jimeno & Robinson (2009), we consider $Inst_{i,t-1}$ as the constraints on the executive (*C*) from *Polity IV* in period *t-1* but, on the contrary to their approach, we admit changes in time of the index. This measure of historical political institutions is defined as the extent of institutional restrictions on decision making powers of the chief executive, whether individual or collective. In a democracy, constraints would come from the legislative or judicial branches of government. In a dictatorship constraints may come from the ruling party in a one-party system, a council of nobles or powerful advisors in monarchies, or maybe the military in polities which are subject to the threat of military coups. The extent of constraints on the executive are coded as being between 1, meaning *"unlimited executive authority"* and 7, implying *"executive parity or subordination"*. A country would be in the first category if "*constitutional restrictions on executive action are ignored"* or *"there is no legislative assembly or there is one but it is called or dismissed at the executive's pleasure"*. A country would be in the upper category if *"a legislature, ruling party or council of nobles initiates much or most important legislation"* or *"the executive is chosen by the accountability group and is dependent on its continued support too remain in office"* (Marshall & Jaggers, 2009: 23-24). (see Appendix).

These indicators are systematic subjective ratings generated by specialists to provide to different agents (typically politicians and investors) measures of political and institutional risks, governance and democracy. However, considering that they are the results of value judgments and entail evolutions in which periods of absolutely stability are interrupted with sudden jumps (the discrete evolution of the index), their application for statistical long-run studies presents disadvantages. We introduce alternative indicators in order to obtain robust estimations.

Clague et al. (1999):187 say that the government has four crucial roles to play in contract enforcement and the protection of property rights: (i) It provides third-party enforcement when no self-enforcing mechanism exists; (ii) It may be the entity that communicates the branches of the contract; (iii) It may enforce the arrangement that private agents apply to constitute themselves as a

[8] Data taken from Willebald (2010d). These estimates make an attempt to resolve some of the problems associated to the use of ratios of earning rates (rent by unit of land / wage rate) as indicative of the evolution of income distribution. This last option has been the dominant approach of a fruitful literature that, starting with the works of Williamson, Taylor and O'Rourke, advanced in the analysis of the First Globalization (O'Rourke, Taylor & Williamson, 1996; O'Rourke & Williamson, 1994, 1999; Williamson, 1996, 2002). However, if we consider the evolution of the mass of land rents and total wages within sectors, it improves the previous explanation because we incorporate the quantity of each factor and new arguments to understand how the inequality evolved during that period. .

formal group; and (iv) the government ensure peace. Precisely, these characteristics are applicable to the creation and distribution of the landowner rights and the enforcement of the property system. Therefore, these concepts result interesting to guide our approximation to the issue. They argue that to capture the potential gains of those activities intensive in contract enforcement and property rights it is possible to use the relative use of currency applying the concept of "contract-intensive money". They define contract-intensive money (*CIM*) as the ratio of non-currency money to the total money supply, or $CIM=(M_2-Curr)/M_2$, where M_2 is a broad definition of the money supply and *Curr* is currency maintained by people (outside banks).

The application of those ideas to settler economies is not new. Prados de la Escosura & Sanz-Villarroya (2006, 2009) use the same concept to evaluate the role of the institutional arrangements in the long-run decline of Argentina, comparing the evolution of the *CIM* with the cases of Australia and Canada. Both, Clague et al. (1999) and Prados de la Escosura & Sanz-Villarroya (2009) argue about the goodness of the fit of these indicators and the evidence is convincing. *"CIM is a reflection or measure of the type of governance that improves economic performance rather than a cause of that performance"*(Clague et al., 1999: 189) and, in this sense, it can operate as an instrumental variable in the historical analysis. In other paper, we compare the evolution of both indicators for each country to justify our decision of working alternatively with them (see Willebald, 2010c). Considering average 10-year periods, the association between both variables is important (Graph 1) and we will repeat our statistical analysis of executive constraints with *CIM* indicators to estimate equations *(3)*.

[Insert Graph 1]

In all estimates, we consider indicators for each country *i* in time *t-1* to control for possible effects of endogeneity in the model.

2.2. Explicative variables: natural resources

"Natural resources" is a more restricted category of analysis than "natural capital" because it does not consider the systemic character of the latter (Ayres, et al., 1997). However, it gets precision in the historical analysis of economies where the constitution of markets and others institutions were determined simultaneously with the exploitation of natural resources.

To discuss the impact of natural resources on economic development it is useful to distinguish among resource abundance (a stock measure of resource wealth), resource rents (the 'windfall' flow of earnings derived from the natural resources at some point in time) and resource dependence (the degree to which economies have access to alternative sources of income other than resource extraction; usually related to export specialization). Obviously these concepts may be related

because economies with large natural capital may get high incomes from extraction; specialize in primary exports and become dependent on resources. But some resource-rich countries are not dependent on resources and some relatively resource-poor economies are. Besides, there is much confusion about the exact meaning of the concept "resource abundance". The sense may easily change among sciences, if not even in different areas of Economics. In natural sciences or Environmental Economics, resource abundance usually refers to the amount of potentially exploitable natural resources. But when we study the Dutch disease, resource abundance refers to the amount of already exploited natural resources and reserves. The share of potential resources that, in the end, becomes economically exploitable depends on many factors such as economic and political conditions and technological advance.

Initially, the literature proposed the "curse" as an empirical fact almost unquestionable basing the study on an index –GDP shares of primary exports– more suitable to measure the *dependence* than the *abundance* of natural resources. In these terms, the focus of the analysis was concentrated on the channels that connect both processes –rich natural resources and economic growth– according to the typical factors that affect economic performance: accumulation of productive factors (investment, human capital) and technological progress. However, curse's literature has incorporated actively institutional arrangements into the analysis because: (i) institutional topics have increasingly became part of the recent mainstream economic thought; (ii) a central point of the natural resources question is the ownership –of the assets and the rents associated with their productive application–; and (iii) the interest groups and the state constitute central agents in the formation of the property system. Results have been mixed but, in general terms, the consensus about some kind of conditionality predominates in the literature. The quality of the institutions would play a central role in the curse and the blessing of natural resources and even in the presence of abundant natural resources, the economies can present a promising economic performance when institutions are "good" (these countries would show some kind of curse reversal). Finally, the latter contributions in the literature react to this consensus. Several scholars distinguish between natural resources *dependence* and the natural resource endowment or *abundance* taking into account alternative indicators as the stock of natural capital[9] or total natural resources assets. In this analytical line, the empirical works challenge the traditional view inverting the relationship –resource abundance positively affects growth and institutional quality (Ding & Field, 2004; Brunnschweiler, 2008)– and identifying the curse with *"a red herring"* (Brunnschweiler & Bulte, 2006). In accordance with these considerations, our measure of abundance of natural resources in settler economies needs some further explanation to specify its implications.

