

**Aggregation, Emergence, and Economic  
Development**

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*The ideas presented in this research are the author's and do not represent official positions of the Mercatus Center at George Mason University.*

## I. Introduction

"The world of humankind creates a manifold, a totality of interconnected processes, and enquiries that disassemble this totality into bits and then fail to reassemble it falsify reality. Concepts like 'nation', 'society' and 'culture' name bits and threaten to turn them into things. Only by understanding these names as bundles of relationships, and by placing them back in the field from which they have been abstracted, can we hope to avoid misleading inferences"

E. R Wolf [1982]<sup>1</sup>

A Burmese man, living illegally in Thailand, is given a choice between a box of cigars and a book written in English. The cigars are the brand he regularly smokes and he cannot read or speak in English. And yet he chooses the book. Why?

In the heart of Manila, the capital of the Philippines lives a dynamic business lady. With money she and her husband received as a wedding gift, supplemented with a loan from a Microfinance organization, she opened a small store. Throughout the last decade her business has growth substantially and has allowed her to buy rental properties. And while she is no longer a member of the microfinance organization that originally helped her, she refuses to use the banks. She prefers to use the local moneylenders, who charge 3 to 4 times as much as the banks. Why?

While both of these questions have unique answers they both present a similar challenge to economists and others who desire to help so many of the world's poor. The Burmese man and the Filipino lady, each value their options differently than conventional wisdom would suggest, or at least as they are presently thought of in current macroeconomic models. The Burmese man cannot read English so how can he enjoy a book he cannot read, over something he has enjoyed

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<sup>1</sup> Wolf, E. R., (1982) *Europe and the People without history*.  
Berkeley: Berkeley University Press

in the past? And why would a successful businessperson, in a world of profit maximization, ensue the use of formal institutions and their lower interest rates to use the informal moneylenders with their significantly higher rates? Is the subjective nature of each individual's personal valuations beyond the reach of our macroeconomic models?

Our world is full of well-meaning economists who believe intervention will do the trick if we can just get the right policy mix. But this belief is built upon the premise that our macro models are capturing enough of the real world so that interventions can be well crafted in an attempt to realize their goals, be that development or cyclic stabilization. Too much of the measuring of success relies upon aggregative statistics, which have become the defacto benchmark. But these aggregated measures have become much more than just information. They have become the very target a given policy is attempting to change.

In this paper we argue this approach is flawed for two distinct but interrelated reasons. First, the aggregated variables are taken as a representation of reality. They are taken as including our Burmese man and Filipino lady. Second, the aggregated variable is mistakenly seen as something upon which the policy maker can directly act upon or change.

In the next section we will discuss some efforts, within the discipline of economics that have been made to increase our awareness of these problems. But as we will later argue they fail to go far enough while others have engaging in what can best be regarded as insulating stratagems. (Kuhn)

## **II. The growing cracks within economic theory**

“Contemporary orthodox economics is isolated. It is isolated from its roots in the late eighteenth and early nineteenth centuries, when economists were by no means afraid to theorize, but did so purely to illustrate and understand the great practical issues of the day”

Paul Ormerod (1994)

Economics seems to be in trouble and there is no shortage of books on the topic: *The death of Economics*, *The end of Economic Man*, *Economics on Trial* or *Machine Dreams*. Much of the trouble is to be found in the flawed ideas implicitly assumed within the macro models still taught in most standard undergraduate and graduate texts.

Even if the Microeconomic consensus of the neoclassical paradigm fails to completely fracture (Mirowski) Macroeconomics can no longer be sense as simply empirically challenged. Kirman (1992) presents a damning criticism of the representative agent approach to macro theorizing and modeling. He argues this approach is not only unjustified but is often wrong and fundamentally erroneous. But the errors that are a consequence this type of modeling are ubiquitous, so much so that Kirman is loath to single out any particular author, as the examples “are so easy to find, [he] will not risk the wrath of his colleagues by citing particular examples.” But his criticisms, while aimed at the representative agent approach, are not turned on macroeconomics in general. The problems of aggregation are only raised within the representative agent approach. And while this problem cannot be overcome directly, Kirman advocates new macroeconomic modeling which studies the aggregate activity directly.

