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Industrial policy and complexity economics — **Josef T. Yap, John Faust M. Turla**

Mapping feasible routes towards economic diversification and industrial upgrading in the Philippines — **Annette O. Balaoing-Pelkmans, Adrian R. Mendoza**

Industrial policy for innovation: why does it matter? — **Rafaelita M. Aldaba, Fernando T. Aldaba**

Exploring the prospects of services-led development for the Philippines — **Ramonette B. Serafica**

Natural gas and transitioning to renewable fuels: considerations from industrial policy — **Dante B. Canlas, Karl Robert L. Jandoc**

How might China-US industrial policies affect the Philippines?: a quantitative exercise — **Ma. Joy V. Abrenica, Anthony G. Sabarillo**

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Comment on "Industrial policy and complexity economics"

Raul V. Fabella*
University of the Philippines

First of all, I must admit to some unfamiliarity with complexity theory. Secondly, I agree on the importance of focusing on why investment rates in the Philippines are so low: the private investment rate of the country has remained below 25 percent and government capital outlays have remained even lower. Achieving a higher target of eight percent in government capital outlay within the next two years seems unlikely due to overwhelming consumption demands on resources which reduces the share of investment.

I appreciate exploring out of the box and complexity theory is certainly out of the box. Complexity uses a different kind of mathematics. A simple feedback loop can create unmanageable complexity. On imperfect information, we make a distinction between risk and uncertainty. Risk exists in a world with known probabilities and states of the world although knowledge may be imperfect. Risk can be reduced by acquiring more and more data. Uncertainty is something else: where uncertainty is radical, phenomena of interest and their dynamics are not governed by known probabilities. Nor are the states of the world known with certainty as they may be emerging. Emergence may be weak or strong. Strong emergence happens when the collective exerts an influence on the behavior of its parts: strong emergence is not yet governed by known mathematics.

Looking for an understanding of our problems in new math is admirable but also risky. The resort to complexity may just be misguided if, as Joseph Stiglitz affirms, cited by the authors, the failures we face are failures of political economy. I agree with Stiglitz that failures in politics, rather than mathematical economic modelling, are often the biggest obstacles to development. A noteworthy example is the Comprehensive Agrarian Reform Program (CARP), introduced in 1988, which remains in effect and continues to limit agricultural progress by limiting farm acreage growth. One way to create positive economic feedback is through farm consolidation, allowing for larger farm sizes and increased capital investment, similar to the strategies employed by China.

On radical uncertainty: what is the sense of radical uncertainty in this paper? Does this refer to the Knightian radical uncertainty from 1921 or John Kay and Mervin King's *Radical uncertainty: decision-making for an unknowable future* from 2020? Is our lack of knowledge resolvable by acquiring additional

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knowledge? Not in the case of radical uncertainty. The probability distribution or knowledge over the states of the world that is still being created; knowledge may not be built. It is contrary to risk uncertainty where the governing probability distribution is known and thus more data may whittle down the uncertainty.

The discussion on increasing returns to scale is very relevant to industrial policy. However, this is difficult to reconcile with neoclassical economics which assumes convexity overall and thus precludes scale economies.

Government interventions are conceived to correct garden variety market failures, where unaided interactions between self-seeking private actors result in inferior outcomes. Such, for example is CARP. But there is also the idea of meta-market failure: an economic system might function Pareto efficiently according to market principles but still produce socially undesirable outcomes, such as income inequality. In such cases, government intervention may be necessary to correct the system, not because of traditional market failures, but to align market outcomes with social goals. This seems to be the problem raised by Thomas Piketty in *Capital in the 21st century*.

Finally, with reference to the success of South Korea, which had sound underlying policies, and the Philippines where policy mistakes happened: what was the divergence due to? Was the divergence due to noncorrelation among the three variables? Or is the non-correlation due to Stiglitz's political economic behaviors? In the econometric work, it seems that there is a need for the three variables (investment/GDP, export/GDP, and manufacturing/GDP) to correlate highly throughout the development arena. What if there is no correlation at all? What if the correlation is only among two of them? Are the three highly correlated in Vietnam and Malaysia? How about the Philippines, what was the correlation between these? These questions don't seem to be satisfactorily answered.

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