[9] See, for example, World Bank (2006).

In our proposal, *NR* corresponds to the natural resource wealth expressed in terms of the land non-occupied or non-incorporated to the production and, in this sense, it is closer to an *abundance* than a *dependence* concept. In a previous paper (see Willebald & Riaño, 2010, and Willebald, 2011) We propose several measures of *NR*, which represent one of the main "potential" productive factors that the colonizers faced when they arrived at these territories. Initially, we work with an indicator similar to the index *F* of García-Jimeno & Robinson (2009). However, our *NR* differs because it measures the proportion of occupied land according to the land proper to allocate grassland and to raise animals instead of all non-occupied land in relation to the national territory. Then:

$$NR_{i,t-1} = \frac{OA_{i,t-1}}{PVG_{i,t-1}} \qquad (4)$$

Where:

$OA_{i\,t-1}$: is the occupied area (in km^2) of country *i* in period *t*, with *t=1870, 1880, 1890, 1900* and *1910*. . We classify territories with more than 2 people per square mile (0.7722 people per square kilometre) as occupied land (closed frontier) as it is a standard in the literature.[10]

PVG_i: is the "potential vegetation grassland" area (in km^2) of country *i*.

An important point in our definition is that our indicator *NR* presents an increasing trend –with some breaks– that denotes the progressive –and sometimes intermittent– advance of the population on the territory. Therefore, in fact, our economies became less land-rich along the period and, if we assume the standard hypothesis, they would be "escaping" from the curse. In other words, the natural endowments become relatively scarcer with the expansion of the population on the "open" frontier and, alternatively, they become limited as more land is incorporated into the production. In these terms, natural abundance is not a static concept but it changes in the long-run. As in the previous case, we consider measures for each country *i* in time *t-1* to control for possible effects of endogeneity.

How can we represent the gradient of different appropriability conditions of natural resources? In a previous article (Willebald & Riaño, 2010, and Willebald, 2011), we present indicators corresponding to different types of land in accordance with land aptitude to allocate grassland. We classify the area in high, medium and low aptitude,[11] and we analyze the evolution of each frontier according to total grassland ("extensive indicators"), to each type of endowment ("intensive indicators") and the contribution of each type of land on the total expansion of the frontier ("contribution indexes"). Specifically, with: (i) "extensive indicators": we compare the expansion by each type of land in relation to total grassland; (ii) "intensive indicators": we compare the

[10] See García Jimeno & Robinson (2009) for a justification and Willebald & Riaño (2010) for a discussion.

[11] We classify land according to aptitude to allocate grassland in terms of biome types of potential vegetation presented in Klein Goldewijk & Van Drecht (2006).

expansion by each kind of land in relation to the total land available of this type; (iii) "contribution indexes": we measure the contribution of each land of type in the total expansion of the frontier. We find a stylized fact that motivated the following conjecture. Those economies that, during the First Globalization, expanded their frontier through the incorporation of high aptitude land would have been subject to stronger economic expansion but, simultaneously, it would have predominated a more intensive worsening in income distribution. This conjecture may be evaluated in terms of an appropriability problem that emerges from the different land quality, and our analysis contrasts the impact of each type of frontier on economic development (in terms of growth, income level and distribution). We consider our contribution indexes for high (*HI*) and medium (*MI*) land aptitude to represent the appropriability gradient (from more to less appropriability) and evaluate the sign and the significance of the coefficients comparing the evolution of both indicators. Countries advanced by both types of land concurrently and we are interested in comparing the simultaneous evolution in our test. Therefore, we construct a composite index where *HM=HI-HM* represents the relative contribution of each type of land in the total expansion of the frontier. The "direction" of the appropriability is given by the technical conditions of the different lands. Better lands –the most productive lands– open the possibility to generate and appropriate rents when they are applied to the production. Positive signs are associated with more intensive land frontier expansion by more appropriable lands and, in accordance with the curse hypothesis, it should affect economic performance with lower incomes and higher inequality. However, natural resources do not perform alone but interact with institutions. This interaction is the reason of our third explicative variable.

2.3. Explanatory variables: interaction between natural resources and institutions

Due to economic and technical reasons, different land qualities are more likely than others to cause problems such rent-seeking and conflicts. However, this problem could be countered by "good" institutions and whether natural resources are good or bad for a country's development can depend on the interaction between the prevailing institutional arrangements and the type of resources the country has. We consider the joint action of natural resources and institutional quality indicators to test this question and we introduce the multiplication of both indicators as an additional variable.

2.4. Our empirical model

We are interested in contrasting the incidence of institutions working "alone" and interacting with natural resources. Therefore, we work with two models:

$$y_{it}=\beta_0+\beta_1 NR_{i,t-1}+\beta_2 Inst_{i,t-1}+\varepsilon_i \qquad (5)$$

$$y_{it}=\beta_0+\beta_1 NR_{i,t-1}+\beta_2 Inst_{i,t-1}+\beta_3 (NR_{i,t-1} . Inst_{i,t-1})+\varepsilon_i \qquad (6)$$

Where we consider, alternatively:

y: AGDPpwG, AGDPpw and *RW.*

NR: HM

Inst: C and *CIM.*

NR x $Inst_{i,t-1}$*: HMC, HMCIM.*

2.5. Hypotheses

What do we expect? A reasonable assumption is to identify economic development with richer economies (faster economic growth and higher incomes) and more egalitarian societies. During the First Globalization, settler economies experienced a process of strong expansion and, simultaneously, a worsening in the income distribution. Both processes would have been the result of incorporating abundant land into production and in this sense their economic performances in the long-run were the outcome of a decreasing natural wealth. We test two hypotheses: (i) the different grade of appropriability conditions the magnitude of the impact on economic development; (ii) "good" institutions, and specially in interaction with natural resources, induce the reversion of the curse or they reinforce the blessing.