Ormerod (1994, 1998) argues that the present failures of macroeconomics cannot be rectified within the prevailing methodology. New attacks come from game theorists (Gintis, Binmore, Basu) in an attempt to shore up our macroeconomic perspective. But these efforts while insightful at the micro level fall into the same problems of aggregation.

The representative agent, while coming under attack, is but one of the macro model building blocks. The other is the Walrasian price and allocative process. Axtell (2003) has argued non-Walrasian allocations featuring price dispersion, are Pareto optimal and more efficient than Walrasian mechanisms when the costs of complexity are considered. This in conjunction with the implausibility of the Walrasian process, he argues, requires a substantial revision of the conventional wisdom. The rise of computational social science has much to do with its attempt to incorporate heterogeneous agents with limited knowledge. The idea that

societies grow, much like an ecosystem, rather than simply run along a predetermined track, like a train, seems to capture more of reality than simplistic representations.

Of course this should be no surprise to economists, really! Hayek won a noble prize and of all his contributions the most often cited seems to be the importance of local knowledge and how the economic nexus is best seen as a spontaneous order. (Hayek, Boettke, Vanberg, Sugden) But it is not simply local knowledge, the idea that institutional knowledge contributes to economic performance is no longer controversial but it is certainly problematic –especially if we want to measure it. (North, V. Smith) Much of the Asian development literature now plays more than a passing interest in the colonial history in that region.<sup>2</sup> And while institutions and culture matter, and although widely recognized, they are still generally excluded, as most discussions of development policy are quantitative by nature.<sup>3</sup> In line with this new way of thinking there has been a clever analysis of culture in the transitioning Eastern European countries but the question of how resilient culture will be in the face of changing institutionalized incentives still remains.<sup>4</sup>

But despite all of the above efforts, or perhaps because of them, some economists are working to patch up the present state of macroeconomics. Stoker (1993) argues that more realistic sets of representative agents will help. Heterogeneous agents with utility maximization will improve the models currently in use. Diebold (1998) believes the future of macroeconomic forecasting, rather than being bleak, deserves our optimistic attention. As we have learnt from our mistakes and can build upon the “useful legacy of lasting contributions” from previous efforts.

Could it be that the tide of economic imperialism has turned. Economics may need to look to other social sciences to relearn the importance of the individual rather than the aggregated

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<sup>2</sup> Tan, G. (2003) *Asian Development: An Introduction to Economic, Social and Political Change in Asia (2E)*. Melbourne: Eastern Universities Press

<sup>3</sup> Daley, S “Old Wine in New Bottles”, Working Paper and Romer, D. (2001) *Advanced macroeconomics*. New York: McGraw-Hill (especially pp. 143-149)

<sup>4</sup> Steve Pejovich, Texas A&M University, “Understanding the Transaction Costs of Transition: It’s the culture Stupid” , USAID Forum Series on the Role of Institutions in Promoting Economic Growth April 4, 2003.

accounting of measurable variables. But the lessons of the past have for the most part fallen upon deaf ears. If economics is to learn anything from the complexity revolution surely it would be the impossibility of forecasting and the impossibility of the type of macro models that were the mainstay of the Keynesian revolution and its subsequent synthesis with neoclassical economics. Notwithstanding these problems, the basic models still being taught to graduate students of economics involve “the dynamics of economic aggregates [which] are determined by decisions at the microeconomic level” where there are a large number of identical firms and identical households. (Romer)

While many economists do not believe the econometric modeling is arbitrating truth they still fail to discard it as the framework through which the development issue is seen. More recently Fogel has argued macroeconomics inability to predict and subsequently explain the recent productivity increases in the U.S are simply a consequence of its limited paradigm. He does believe, however, that economists can remake themselves so that the models advocated in the future will present us will close approximations of reality.

### **III. Seeing the forest but missing the trees**

“Neither aid nor investment nor education nor population control nor adjustment lending nor debt forgiveness proved to be the panacea for growth. Growth failed to respond to any of these formulas because the formulas did not take heed of the basic principle of economics: people respond to incentives”

William Easterly (2002)<sup>5</sup>

The Burmese man, and Filipino lady mentioned above demonstrate the uniqueness of each individual. But if the individual is not studied directly and we focus on aggregated outcomes

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<sup>5</sup> Easterly, W. (2002) *The Elusive Quest for Growth*. Cambridge: The MIT Press

how reliable will this practice be in helping us understand the process of economic change. Despite the recognition of the 'missing individual' within models attempting to alleviate this problem through the study of aggregated behavior is still flawed.

