National Innovation Systems, Institutional Path Dependence and Economic Development in Latin America

James M. Cypher

Pushchino Symposium, Institute of Economics, Russian Academy of Sciences:

12-13 September 2013

Abstract, I

- Since colonization by Spain and Portugal in the 16th Century, the structure of Latin America's political economy has undergone slow transformation, while institutional path dependence has left a profound colonial legacy inhibiting processes of economic transformation.
- One hypothesis is that Latin America's neo-feudal structure was deepened after Independence through a symbiotic consolidation of neo-feudal and merchant capital modes of production.

Abstract, II

- endogenous ‘backward’ forms of production and circulation were subordinated to the exogenous capitalist mode of production during the Second Technological Revolution (1870-1913).
- Due to the pre-industrial structure, no transfers of technological capacity occurred. With proto-industrialization and later the onset of the era of Import Substitution Industrialization (1930-1980), Latin America entered its second of three periods of institutional-structural transformation.
- During this period of shallow industrialization promotion of autonomous innovation capacities was rarely pursued.

Abstract, III

- The third structural transformation, Neoliberalism, has, in many respects, opened the way for adverse path dependent processes, particularly with regard to endogenous technological capabilities.
- Latin American has shifted further away from the frontiers of science and innovation.
- Only Brazil has seriously pursued the construction of a National Innovation System. This paper presents an Institutionalist analysis of the evolutionary path of endogenous innovation capacities, emphasizing the current era.

contents

- This paper is divided into four main sections, the first of which is grounded in Institutionalist analysis as developed by Veblen and Brady.
- The second section constitutes an attempt to encapsulate the essence of the national system of innovation approach.
- The third section presents a summary analysis of the relationship between economic development and the national innovation systems approach.
- The last section presents a historically contextualized application of the foregoing analyses as they can be applied to Brazil.

Veblen (1857-1929)

- Veblen was concerned with why and how the advanced industrial nations had evolved, how and why structures had been altered and abandoned and the underlying causes of ongoing social transformations.
- In his masterful studies of Germany and the US, as exhibited in Imperial Germany, the Theory of Business Enterprise and Absentee Ownership, Veblen was concerned with social power.
- This social power was either used to maintain an institutional structure (ceremonialism, or path dependence) or to alter it, for better (instrumentalism) or worse (adverse path dependence). It was not Veblen, but Hamilton in 1919 who described Veblen—with his unique form of analysis—as part of an emerging school of 'institutionalist'

VEBLENIAN INSTITUTIONALISM & NIE

- why are some countries poor and others affluent? Practitioners of what has frequently been term the 'New Institutional Economics' or (NIE1), have commonly suggested that nations that follow the rule of law and have strongly defined property rights are those that achieve affluence.
- NIE is actually Neoliberal Institutional Economics (NIE2). This is a purposely constructed oxymoron intended to buttress William Dugger's analysis that so-called NIE1 is neither new nor institutional

VEBLENIAN INSTITUTIONALISM & NIE

- upon examination, the romantic reductionism of NIE1 collapses into NIE2: here only those institutional tendencies or changes that enhance the autonomous power of market forces can be considered meaningful and causal for economic development.
- characteristically of this particular brand of Neoliberal analysis that NIE2 offers no convincing historical evidence to support what is, upon examination, a mere set of tautologies; it is in fact ahistorical, and best exhibits the degenerative tendencies that have overtaken some practitioners of contemporary economic thought

Institutional Dynamics: Evolution

- Setting the process of institutional change into motion is, linked to technological change, which, is linked to a fundamental tendency of human behaviour (‘idle curiosity’)
- even under the most favorable of circumstances, the potential advances that can be derived from ‘idle curiosity’ may be counter-posed by the predatory inclinations of the dominant social strata—the very negation of ‘curiosity’ in favor of (ceremonial) conformance to established social norms that hegemonize the idea of ‘leisure’ or ‘idleness’ as the ultimate imprimatur of social well-being and status.

Schumpeter?

- Schumpeter found the motor force for his dynamic system to be that of innovation harnessed by entrepreneurs.
- later, Schumpeter acknowledged that the individualistic entrepreneurs were fading out
- Gerschenkron demonstrated that States, and large business organizations, could equally—if not more so—play the catalytic role once fulfilled by the entrepreneur, and earlier by the ‘mere’ mechanic

Veblen introduces technology

- it was Veblen who initiated the emerge of the keyword technology, due to his careful scrutiny of Germany's rapid economic rise in the late 19th Century—as reflected in *Imperial Germany and the Industrial Revolution*
- Veblen found that the earlier understanding of technology—as" framed in such terms as useful arts, manufacturing, industry, invention, applied science, and the machine"—had lost its descriptive power as German society had evolved and new meanings emerged

Die Technik

- In England, technology was as field of study concerned with the practical arts; not industrial processes or artifacts. In German-speaking regions, a new discourse emerged around *die Technik* in the second half of the nineteenth century, which referred to the practical arts as a whole, especially those associated with engineers and modern industry
- Veblen encountered the concept of Technik in German social theory, he incorporated its meanings into the English word technology, thereby transforming it into a sophisticated concept that was in many ways ahead of its time. Most scholars who drew on Veblen's concept missed its subtleties…

The Monopoly Capital Stage & Veblen

- As Gordon has demonstrated, Veblen diagnosed the interrelated issues of oligopoly power, technical change and industrial transformation arising from the Second Industrial Revolution—exactly in that historical epoch which produced the highest rate of increase in productivity and the most sweeping wave of innovations ever in the US economy
- Veblen grasped the essence of the historical moment of his time—modern science had been welded to production via the rise of the horizontally and vertically integrated industrial firms.