First, considering equation *(5)* in the case of *AGDP* (growth rate and level per worker), and according to the appropriability hypothesis of the curse of natural resource abundance in the technical dimension, β_1 should be negative because it would result more adverse to incorporate better than worst lands (according to the capacity for generating larger appropriable rents). In the case of *RW*, we would expect a positive effect of resources on inequality (worsening in income distribution as the curse) associated to the higher grade of appropriability of the more productive land. β_2 should be positive in the estimation of agrarian income level and growth (per worker) because the standard results are that good institutional quality is beneficial for economic performance, and β_2 should be negative in the estimation of *RW* which would indicate improving in equality derived from good institutions. Second, we estimate equation *(6)*, and we propose similar arguments as in the previous speficication, although we work additionally with the interaction component. How we evaluate the institutional dimension of the appropriability problem? Evidence in favour of this hypothesis would require finding more intensive effects of institutions when we estimate equation *(6)*, with the coefficient of the interaction variable (β_3) significant and positive in the production side (growth and level) and negative in the income side.

3. Results

We work using panel data and we consider the more suitable model for each case among fixed effects (FE), random effects (RE) and ordinary least square (OLS). As it is usual in the literature,

initially we tested the correlation between the individual effects and the other regressors with the Hausman test to see if the results allow us to reject the null hypothesis of no correlation and used fixed effects model or do not reject it, and estimate the model of random effects. In addition, we tested the significance of the individual effects computing the Breush-Pagan for random effects, and the F test statistic for the fixed effects. For those cases that individual effects were not significant, we use OLS. To control for heteroscedasticity we always used robust standard errors.

To estimate the economic growth per worker in the agriculture, we introduce the lagged value of *AGDPpw* to admit the presence of convergence effects. Natural resources, institutional quality and the interaction variable are not significant variables to explain agrarian production growth rates. We obtain negative signs for natural resources (β_1) and they would suggest some kind of curse but our evidence does not support this assertion (we include our results in the Appendix). However, our variables perform adequately to explain the level of product per worker in agrarian activity (see Table 1). We found a positive relationship between level of income per worker and natural resources and this (suggested) "discrepancy" between levels and growth is not new in the literature because similar results were found in Boyce & Emery (2006) and Bravo-Ortega & De Gregorio (2005) for the total GDP. A country that applies more intensively land of high quality in the agrarian production would obtain higher levels of income per worker ("welfare") and would enjoy the blessing of the natural resources, although it can face the curse of lower growth rates. Strictly, in our case, the natural resources apply to production do not determine the pace of agrarian production but they explain the level of production. What happen with our appropriability hypothesis in technical terms? We reject it in the case of agrarian income level because the incorporation of better lands –and, in consequence, more appropriable ones– impact positively in the agrarian production (in other terms, to advance more intensively by "good" lands would be a blessing).

The coefficients of the institutional quality (*C* and *CIM*) are positive and significant in accordance with our hypothesis but the introduction of the interaction component in the estimations does not improve our results. Therefore, what happen with our appropriability hypothesis in institutional terms? With this evidence, we do not accept the institutional dimension of the appropriability problem. In other terms, better institutions acting together with natural resources do not explain the agrarian production. This finding may represent evidence in two different directions. On the one side, the institutional quality was not so important to economic growth in the case of settler economies during the First Globalization. In other words, the source of higher production in the agriculture would have been to bring into productive use idle resources to fuel economic growth rather than the creation of institutions to promote the expansion in relation to land. On the other side, these results warn us about the shortcomings of our institutional indicators. It is probable that

our broad indicators of institutional quality were not capable to represent the effective incidence of institutions on agriculture production. These considerations drive new steps in the research to precise our approximation to the functioning of institutions related to land and productive factors in agriculture. This question will be matter of Section 4.

[Insert Table 1]

Finally, the exercises referred to income distribution show how our specification of abundant resources presents positive and significant coefficients that do not reject the curse hypothesis. In other words, abundance of high quality land applied to the agrarian production in relation to medium quality land (in terms of the contribution to the total land frontier expansion) was associated with higher rentals/wages ratios and, therefore, we identify the curse of natural resources in terms of equality. Therefore, we do not reject the appropriability hypothesis in technical terms and, effectively, to advance more intensively the frontier by the best lands would affect the income distribution. We obtain predominantly negative coefficients for the institutional quality indicators which would show that institutions contributed with the blessing (they would be associated with low levels of *RW*), although only *C* is statically significant (model 5). As in the previous exercises, evidence in terms of the institutional dimension of the appropriability problem is not convincing because the interaction variable is not significant to explain *RW*. However, the results revert with *CIM* as explicative variable; in according with this evidence, institutional quality would not affect income distribution but the interaction between *CIM* and natural resources would moderate the curse of natural resources on income distribution (model 8).

Our evidence offers three conclusions. First, expanding the frontier more intensively by better quality lands would induce higher level of agrarian income per worker, but it would worsen income distribution. Second, if we accept that better lands are subject to severer appropriability problems, we reject the technical dimension of the appropriability hypothesis in the case of production, but we do not reject it in terms of inequality. In other words, to be subject to higher pressures to appropriate lands (and their derived rents) would not affect the productive size of the economy, but it would induce worst income distribution and more rentist societies. Finally, we accept the positive role of institutions in economic performance but we reject the institutional dimension of the appropriability hypothesis. If we accept that our indicators (*C* and *CIM*) represent adequately the governance and enforcement conditions of the economy, they would induce higher production levels in the agriculture –reinforcing the blessing– and lower participations of land rents in total wages –moderating the curse– although the interaction with natural resources does not offer convincing evidence.

3.2 Highlights and shortcomings

Our exercises are far from conclusive –basically because our data base is small– but they indicate interesting insights. We do not reject the curse of the natural resources appropriability hypothesis (technically) in terms of economic expansion of agrarian sector and income distribution, but the incidence of incorporating more intensively land of high quality would have represented a blessing for the richness in the agriculture. The institutional quality –acting alone or in combination with the natural resources– was capable to induce contrary effects to the natural resources incidence because it moderated the curse or strengthened the blessing, although we do not find evidence in favour of institutional dimension.

In brief, those economies that expanded their land frontier by the relatively better lands or, in other words, as the contribution of high land quality was superior than medium land, faced the blessing of the abundance of natural resources to obtain high levels of agrarian income per worker but experienced the curse of lower expansion and worsening income distribution.

The most important shortcomings of the previous analysis derive from the analytical treatment of the institutions. At least, it is possible to identify three clear limitations of our approach.