What are borders? Are they just an artifact of modernity? The growth of nations and the subsequent rise in the size of the governments in those nations has naturally lead to most economists focusing on economies at a national level. This however fails to tell us things of real significance. The Chinese story of stagnation during the age of the greatest advances of the Industrial Age in Europe is seen as a puzzle. The Chinese for many years enjoyed the benefits of a society and a level of technology greater and more advanced than Britain and its neighbors. China possessed a greater level of capital, well-defined property rights, and a well-developed legal system. So why then did the Industrial Revolution not happen in China? If it was possible in Western Europe, then why had it not already occurred in a place, which had been more technologically advanced for a much longer period of time?

Institutions, culture and the protestant ethic are often bandied about as one-dimensional explanations. Pomeranz argues that a combination of factors resulted in the unique circumstances and opportunity available to Western Europe.<sup>6</sup> His multifaceted explanation focuses the regional variation within China and Europe rather than a simple comparison of nations. He demonstrates the wide socio-economic differences within China and Britain and points to this as a major contributing factor. The domestic distribution of industry and natural resources play a large role in the different opportunities for industrialization each country faced. Simply put, industrializing Britain was able to extract its huge coal deposits and transport them to the desired locations at a much lower cost than could their counterparts in China. This was the first important divergence on the road to industrialization.

This focus on regional as opposed to national statistics and variables is an excellent example of the type of economic history inspired by the work of Jacobs. Where the city-state is

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<sup>6</sup> Pomeranz, K. (2000) *The Great Divergence*. Princeton: Princeton University Press

seen as the seat of economic activity. National economies do not grow at a uniform rate across the artificially defined country but rather at differing regional or city levels. Pomeranz suggests the differences between the various regions of Western Europe (not just at a country level), are essential elements in the growth of one and the stagnation of the other.

It is possible for a country's national growth rate to be significantly different from its constituent states or city regions. This phenomenon will be exacerbated the greater the existing disparities between regions. Think of the U.S Western expansion. People were leaving the Northeast and traveling South and West. Income per capita estimates suggest people were leaving the high-income region for the low-income region. Looking at the regional economies we see that the West and South were both growing much quicker than the Northeast but the increasing populations of those regions influenced the per capita figures. Aggregating income for the entire country misses the richness of a more descriptive account.

In a recent field study conducted by USAID in Romania the lack of integration of the rural areas into the overall economy presented a barrier that again will not be reflected in the national accounts. What was observed was the diversion of resources into unproductive activities as the entrepreneurs sought to work their way around the bureaucratic and legislative barriers needlessly imposed upon the rural communities but absent in the urban areas.<sup>7</sup> And while we now distinguish between urban and rural environs it must always be remembered that rural and urban areas are not two homogenous classes, especially in relation to income.<sup>8</sup>

There is also the significance of income growth. In the heart of Baseco, Manila lives Ruth Sombbrero. She has been a member of CCT (Center for Community Transformation –an organization providing microfinance services) for the last few years. In which time she has been able to dramatically increase her income. With her first few loans she bought a TV and a video

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<sup>7</sup> William J. Baumol, "Entrepreneurship: Productive, Unproductive and Destructive," *The Journal of Political Economy*, 98: 893-921

<sup>8</sup> People moved to lower per capita regions because they believed their opportunities would be greater. We also see this in times of civil war and unrest as people depopulate the cities (normally a higher income region).

and the rights to a lot across from her own sari-sari<sup>9</sup> store which she turned into a little movie theatre. Ruth also bought an incubator so that she could raise fighting cocks. Together these activities have resulted in the tripling of Ruth's family income. Notwithstanding this dramatic increase, the population of Baseco-a small geographic area containing a quarter of a million people (approx. 65,000 households)- will ensure that Ruth's increase will have a negligible impact on the average income of their suburb. Microfinance outreach (number of people in programs) has been estimated at less than one percent. Let us assume for the moment a figure of one percent outreach and that the average income of a Baseco household is currently at the poverty line.<sup>10</sup> Even if one percent of the households experienced the dramatic improvements of Ruth and her family the per capita income of Baseco would grow less than two percent.<sup>11</sup> If the goal of Microfinance is to relieve poverty one would hardly think that such slow progress justifies the resources required when the macro measures, even at a regional level, are the inputs that influence the policy decision.

