Research Statement

Luis Felipe Sáenz*

My research interests are related to Growth and Development, Macroeconomics and Economic History. A common denominator in my research agenda is the role of sectoral analysis in shaping the process of economic development. In the words of W. W. Rostow, "(...) we require a (...) theory (...) which focuses directly and in some detail on the composition of investment and on developments within particular sectors of the economy."[1] In this research statement, I briefly discuss the contribution of my job market paper as well other current and future research projects.

My job market paper, entitled "Time-Varying Capital Intensities and the Hump-Shaped Evolution of Economic Activity in Manufacturing", focuses on understanding the rise and decline in manufacturing activity followed by economies as they structurally transform. I argue that it is critical to consider the fact that capital intensities in manufacturing increase during the development process. I construct a model of structural transformation that allows for time-varying capital intensities and test the hypothesis using the development experience of South Korea as a laboratory to address whether one can generate the hump-shaped evolution of manufacturing activity with the introduction of time-varying capital intensities. My main finding is that the growing bias toward capital in the production for manufacturing output is critical to generate the declining part of the hump. Whereas extant drivers of the structural transformation do generate the decline in agriculture, the rise in services, and the rising part of the hump, time-varying capital intensities are the additional "labor push" needed to account for the deindustrialization observed at later stages of development.

In this paper, I use data on capital income shares in agriculture, manufacturing and services to identify time-varying capital intensities, and show that this evidence is consistent with the Kaldor facts for the United States and for South Korea after a substantial decline in the agricultural participation of employment has been achieved. My interpretation of these results is in line with the main mechanism suggested in my paper: Time-varying capital intensities are an additional "push" of labor out of manufacturing driving the economy toward services, where the capital income shares are not declining for the sector as a whole, in spite of the heterogeneity observed within services.

My job market paper owes a major intellectual debt to David Ricardo and his mea culpa regarding the role of machinery in the distribution of income. In short, David Ricardo considered in the first two editions of his book entitled "On the Principles of Political Economy and Taxation" that the introduction of machinery would not impact the interests of the working class due to his notion of fixed proportions for capital and labor. However, in a new chapter entitled "On Machinery", he recognizes that the invention of machinery can potentially bias the production toward capital goods since its purpose is nothing but to save labor.

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*University of Illinois – Department of Economics. 7 David Kinley Hall, 1407 W. Gregory, Urbana, IL 61801. E-mail: saenz3@illinois.edu. Web Page: https://sites.google.com/site/luisfelipesaenz/.

[1]W.W. Rostow, *The Stages of Economic Growth. A Non-Communist Manifesto* (Cambridge, 1965), p. 13.

In my third year paper, entitled "The Ricardian Effect: Evidence from Colombia",[2] I tested Ricardo's hypothesis using a longitudinal dataset for Colombian manufacturing establishments for the period 1982-1998. The virtue of the data is that it provides measures for capital the number of workers employed at the plant level together with whether the task of each worker belongs to non-production or production activities. After estimating input demand elasticities, I found that, on average, when a plant increases its capital stock by 67 per cent, it will reduce its payroll by one non-production worker and four production workers. This replacement is stronger after the so-called market-oriented reforms of the 1990s. To my surprise, I did not find evidence of complementarity between capital and non-production workers; although with better measures of skill and non-skilled labor, I would expect to find such complementarity.

Was David Ricardo right? The evidence suggests that indeed capital does replace labor. Moreover, on aggregate, I show in my job market paper that the capital participation in the manufacturing value added is growing, so one can say that Ricardo's claim finds echo if one observes the dynamics of input demands in manufacturing. However, in order to have a comprehensive view of the economy as a whole one needs to account for the role of services and its heterogeneity. My first step to understand the service economy is an attempt to answer the following question: Why is Europe, relative to the United States, lagging behind with regards to labor productivity?

With two colleagues from the Ph.D. program at Illinois (Cesare Buiatti and Joao B. Duarte) we document that, in terms of labor productivity, Europe was converging to the United States before the 1990s when the participation of employment in manufacturing was still an important fraction of the labor force for several European countries. However, due to the process of structural transformation, the movement of labor out of manufacturing implied a transition from more productive to less productive sectors, as suggested by Baumol with his explanation of the cost's disease at later stages of development. However, in spite of the fact that both the U.S. and Europe were becoming service economies, the U.S. outperformed Europe in some sub-services that are largely responsible for Europe's lagging behind.

We construct a model of structural transformation in agriculture, manufacturing, and eleven comparable sub-services which identifies that the productivity observed in whole and retail trade and financial and business services are largely responsible for most of the observed gap between the U.S. and Europe. We also find that this distance is not explained solely with relative measurements of inputs. In spite of addressing empirically the observed gaps in physical capital, in education and in information and communications technology, we still leave a large fraction of the gap unexplained. Moreover, we find that this residual gap is affected significantly if one considers output market regulations. Europe is lagging behind due to its stringent regulation framework that undermines competition, and this seems to be particularly relevant for financial and business services.