First, we reduce the complexity of the institutional arrangements (in structure and change) to "one number". It is clearly questionable whether we can add up all kinds of different institutions into a composite concept and measure its quality. It is really that it may be useful to study some economic relationships, but it minimizes the analytical and explicative power of institutions in economic development. [12]

Second, in our analysis, we consider institutions as an exogenous component of the economic system, but exists an extensive literature that emphasizes the endogeneity of the institutions.[13] A classical discussion in the study of the settler economies is about the *latifundia* and the huge damage on economic growth of this property structure (see, i.e. CIDE, 1965, for Uruguay; and Heaton, 1925, for Australia). However, several authors argue that these large estates are not given structures but the results of economic and technological forces (see, i.e. Williams, 1975, for Australia); this is an analysis perfectly compatible with the notion of institutional endogenenity that will be faced in deep in future stages of the research.

Finally, the statistical exercise based on a "macroeconomic" level does not deal with the decision behaviour of the agents. It is true that in settler economies the agrarian interests were early in contact with the political power inducing decisions or participating directly in the governments. In this sense, our previous approach would capture the expressions of the relationships among agents

[12] For a critical overview, see Chang (2010).
[13] See Alston & Mueller (2005 and 2003) for a literature review.

in a macro level. However, with this approach is unlikely we understand the specific actions of the different groups and the dynamics of the process within particular sectors.

The way to solve, at least partially, the deficiencies of our method is to change the approach to complement –and not to substitute– the previous analysis. A first step in this direction is to identify the specific institutional arrangements that regulate –formal or informally– the appropriability conditions of the land (and, as consequence, of the rents). We describe the process of the distribution of land property rights and the characteristics of the land tenure systems in a historical and comparative perspective considering, as illustration, four economies of the "club": Argentina, Australia, New Zealand and Uruguay. Therefore, we will pay attention to the previous shortcomings in three complementary directions. First, it is possible to give additional dimensions to the "constraints on the executive" (*C*) and the evolution of the *CIM* to improve the representativeness of both types of indicators. Second, we can introduce in the analysis elements that characterize the endogenous formation of institutions in the society as the political confrontations, the influence of the different power groups or the incidence of technological issues. Finally, when we describe the process of distribution of the land property rights we propose our approximation to the agents' decisions. This option does not completely solve the shortcoming of our previous macro level analysis, but it is a first step in this direction.

4. Appropriability and the formation of the land ownership system

In the 19th century one of the main social and economic processes in the settler economies was frontier expansion and the creation of the institutions (formal and informal) that determined wealth distribution and the conditions of income inequality. Initially we discuss two key components of the process: the characterization of the land tenure system and the role of the state in this institutional configuration. Afterwards we present the features of both components in the particular cases of Argentina, Australia, New Zealand and Uruguay, and we identify two models.[14] One of them –which is closer to the "British model"– is characterized by an active state with developmental features that promotes a pattern of greater equality. The other –which is the "Hispanic model"– is dominated by a state pressured by financial difficulties, recurring disorder in the administration of public land, and a high degree of intervention by the agrarian oligarchy in political power, all of which promote income concentration.

4.1. Land tenure systems: characteristics and conditions

Land tenure refers to the collection of rights and obligations under which land is held, used, transferred and inherited. The meaning of the concept varies with the social and historical context.

[14] A first approach to the question was presented previously in Álvarez & Willebald (2009). For New Zealand and Uruguay also see Álvarez (2008).

It is used to allude to land tenure prescribed by statutory or common law, to customary land tenure, and to practices or routines (Alston & Mueller, 2005; Moyo, 1995; Shivji et al, 1998). The specification (definition and interpretation) and enforcement of land ownership rights constitute two fundamental dimensions in the process of the appropriability of natural resources because they affect the timing of settlement and the use of the land. Therefore, and from a conceptual point of view, the formation of the land ownership system is as important as the role of the state in establishing land ownership rights. We consider the relation between the two dimensions to make our concept of appropriability more precise.

Land ownership system

Arrangements vary enormously between rural and urban areas because land is used for agriculture in the former and for residential and business purposes in the latter. Land ownership systems can be categorized in line with three essential dimensions: (i) the presence or absence of formal land deeds, defined as the registration of land ownership rights with a government authority; (ii) the extent of landowner and landholder rights to contract voluntarily for use of the land; and (iii) the spectrum of private-communal ownership rights to the land, and in this there are two extremes, one is the independent farmer owning land with freehold (or fee-simple) deeds, and the other is bound laborers working on plots of land temporarily assigned to them by the authorities in a communal land system. Freehold ownership is perpetual, it can be inherited by a freely-designated successor, it is freely alienable, it is often registered with a central authority that has undertaken a survey of the land (sometimes called a cadastral survey), and it is characterized by fixed annual obligations (La Croix, 2002). Leasehold land is based on the notion of rentals for long periods. Land belonging to one entity –either the state or an individual– is leased by contractual agreement to another entity. These leases may be long or short. In practice, 99-year leases are considered to be as secure as a freehold tenure system. The lease agreement is then registered with the ownership of that land to create land rights that are enforceable (Economic Commission for Africa, 2004: 20-21).

Role of the state

The arrangements governing land ownership rights vary depending on who specifies them and who enforces them. In these two dimensions the possible actors range from the first person that claimed ownership of the land in question (the claimant) –or a group of claimants who act collectively– to the state that is interested in the "agrarian question" and acts on the matter.

Usually it is the state that defines, interprets and enforces land ownership rights. The definition of these rights is a legislative function of the state, the interpretation is a judicial function and enforcement is a police function. These functions entail costs and in consequence the state may leave some rights as open access. Many assets have numerous components and it is costly to define

land ownership rights for all the dimensions of value. Some attributes may be either *de jure* or *de facto* left as open access. There are incentives for individuals or groups to expropriate the right to use land exploiting attributes that the state leaves as open access. In many situations, individuals or groups use violence as a strategy to capture land ownership rights. By individual enforcement we mean the efforts that individuals make to maintain their rights (putting a fence around the land, posting "no trespassing" signs in "strategic" places, etc.). Governments enforce land ownership rights through the police and courts (Alston & Muller, 2003, 2005).