Aggregating national statistics therefore misses the lessons revealed by Pomeranz and Jacobs. In which the variation between countries can be of much less importance than the regional differences within a country, or the region of one country compared to the region of another. Generally within the same nation, regions face fairly homogenous levels of economic and political freedom. And so the potential problem of inter-country regional variation has been ignored in an attempt to produce evidence of coincidence or causality in differences in growth

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<sup>9</sup> Often these stores begin as a hole in the side of their dwelling through which they sell their products to those who pass by. Over time, and with investment, these stores can become quite permanent with glass cases for food display, counters, refrigeration and a wide range of products.

<sup>10</sup> Both of these assumptions will biased our estimate upwards, overstating the impact of a Ruth type increase.

<sup>11</sup> With a poverty level of 13,800 Php per capita and an average household size of 3.84 the average income for the household would be 53,076 Php. If one percent of these household (650) tripled their income it would result in an overall increase in the Baseco income of sixty-nine million Php. When spread across all households the final increase in average per capita household income is 1,061 Php a 1.9% increase.

and development as a consequence of the level of political and economic freedom.<sup>12</sup> Something more than the political and economic freedom, at the national level, is driving the differing growth rates of its regions. While the Pomeranz thesis deserves more attention we are not putting it forward as all encompassing explanation. But we are suggesting the methodology employed may promise a greater economic *verstehen*. This is because of the richness of the story that can be told when the agents themselves have not been aggregated away leaving us only national aggregated totals.

In his book *Globalization and its Discontents* Joe Stiglitz argues that trickle down economics has failed and that more interventionist policies are required to achieve a more equitable distribution of income. Without addressing the philosophical issue of equity we can still find two significant problems with the Stiglitz argument that come about because of his false confidence ‘in the numbers’. First, one must be cautious in using figures as the arbitrager of theory. Using the same database as Stiglitz, his claim that the lowest quintile of the U.S population saw real declines for the decade of the nineties is true for less than 30% of the last thirty years of data.<sup>13</sup> This is not to suggest Stiglitz is dishonest as much a victim of data which could justifiably ‘prove’ both sides of the argument. In such case Disraeli’s injunction regarding statistics is well worth remembering.<sup>14</sup> Second, the issue of income mobility is not addressed in the figures. Taking such a static view of the world, as Stiglitz has, implies that the people populating the lowest quintile will be the same group of people that will do so every year. But this implicit assertion is not borne out by cross section research. People do move through the quintiles throughout their lifetime. One or two tables of data rarely capture the complexity of reality.

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<sup>12</sup> Sully and Gwartney et al. (2003) “Economic Freedom and Crosscountry Differences in Income and Growth” Present to the Annual meeting of the Association of Private Enterprise Education held in Las Vegas Nevada, April 6-8, 2003

<sup>13</sup> This is done by generating a decade for each year since 1970 so that we have a decade commencing in 1970, 1971, 1972 etc.

<sup>14</sup> Benjamin Disraeli, Prime Minister of Great Britain once remarked that there are “Lies, damn lies and statistics.

Can the macro measures therefore tell us anything? Yes. But to suggest they provide the complete picture flies in the face of reason. Above we have simply argued that regional and at times individual level data is necessary to truly understand the impact of a particular policy or intervention. The question you wish answered will determine the extent and type of data that will need to be gathered. In the following section we will argue the objectification of these aggregated measures has produced a false confidence in the minds of policy makers.

#### **IV. Macroeconomics in the Shadow of Keynes**

“Nearly any introduction to economics will point out, in one way or another, that an economy is a complex pattern of activities that no one could plan or organize in specific detail. Things work and life proceeds in a generally coordinated fashion not because someone is in charge of assuring that this happens, but because no one is in charge. The complexity of an effort directly to produce that coordination would overwhelm any attempt actually to do so. The central concern of economic analysis has been to illuminate the workings of the “invisible hand” processes of economic governance through which economic coordination emerges.”