1980-present: state-led national innovation systems

- National Innovation Systems comprise three interactive constituent elements:
- private sector firms which are engaged in activities that associate with innovation—such as (R&D
- university research laboratories and other science and technology research programs undertaken at universities,
- state agencies and/or ministries devoted to or specializing in the promotion of science, technology and innovation.
- This is the basic triangular relationship: but, these component parts must operate with a high degree of fluidity, complementarity and “trust”:

NI Systems & Development

- The sizeable literature relating to the NIS approach arose in Europe. Inadequate research has been conducted regarding the degree of transferability of this concept to developing nations

- Extensions have been made to the successful East Asian nations, beginning with the case of Japan. Most recently China's efforts to build their NIS have received attention

the dual aspects of innovation

- national firms frequently lag behind because technological capacity relates to (1) both the tacit ‘know-how’ (learning capacity and reverse engineering capacity) and later know-why (autonomous technological creative capacity) and to
- (2) the state-of-the-art *technology of organization*, where developing nations are weak as Nelson has emphasized
- Learning-by-doing, understanding and interacting is as crucial as managing S&T

NIS and transferability

- Amsden has shown that such transference can be an has been achieved—but not universally
- 'developmental states'—the opposite in many respects of Veblen's 'Dynastic State'—can and have used the 'principle of reciprocity' to fulfill industrial policy objectives in East Asia.
- the Neo-Schumpeterian advocates of the NIS approach have little specific to offer in terms of how the NIS triangle can be build or sustained in the nations of the 'periphery',
- Amsden demonstrated that innovation in policy design was eventually applied to the issue of building endogenous technological capacity.

Ohno and the predatory animus

- To the degree that the NIS 'triangle' exists—it is not understood as a prime causal driver of the development process.
- It operates at a lower, (inter)dependent level. Ohno's research reveals the three interdependent components presented in the NIS approach lack specificity in
- Ohno emphasized the social dysfunctionality arising from the 'lazy private sector' which can only be overcome by 'a strong state' which operates with a deep knowledge of industry (Ohno 2013). Science and technology are not enough according to Ohno—their existence and participation must be combined with the "resolve and passion of political leaders and public servants" to overcome the limits posed by the private sector's immaturity

Table 1: Total Factor Productivity: Latin America vs. Other Developing Regions: 1990-2005

Regions & Nations	2005 TFP relative to the US (US level = 100)	Annual Percentage Growth in TFP: 1990-2005
Latin America & Caribbean	19.3	0.2
East Asia	8.4	5.1
Middle East & No. Africa	13.3	0.5
South Asia	5.8	2.3
Sub-Saharan Africa	5.6	0.2
Low-Income Countries	5.2	1.7
Developed Nations		
OECD High-Income Nations	77.1	1.3

Source: World Bank, 2008. *Global Economic Prospects, 2008: Technology Diffusion in the Developing World*. Washington: D.C.: World Bank.

Brazil's NIS

- **FINEP**

rejuvenated in 1999 **the Sectorial Funds for Science and Technology**. The **Pro-Innovation** program introduced commenced in 2002. Subsidized credits to innovation-prone national firms under the **Program of Zero Interest** began in 2004. (From inception through 2005 an average of only 18.3 percent of eligible firms—the majority being large firms—received some form of government support through these programs)

- **PITCE: Industrial Technology and Foreign Trade (2004-2008)**

This program was launched in early 2004 with the aim of increasing the levels of domestic value-added and innovation throughout the national industrial base. The objective of the PITCE was broad and fundamental—constituting a turning-point toward 'new developmentalism'. The PITCE, in official language, sought to recuperate the State's capacity as a formulator and coordinator of development policy. The PITCE concentrated on the promotion of five strategic sectors—capital goods, software, semiconductors, pharmaceuticals and medicines—and three sectors of the future—biotechnology, nanotechnology and sources of renewable energy

Brazil's NIS

- **PDP: Plan For Productive Development (2008-2010)**
- PDP became Brazil's most ambitious development program during 2008-2010. The PDP programed outlays of approximately $142 b. USD, the bulk of which was to come from BNDES. Exhibiting the influence of numerous high-level Neo-Schumpeterian policy makers, The PDP sought to coordinate and underwrite the basis for a long wave of accumulation.
- **PACTI: Action Plan for Science, Technology and Innovation (2007-2010)**
- Overall expenditures of roughly $23 billion USD were devoted to research grants and scientific infrastructure. The overall combined objective was to increase the GDP percentage of expenditures on R&D in the private sector to 0.65% and to articulate Science, Technology and Innovation to Industrial Policy.

Brazil's NIS

PMB: The Greater Brazil Plan (2011-2014)

- A dynamic, broad-scale, innovation-centered program designed to contest the recent loss of industrial export capacity and the adverse consequences of deindustrialization. As well, it is a project to restructure the industrial base, intended to provide endogenous high-productivity industrial capacity.
- **PACTI-II, implements the National Strategy for Science Technology and Innovation (2011-2014)** Increases of up to 50 percent in crucial areas, no total outlay figure available
- **The Plan for Innovative Firms (2013-2014)**

Planned outlays of $14.5 b. USD to increase productivity through technical change