In the economies of recent European settlement, the colonizer state (usually represented by the Crown) had an additional function. The doctrine underlying the traditional view of settlement was that in the age of discovery the "new" areas were *"terra nullis"*, that is to say land belonging to no one. European rulers adopted the position that territories without political organization, systems of authority or legal codes could legitimately be annexed. This view, with slight differences, embodied the idea that Europeans were superior to native peoples because they were civilized and Christian, and this superiority was clearly expressed in the art of war (Reynolds, 1987). By definition, the focus of the debate was the "new" territories owned by the Crown and it transferred the land from the public to the private sphere. For decades there was debate about land ownership, tenure systems, prices, conditions of tenure and land taxes, and the authorities in different places established a variety of different frameworks and instruments, which yielded differing results.

As regards the typology of political states, some authors (Auty & Gelb, 2001; Lal, 1995; Leftwich, 1995) differentiate between "developmental" states and "predatory" states. Developmental states act in an autonomous manner and pay attention to long run welfare maximization, while predatory states have factions and act in the service of section interests. The participation of the state in the distribution of land ownership rights and the creation of a land ownership system provides interesting ways in which states can be characterized. It is not our aim in this study to find evidence about this, but our description will shed some light on the matter.

4.2. Australasia vs. River Plate systems

An overview

A first approach to the issue was previously presented in Álvarez & Willebald (2009) and we propose a more detailed analysis in Álvarez & Willebald (2011). According to our analysis, it is possible to identify two land distribution patterns in our settler economies that derived in different ownership structures and land tenure systems.

The Australasian historiography has emphasized that the process of land distribution in Australia and New Zealand was highly idiosyncratic, representing a factor that contributed to the emergence

of an agrarian society with high standards of living and democratic values. The distribution of land constituted a political and economic resource that the state used widely in the 19th century (especially in the second half) to promote better uses of the land and the intensification of settlement. British colonial regime established a strong state that regulated the settlement of European colonists and attempted to promote equitable land distribution. This process was governed by a legal framework that transferred property rights from the Crown ("original" owner) to the colonists, and this ensured the effective ownership of land and moderated land concentration. These objectives were achieved because both states had enough political and institutional power to guarantee secure property rights and it favoured a suitable functioning of the productive factor markets. Markets working accurately are related with the high salarization in the agrarian activity and it constitutes an apparent difference of Australasia with the settler economies of the River Plate.

Land was considered as an important economic resource in economies like Australia and New Zealand that were based on agrarian production and that needed immigrants in order to develop, and this importance was expressed in public policies. Land was also important as a source of fiscal income, together with the transference of land ownership rights, and different tenure regimes were set up (leasing, grants, sale by auction, etc.). The leasing systems made it possible for small agrarian producers without enough capital to become owners to access land. In addition, state limitations on the size of estates moderated the trend towards land ownership concentration.

In Argentina and Uruguay the processes of land distribution started before the wars of independence and therefore developed under the Spanish legal regime.[15] In that period land was not very valuable as the main economic resource was wild cattle. Large estates (*latifundia*) came into being because populations were very small and the Spanish forces in the Viceroyalty of the River Plate were politically weak and mainly concerned with combating resistant native populations to the west and the south and the Portuguese Empire in the east. According to the Spanish land distribution laws, colonists were supposed to physically occupy the land and to produce on it but, in fact, these conditions were not fulfilled.

Most land frontier expansion and the transfer and distribution of land ownership rights occurred after Argentina and Uruguay became independent. This process involved the transfer of public land from the state to settlers through a variety of different legal regimes that moved incoherently between direct sales and leasing. Direct sales were inspired in liberal principles and it was aimed at transferring land to the private sector, and the leasing, as a system, was an effort to retain public land as a source of fiscal income and thus support the public debt. However, it turned out that

[15] The wars of independence took place in the second and third decades of the 19th century.

neither Argentina nor Uruguay benefited for the transfer of land. Both countries lacked the political power to make an ordered distribution of land.

Until the last quarter of the 19th century both states were weak in political, institutional and military terms, and the land distribution process favored social and economic groups and local elites. During the First Globalization land became much more valuable because of its connection with rising international commodity prices, and the large estates consolidated their position in the land ownership structure. These social groups also supported the oligarchy regimen that dominated the political scene up to WWI. A basic concept in the Argentine Constitution of 1853 was *"to govern is to settle"*, a notion first advanced by Juan María Alberdi. But it turned out that the force of the facts were stronger than ideas and most of the land fell into the hands of capitalists and absentee landowners rather than settlers and the work on land.

The land distribution pattern in the River Plate lacked secure ownership rights and was further undermined by political weakness on the part of the authorities. Public policies were incoherent and inefficient, and when land ownership rights finally became more secure (in the 1880s) the result was that a highly concentrated ownership pattern was consolidated. For decades the authorities focused their efforts on organizing the country and the provinces instead of on how land was distributed within those boundaries, and this weakened the state's capacity for action in that matter. A combination of deficient functioning of the productive factor markets, a strong identification between economical and political power (associated with features of colonial heritage), and a persistent social differentiation based on idiosyncratic factors, explains the land concentration and, in consequence, the increasing worsening income distribution during the last decades of the 19th century.

Similarities and differences

On a conceptual level and taking a broad view, the process in the settler economies during the 19th century was dominated by four principles:

(i) The creation of a private land tenure system whereby, depending on the period and with differing intensity, land ownership was transferred to the colonizers. Initially the land was freehold and this was seldom questioned, but it was not long before doubts began to arise, especially towards the end of the 19th century, and there were tentative experiments with leasehold systems that were not always well thought out.

(ii) There was a permanent idea that a new population should be brought onto the land so as to create a society based on immigrants.

(iii) Authorities were increasingly convinced that land was the national wealth and land settlement was the source of prosperity.

(iv) There was a notion that equality in land distribution was valuable in the construction of an independent and democratic nation.

Under these principles, the authorities in the different countries faced similar problems:

(i) Strictly speaking, the land was not "empty". The expansion of the frontier meant displacing the native population and taking over the land they had subsisted on for centuries. However, land obviously had to be brought into civilization and put to use, and the best results would be obtained by bringing in settlers to establish a stable, sedentary society of farmers (Williams, 1975: 63).

(ii) There was a certain amount of theory involved,[16] but basically the way land was administered and how ownership rights for public land came into being was a matter of trial and error. It was very difficult to define land boundaries because of ignorance and information asymmetries, and there were problems too with determining the size of estates and their productive aptitude.