Wagner (2002)<sup>15</sup>

Even when it appears there's a Starbucks on every block, coffee prices are scraping the floor. Vietnam never used to produce much coffee until Hanoi pushed dramatic changes in the country's agricultural production – encouraged by the IMF and World Bank's call for restructuring. Vietnam soon became the world's second largest producer. In real terms, it is estimated that the prices today are the lowest in a century. And while the Vietnamese government

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<sup>15</sup> Wagner, R.(2002) "Complexity, Governance, and Constitutional Craftsmanship," *American Journal of Economics and Sociology* 61 (January 2002): 101-17.

now seeks to reverse the course it originally forced the farmers to pursue (it will attempt to prune 20% of the land currently devoted to coffee) it is uncertain if the farmers will actually listen and voluntarily cut their production. A growing concern is that they will grow even more to compensate for the lower prices.<sup>16</sup>

These types of problems seem to be an outgrowth of what we might call the Keynesian ideology. This is not to suggest it is the result of adherence to the Keynesian framework but to the underlying belief that the economy can be ‘managed’. Such confidence is unwarranted and inappropriate. (Buchanan)

Spontaneous order, with the popularity of complexity and chaos theory, has assumed a greater role in our understanding of macro phenomenon.<sup>17</sup> Complexity has helped us articulate the importance of emergence within the economic world and has highlighted the difficulty we have in determining causation, correlation and coincidence. Think of a traffic jam. Many drivers are simply driving to their desired location. Each driver’s behavior can be described in a few simple rules. Such as,

[Rule 1] if the road is clear increase speed until the legal limit is reached.

[Rule 2] as the distance to the car in front decreases – decrease speed to avoid a crash. A complete stop may result.

[Rule 3] As the distance to the car in front increases increase speed in accordance with

[Rule 1].

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<sup>16</sup> Far Eastern Economic Review. June 5, 2003. Worthless Beans p 6.

<sup>17</sup> Schelling, T (1978) *Micromotives and Macrobehavior*. New York: W.W. Norton

Several simulations demonstrate something you may have personally experienced. You are driving along in heavy traffic and the car directly in front of you is slowing down. And yet further ahead, perhaps five or six cars in front, cars are speeding up while you still slowing down. If you had the luxury of flying above the traffic you would see the traffic jam moving backwards. The traffic jam seems to possess its own attributes and is often objectified as a separate thing. People talk about a traffic jam as if it were simply just another driver. This however confuses the important distinction between one of the individual components and the emergent phenomenon, which results from the individuals' interactions. This habit has been described as a confusing of levels.<sup>18</sup>

Many people, especially governments, speak of the macro measures "as if" it were a separate thing rather than an emergent property of the economic order. We hear this type of talk all the time. "Investment in this particular sector is down, or sluggish" and "The market is in a slump" or "GDP is growing slowly". Yet this or that variable, for example investment, is not an objectified reality but simply the aggregative sum of the many individuals within the economy.

How can a planner know what is best when they will always fail to possess the richness of the local knowledge available to the many and varied individuals within the system. Tiebout's model of governmental competition is built upon the principle that local knowledge provides greater insight than aggregated knowledge.<sup>19</sup> A single household does not care what the national average level of educational spending is per child. They are interested in their local expenditure relative to the other constituencies in which they could live. This is a variant of the knowledge problem.<sup>20</sup>

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<sup>18</sup> Resnick, M. (1999). "Thinking in levels: A Dynamic Systems Perspective to Making Sense of the World. *Journal of Science Education and Technology*. Vol. 8 No. 1. pp. 3 – 18.

<sup>19</sup> Tiebout, C. M., (1956) "A pure theory of Local Expenditures", *Journal of Political Economy*, 64, 5, pp. 416-24

<sup>20</sup> Hayek, F. A., (1945) "The Use of Knowledge in Society" *American Economic Review*, XXXV, No. 4; September, 1945, 519-30.