An important area in my research agenda is related with the historical role of sectors in shaping policy. With Prof. Stephen Parente from Illinois and Prof. Anna Seim from Stockholm University we revisit the puzzling correlation (or lack of) between income and democracy and suggest a theoretical framework where the transition out of agriculture matters substantially for the future prospects of democracy. Our empirical motivation illustrates that education increases the chances for democracy, but those chances are jeopardized at high

[2] This paper won the Brems Graduate Research Award for Best Third Year Paper at the University of Illinois.

income levels if the political regime is still autocratic. One can even say that only societies that had a transition based on education are expected to democratize. Empirically, the novelty comes from an interaction between income and education. The evidence suggests that the chances for democracy are higher for poorer countries so long as they are starting a transition with human capital formation. We interpret this result as evidence that income alone is not the driver of democratizations, and that the education of the workforce is essential to understand the adoption of democratic regimes.

Motivated by this empirical evidence, we develop a theory where landed elites require illiterate workers whereas the nascent industrial bourgeoisies need workers with positive investments in education. We show that the interests of landed elites are critical for blocking education and thus delaying democratization. In our model, the democratization is followed by the transition out of agriculture as long as that this transition is toward an industrial sector that demands human capital at its nascent stages. Education plays an essential role toward democratization at early stages of development, namely when the transition takes place from a Malthus economy based on landed elites and illiterate workers, to a Lucas economy based on the employment of educated workers.

In another research project co-authored with Prof. Marcelo Bucheli from Illinois, we explored the differences in policies pursued by the main export sectors in Colombia during the Great Depression. Our contribution is entitled "Export Protectionism and the Great Depression: Multinational Corporations, Domestic Elite, and Export Policies in Colombia."[3] Our main contribution is that each of the export sectors pursed protection from the state in the midst of the Great Depression, but this protection varied according to the technological barriers of entry in each sector and to their capacity to overcome the problems of collective action.

During this research, Prof. Marcelo Bucheli and I learned that in order to understand the economic policy in Colombia it is critical to investigate thoroughly the coffee sector. Numerous economic historians have pointed that one cannot even think about a "Colombian economy" before the surge of the coffee industry during the early twentieth century. We recently submitted an article to the *Strategic Management Journal*. In this submission, we investigate the disproportionate power held by the coffee sector and show how an organization shaped a country's long-term policy by developing a narrative to justify its power. We argue that an historical narrative can be considered as a public good, and other actors with different political purposes can eventually appropriate them. For this and other ongoing research projects around the coffee sector in Colombia, we had access to minutes and internal documents of the National Coffee Growers Federation in Bogotá, Colombia. This archival material is not available to the public, and it provides an unique window to understand the disproportionate role of an particular sector in shaping the policy of a country.

With Marcelo Bucheli we are currently preparing a book for submission to Oxford University Press using the archival evidence on the Colombian coffee sector to investigate the shaping of the institutional framework in Colombia by the coffee growers for the period 1935-1998. We are also exploring in a separate project the changing institutional framework in Argentina after WWI through the lenses of the domestic oil market. Argentina was one of the wealthiest countries in the world thanks to its superb agricultural productivity and its orientation

[3] This paper is published in the peer-reviewed collection of essays edited by Paulo Drinot and Alan Knight in 2014 and entitled *The Great Depression in Latin America* (Durham: Duke University Press).

toward free markets before WWI. However, after WWI Argentina faced a challenge when the European markets were no longer a sustainable client for their exports, unleashing important changes to the institutional framework.

The Argentinean case is also a subject of inquiry in an ongoing project with Cesare Buiatti entitled "Learning to Block the Riches". In this project, we bring the notion developed in the literature of Learning and Bounded Rationality which suggests that econometric tests for model selection can vindicate inferior models when the data-generating-process is endogenous. Were the protectionist policies pursued by Argentina optimal? Our goal is to show that in spite of being policies that sustained an unproductive industrial sector, the selection of these industrial policies can be vindicated as optimal when the econometrician and his conclusions have an effect on the policy he seeks to inquire about. In the words of C.S. Lewis "(...) unless the measuring rod is independent of the things measured, we can do no measuring."

In a new project that is still in its early stages, I pursue an immediate question derived from my job market paper related to the mechanics behind time-varying capital intensities. The heterogeneity observed in capital income shares between manufacturing and services is an important subject on its own. To address this question, I am considering a framework which combines firms that are heterogeneous with regards to the tasks that they perform, the firm's survival pressures given by rising wages over the development process, and the fact that whereas routine-based tasks are subject to automation, "difficult" tasks require investments in human capital. The decision of automation is the critical element to understand time-varying capital intensities and its heterogeneity between industries with more routine-based tasks (manufacturing) *vis-à-vis* industries in charge of solving "difficult" tasks (services). A critical element of the theory is that this decision is updated each period when capital units are depreciated. Therefore, the heterogeneity observed in depreciation rates across different capital investments is an additional layer to explain time-varying capital intensities.

I am also interested in expanding my understanding on the process of premature deindustrialization experienced by some developing countries, particularly in Latin America. After showing that capital intensities are critical to address the declining part of the manufacturing hump-shape an important question is to understand to what extent the structural transformation depends on industrial policy regimes - such as the industrialization by substitution of imports- and to what extent it depends on factor endowments. My job market paper suggests that capital intensities changing over time must be part of the answer.

Last, but not least, there are a number of future projects derived from the paper on income, education and democracy with Professors Parente and Seim. For instance, we plan to explain the discrepancies in polity between the industrial north and the agrarian south that were at the root of the U.S. Civil War. Additionally, we are interested in explaining a robust preliminary finding: The negative correlation between income and democracy for former colonies, documented previously in the development literature, is driven by party autocracies. In general, my plan is to continue working on research questions at the intersection between Macroeconomics and Economic History in order to contribute to our understanding of the process of economic development.