(iii) Land policies were dominated by conflicts among interest groups in which each faction played its own game. Occupiers used their wealth and influence to evade attempts to reallocate land, and many evasion methods were used such as "dummying", "peacocking" and forcing auctions.[17] Additionally, land oligarchies usually participated actively in the various levels of government and fostered legislation that furthered their own interests.

There are two main models, and there are four main differences between them:

(i) The colonial heritage in the River Plate –as explained by Acemoglu et al. (2001, 2002) and Engerman & Sokoloff (1997, 2001)– contrasts with the delayed institutional development of Australasia.[18] In some sense, the absence of "path-dependence" allowed a really "new" system to be created in Australia and New Zealand, close to the British tradition and with the North American system as a model.

(ii) The oligarchic elites in the River Plate exerted broad control over land ownership, and with the development of constitutional government they consolidated their hold on political

[16] Some of the most influential theorists were Robert John Wilmot-Horton and Edward Gibbon Wakefield in the early part of the 19th century, and Alfred Russell Wallace and Henry George toward the end of that century.

[17] "Dummying" is acting on the behalf of another individual in legal matters. "Peacocking" refers to the acquisition of the best pieces of land in such a way that the surrounding land is useless to others.

[18] Bértola et al. (2010) present an analysis of the evolution of income distribution in the Southern Cone of South America considering the colonial heritage as a main factor. The concept is no new. It is part of the classical Latin-American economic thought of the 1960s and 1970s about the economic development of the region (see Cardoso & Faletto, 1969; and Cardoso & Pérez Brignoli, 1979).

power. This contrasts with the pastoral economy of Australasia that was shaped by rules imposed by a bureaucracy that was relatively disinterested –it was dependent on the Crown– and involved the active political participation of small farmers (Denoon, 1983)[19] motivated by democratic values.

(iii) In Australasia the various states participated in the "agrarian question", and a well-organized public administration made it possible to implement and enforce autonomous actions. In contrast, chronic fiscal deficits in the River Plate and continuous political struggle –after the independence and among descendants of colonizers– prevented the implementation of long-run policies. As a result, the governments of Australasia set up administrative and institutional arrangements that were closer to the notion of a developmental state.

(iv) Australia and New Zealand shared the same fragment culture and the reforms reflected the same fundamental egalitarian, communally focused, working-class radical values that immigrants brought with them. Both societies shaped a socio-political context that put the land question as one of the main issues of the public policy, and politicians, theorists, and common citizens identified early these concerns. Colonial social hierarchy lacked the appearance of permanence and the change of status was a relatively familiar experience. This social homogeneity made a powerful unity in political questions (Paulson, 1988; Rosecrance, 1964).

Questions of land tenure were enormously important in the political economy of newly settled regions, and the ways in which such issues preserved a greater concern *"with property as a function rather than a right"* (Hawke, 1979: 382), provide guidelines to understand such differences. In conceptual terms, the institutional arrangements than governed the distribution of land ownership and the behavior of the landowners (effective and potential) involved were similar between regions. Regulations were written with the same kind of concerns and interests in mind, and the American system was identified as an attractive model. The agents acted in accordance with their own interests, created mechanisms to obtain land for themselves and took advantage of other proprietors when circumstances permitted. The profound differences between the two systems were that the governments in the River Plate had little capacity to enforce regulations, and there were elites whose power was based on land ownership that influenced state policy (in the sense of Robinson, et al., 2006), a feature that derived from a strong colonial heritage. The authorities in Australasia created a more favorable environment for colonization and land settlement because they had the

[19] *"…Australian wheat-farmers enjoyed a security of tenure and a degree of state sympathy which 'arrendatarios' in Argentina would scarcely have believed possible"* (Denoon, 1983:102).

power to enforce the regulations, they were guided by notions of development from the colonial government, and they enjoyed a context that was more stable economically and politically. In terms of land distribution the differences were not so significant than in terms of the functioning of the markets (we refer, specially, to productive factors) and, consequently, it might explain part of the income divergence between regions (see Willebald, 2010b, and 2010c). Under these circumstances, the conditions of appropriability were clearly different and more intense in the River Plate economies, they had incidence in the income distribution rather than the wealth generation, and were accompanied by idiosyncratic elements that reinforce the consequences of natural resources endowments.

Therefore, we can come back to our appropriability hypothesis. The environmental factors –the landholding system– that control the innovator's ability –the holder's capability– to get returns generated by an innovation –the incorporation of "new" land– characterized two different "models". Within similar economic growth conditions, one of them rendered an income inequality pattern of high concentration and rentist societies (Hispanic model) and, the other, a more egalitarian model with higher participation of wages and broader markets (associated to wider middle-social classes) that functioning more efficiently and encourage economic growth (British model). The differences in terms of income distribution in the agrarian activity, land property, capacity of influence of the states, colonial heritage and social homogeneity, explain two different ways to interact with the abundant natural resources.

5. Conclusions and final remarks

We analyze the effect of natural resources on economic growth and the functional income distribution in the agrarian activity, applying the curse (and blessing) of natural resource hypothesis for guiding the discussion. Our conjecture is that settler economies are characterized by abundance of natural resources, but natural capital is not homogeneous in composition (soils, humidity, temperature) neither in intensity (of extraction and use) and it determines differences in terms of economic development. We focus on the action of the abundance of natural resources that a country posses and the quality of its institutions in terms of the appropriability of a resource. Methodologically, we propose two approaches. One of them is based on the estimation of the statistical relationship between economic performance, natural resources and institutions. The other consists in an historical description of the distribution of land ownership rights and the institutional arrangements related to land property in four countries: Argentina and Uruguay (as Spanish ex-colonies) and Australia and New Zealand (as English ex-colonies).