This confusion of levels is however, only the beginning of the policy dilemma. Let us pretend for one minute that you could possess the sufficient local knowledge to understand the optimal solution to societies' productive questions. The problem will still remain that the action of the planner is an attempt to change, or more properly influence, the macro variable directly. Returning to our traffic example from above. This is equivalent to introducing a law doing away with traffic jams, or rather regulating the amount of jams. While it might well be in the interests of all drivers to have fewer traffic jams it is foolish to think that the jam itself can be reasoned with or expected to respond to incentives, whatever they may be. We would laugh at such attempts as we recognize the need to address the drivers' individual incentives. And yet the advice to increase GDP, investment or the minimum wage may very well fail to produce the intended outcome because of the policy makers faith in aggregative accounting at the expense of individual incentives.<sup>21</sup>

This point is fairly easily illustrated. Stiglitz argues that Malaysia was right during the Asian crisis (1997) to enforce the capital controls it had put in place earlier that decade.<sup>22</sup> These controls would stop capital flight; as if capital flight is an action the capital itself decides to take. Investment is not some exogenously traveling phenomenon. It is as if investment were like butterflies simply roaming the world randomly with the most able men with butterfly nets catching the most. Investment comes from investors and they must want to be caught. Once bitten twice shy aptly sums up the present state of foreign investment in Malaysia. The short-term gain, of 1998, has come at a much greater long-term cost. While capital may not remember, the investors are sure not to forget.

Change begets change. The agents who populate the world's economies do not possess a fully formed unchanging set of preferences with a pre reconciled optimal solution. If the rules of

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<sup>21</sup> The majority of studies have demonstrated that raising the minimum wage is detrimental to the employment of low paid workers and yet they are still the group that increases are supposed to be assisted. It boils down to discrimination in favor of those already with jobs, or at least those able to keep their jobs when the minimum wage is raised.

<sup>22</sup> Stiglitz (200

the game are changed the incentives will lead to changes in the behavior of individuals. And while the benefits of abstraction allow us to grasp complex relationships with simpler models we must be careful. It is a mistake to believe that the aggregated variable tells us all we need to know. It is compounding our problem when we then formulate policy aimed at changing that variable as we mistakenly believe the model captures enough of reality to allow us to 'figure out' adjustments leading to Paretian improvements.

## **V. Conclusion: What will rise from the ashes?**

An aggregated variable is different from simply multiplying the average by the number of items. And this is different again from dividing the aggregate variable by the number of items. This confuses the levels and makes an understanding of the individual impact of policies aimed at aggregative variables impossible ex ante. Ex post examination of the macro phenomenon is akin looking at the number of traffic jams after a policy of traffic jam reductions is commenced. What is missed? Seeing the forest is not seeing the trees no matter how much we wish it to be.

It has been suggested Microeconomic high theory has fractured beyond the point of repair?<sup>23</sup> Development economics has had such a crisis and began a serious, albeit flawed, attempt to remake itself. And while macroeconomics is not without its uses, the growing formulization has not resulted in noticeable gains in predictive or even explanatory power. After almost seventy years of a systems dynamic approach to the macro economy, and its developmental implications, it is time we realized the limitations of such a paradigm. Perhaps it is time to reallocate our intellectual capital to more promising research programs.

Individuals are different and they respond to the incentives they face. While the rejection of socialism is almost unanimous the tools of the planner are still the tools of the development economist.<sup>24</sup>

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<sup>23</sup> Mirowski, (2002) *Machine Dreams*.

<sup>24</sup> Scott, J. C., (1998). *Seeing like a State*. New Haven: Yale University Press

The current program of development is mired with a sort of selective vision, which is often blinded to the unintended consequences of their action. The hubris of the economist must be set-aside in a sincere search for truth. Improving the prospects for the progress of mankind may well depend on economists leaving their ivory towers and entering into a dialogue with the very people they claim to be helping. The economist must therefore set aside the discussions of the weighty ideas, and focus on practical issues of import today.<sup>25</sup> And although the advocates of the present paradigm are quick to point out their occasional successes we should not be swayed from seeking better theory. After all even a broken clock is right twice a day.

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<sup>25</sup> "Is there some action a government of India could take that would lead the Indian economy to grow like Indonesia's or Egypt's? If so, *what*, exactly? If not, what is it about the "nature of India" that makes it so? The consequences for human welfare involved in questions like these are simply staggering: Once one starts to think about them, it is hard to think about anything else." Robert Lucas. "On the Mechanics of Economic Development," *Journal of Monetary Economics* 1988