In accordance with the first approach, we elaborate a gradient of appropriability natural resource abundance taking in account the relative contributions by type of land and associating higher

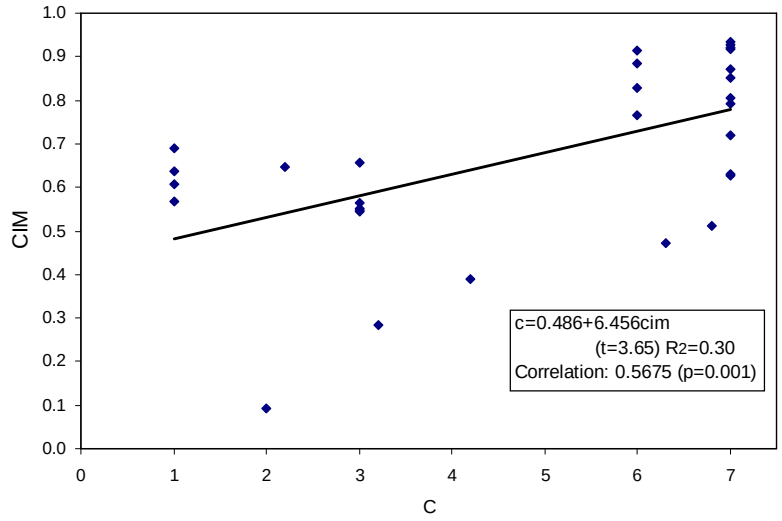
indicators with higher degree of appropriability. We do not reject the curse of the natural resources hypothesis in the income distribution worsening, but we reject it in terms of the level of product per worker. The institutional quality was capable to reverse the effect of natural resources because it strengthened the blessing or moderated the curse. However, we do not find evidence in favour of the institutional dimension of the appropriability hypothesis because the action of institution through the interaction with natural resources is negligible.

The second approach is based on an historical description of the distribution of land rights and the institutional arrangements related to the land property in the River Plate (Argentina and Uruguay) and Australasia (Australia and New Zealand). The enforcement capacity of the authorities in Australasia, determined by the colonial government and a more stable economic and political context, created an environment more positive to the colonization and land settlement. Under these circumstances, the conditions of appropriability were clearly different than in the River Plate.

The problem of appropriability arises as an attractive argument in the relationship between economic performance and natural resources. Considering the institutional arrangements related with land property, they seem suitable for obtaining high product levels in the agriculture, but inadequate to promote more egalitarian societies. This evolution was more apparent in the Hispanic ex-colonies that in the case of economies conformed in the Anglo-Saxon tradition, where “good” institutions foster the blessing and moderate the curse of the natural resources. Disparities in terms of land aptitude would induce different incentives and possibilities to the agents to appropriate the rental differential between the types of land. In other words, the appropriability problem will be stronger (or more intense) when the lands occupied are better (higher quality) because they would open the chance to appropriate rents. However this expectation would be mediated by the action of the institutions and the path dependence of the settlement.

Graph and tables

Graph 1
INSTITUTIONAL QUALITY IN SETTLER ECONOMIES
Executive constraints (C) and CIM indicator (10-year average)



Source: Polity IV (2008), Prados & Villaroya (2009); Román & Willebald (2010); Willebald (2010c)

Table 1
ECONOMETRIC EXCERCISES: AGRARIAN GDP PER WORKER, INCOME DISTRIBUTION, INSTITUTIONS AND INTERACTION NNRR-INSTITUTIONAL QUALITY

Dependent variable:

	GDP per worker				Land rents/Wages			
	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) FE	(6) RE	(7) FE	(8) FE
Constant	**5.834**	**5.555**	**4.976**	**4.928**	**2.549**	**2.414**	**2.067**	**2.080**
	*(13.85)****	*(10.09)****	*(14.00)****	*(12.75)****	*(3.75)****	*(3.24)****	*(4.92)****	*(4.66)****
HM	**0.003**	**0.005**	**0.001**	**0.002**	**0.005**	**0.004**	**0.004**	**0.013**
	*(3.24)****	*(2.67)***	*(2.96)***	*(1.87)**	*(6.42)****	*(3.98)****	*(7.07)****	*(3.92)***
C	**0.178**	**0.226**			**-0.117**	**-0.081**		
	*(2.94)****	*(2.62)***			*(-3.52)***	*(-1.00)*		
HM*C		**-0.0007**				**-0.0001**		
		(-1.49)				*(-0.11)*		
CIM			**2.734**	**2.930**			**-0.113**	**-0.139**
			*(6.92)****	*(5.28)****			*(-0.18)*	*(-0.21)*
HM*CIM				**-0.001**				**-0.012**
				(-0.71)				*(-2.38)**
Rsq	*0.27*	*0.31*	*0.51*	*0.51*				
Within					*0.279*	*0.28*	*0.24*	*0.27*
Between					*0.005*	*0.01*	*0.04*	*0.03*
Overall					*0.007*	*0.01*	*0.00*	*0.00*
F stat	*5.96*	*3.85*	*23.97*	*14.73*	*35.38*		*26.01*	*1300.10*
(Prob)	*0.01*	*0.02*	*0.00*	*0.00*	*0.00*		*0.00*	*0.00*
F all u_i=0					*11.17*		*5.55*	*5.66*
(Prob)					*0.00*		*0.00*	*0.00*
Wald chi2						*1088.62*		
(Prob)						*0.00*		
Observations	*30*	*30*	*30*	*30*	*30*	*30*	*30*	*30*

HM, C and CIM lagged variables.

All coefficients were estimated with robust standard error. t-statistic in parenthesis.

Appendix: description of variables and sources

1. Institutional quality indicators

1.1. Polity IV: constraints on the executive

Presentation

"Polity IV Project: Political Regime Characteristics and Transitions, 1800-2008" is a programme that provides broad information for coding the authority characteristics of states in the world system for purposes of comparative and quantitative analysis (http://www.systemicpeace.org/polity /polity4.htm). "Constraints on executive" data base is divulgated trough the Integrated Network for Societal Conflict Research (INSCR) considering a wide sample of countries from the mid-19th century to 2008. "Constraints on the executive" is a measure of historical political institutions and is defined as the extent of institutional restrictions on decision making powers of the chief executive, whether individual or collective (see Marshall & Jaggers, 2009).

Time coverage

Argentina: 1860-1913 (annual data).

Australia: 1901-1913 (annual data).

Canada: 1867-1913 (annual data).

Chile: 1860-1913 (annual data).

New Zealand: 1860-1913 (annual data).

Uruguay: 1860-1913 (annual data).

Data base considers only independent countries and this is the reason why Australia and Canada include shorter series. Both countries were dependent on British Crown during the 19th century but enjoyed of a governmental regimen with important degrees of autonomy and political systems with broad popular participation (at least in terms of the contemporary patterns). In both countries the independence did not constitute a traumatic episode and the political and governmental conditions changed gradually. Initially, it seems evident that applying the same level of the indicator that presents in the first year with figure (1867 for Canada and 1901 for Australia) would be a reasonable assumption. However, to avoid introducing a bias towards our hypotheses, we "castigate" the indicator reducing one step the rating.

MARSHALL, Monty and JAGGERS, Keith (2009): *Polity IV Project: Dataset Users's Manual*. Center For Global Policy, School of Public Policy, George Mason University, Center for Sistemic Peace, February.

1.2. CIM: contract-intensive money

Presentation

Clague *et ál.* (1999) define contract-intensive money (*CIM*) as the ratio of non-currency money to the total money supply, or $CIM=(M_2-Curr)/M_2$, where M_2 is a broad definition of the money supply and *C* is currency maintain by people (outside banks).

Sources

- Argentina, Australia and Canada came from Prados de la Escosura and Sanz Villarroya (2009, 2006). Data kindly provided by the authors.
- Chile: own elaboration. Data derive from Jeftanovi *et ál* (2003).
- New Zealand: own elaboration. Data derived from Statistics New Zealand-Long Term Data Series (SNZ-LTDS) based on Bloomfield (1984) and own estimates.

Source reports notes and coins held by the public since 1935 and, for the previous years (1875-1934), the category considers notes in circulation. The first figure is $ 10, 778, 000 and the average for 1933-1935 of the second one is 11,049,00. The differences are few and we consider notes in circulation as a good proxy to the currency maintained by the people.

SNZ-LTDS presents own estimates of M_2 for 1877-1913 and, for the previous years, we adjust these data with the movement of M_1 series.

- Uruguay: Data came from Román & Willebald (2010). Data kindly provided by the authors.

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STATISTICS NEW ZEALAND-LONG TERM DATA SERIES, Series Finance, Table: F.1.4, Sub-series: Banks, Total Currency in Circulation and Total Currency held by the Public, http://www.stats.govt.nz/browse_for_stats/economic_indicators/NationalAccounts/long-term-data-series/finance.aspx, retrieved 28, May, 2010.

STATISTICS NEW ZEALAND-LONG TERM DATA SERIES, Series Finance, Table: F.4.1, Sub-series: Money Supply, M1, M2, M3, http://www.stats.govt.nz/browse_for_stats/economic_indicators/NationalAccounts/long-term-data-series/finance.aspx, retrieved 28, May, 2010.

2. Agrarian product per worker and functional income distribution

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3. Econometric exercises: data set and exercises

Country	T1	AGDPW	AGDPWG	RW	C	CIM	HM
1	1860	90			3	0.56	1.00
1	1870	103	0.03	1.60	3	0.55	1.00
1	1880	124	0.03	2.16	3	0.55	1.01
1	1890	544	0.12	1.51	3	0.55	1.01
1	1900	1,427	0.15	1.67	3	0.66	1.01
1	1910	2,376	0.03	3.22	3	0.74	1.02
2	1860	965			6	0.77	1.00
2	1870	1,063	0.02	1.64	6	0.83	1.00
2	1880	1,296	0.02	1.64	6	0.88	1.00
2	1890	1,802	0.03	2.36	6	0.92	1.00
2	1900	1,853	0.00	1.57	7	0.92	1.00
2	1910	2,093	0.01	1.55	7	0.94	0.99
3	1860	734			6	0.47	1.00

3	1870	781	0.01	2.21	7	0.63	1.00
3	1880	993	0.02	1.87	7	0.72	1.00
3	1890	1,126	0.01	2.05	7	0.79	1.00
3	1900	1,498	0.03	1.87	7	0.85	1.00
3	1910	2,102	0.03	2.40	7	0.89	1.00
4	1860	280			2	0.09	1.00
4	1870	302	0.01	3.50	3	0.28	0.99
4	1880	390	0.03	4.23	4	0.39	1.01
4	1890	423	0.01	3.63	7	0.51	1.01
4	1900	347	-0.02	2.35	7	0.63	1.02
4	1910	488	0.04	3.82	7	0.75	1.01
5	1860	1,002			7	0.81	1.04
5	1870	1,780	0.07	1.46	7	0.87	1.09
5	1880	1,301	-0.04	1.20	7	0.92	1.11
5	1890	1,708	0.03	1.36	7	0.93	1.13
5	1900	1,979	0.01	1.86	7	0.93	1.15
5	1910	2,108	0.01	1.70	7	0.93	1.17
6	1860	917			1	0.57	1.07
6	1870	966	0.01	1.23	1	0.61	1.14
6	1880	1,088	0.01	1.86	1	0.64	1.28
6	1890	1,407	0.03	2.31	1	0.69	1.41
6	1900	1,341	0.00	1.92	2	0.65	1.50
6	1910	1,217	-0.01	3.23	4	0.63	1.64

Sources: see text. Argentina (1), Australia (2), Canada (3), Chile (4), New Zealand (5), Uruguay (6).
AGDPWG: annual economic growth of agriculture product per worker.
AGDPW: agriculture product per worker, dollars 1910s.
RW: ratio total rents/total wages (mass of retributions to productive factors land and labor).
C: constraints on the executive.
CIM: contract-intensive money.
HM : ratios *HI/MI* (where *HI* and *MI* are contribution land frontier expansion indexes).

ECONOMETRIC EXCERCISES: AGRARIAN GDP PER WORKER GROWTH RATES, INSTITUTIONS AND INTERACTION NNRR-INSTITUTIONAL QUALITY

Dependent variable:

	Growth GDP per worker			
	OLS	OLS	OLS	OLS
Constant	**0.117**	**0.114**	**0.14**	**0.14**
	*(2.05)**	*(1.96)**	*(2.11)***	*(2.06)***
AGDPpw	**-0.013**	**-0.011**	**-0.022**	**-0.023**
	(-1.49)	*(-1.17)*	*(-1.82)**	*(-1.78)**
HM	**-0.0001**	**-0.0001**	**-0.00003**	**0.0001**
	(-1.26)	*(-1.18)*	*(-1.26)*	*(0.42)*
C	**-0.0012**	**-0.003**		
	(-0.39)	*(-0.63)*		
HM*C		**0.00002**		
		(0.94)		
CIM			**0.05**	**0.05**
			(1.40)	*(1.41)*
HM*CIM				**-0.0001**
				(-0.69)
Rsq	*0.16*	*0.18*	*0.20*	*0.20*
F stat	*2.58*	*2.92*	*3.83*	*2.34*
(Prob)	*0.08*	*0.04*	*0.02*	*0.08*
Observations	*30*	*30*	*30*	*30*

All coefficients were estimated with robust standard error. t-statistic in parenthesis.

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