

## ***On the Quantity Bias in Economics***

***Mariano Torras and Gita Surie***

**Abstract:** Much has been written in recent years about the undue (and potentially adverse) emphasis of orthodox economics on GDP growth. Far less attention has been paid to the growing quantity bias in orthodox economics, and to the ever increasing fascination in broader society with numbers and quantitative data. We contend that the GDP growth bias is inextricably linked to the quantity bias and, moreover, that orthodox economics has catalyzed and reinforced this relationship of cumulative causation. In this context, we find instrumental valuation to be important both in helping identify the quantity bias and in critically analyzing and evaluating it.

**Keywords:** economic methodology, instrumental value, orthodox economics, quantitative bias, quantitative measure

**JEL Classification Codes:** B41, B50, B52

Over the past century and a half, economics has gradually but inexorably become more quantitative. Once recognized as an interdisciplinary area of inquiry, its subsequent identification as a science has led to far greater emphasis on data and statistics, especially in recent decades (Boyd and Crawford 2014; Gordon 1990). The trend has spilled over to modern society, impacting areas outside of economics, such as education, medicine, and general administration. This quantitative bias greatly impacts the study and practice of economics.

Perhaps most notable here is the frequent, yet erroneous conflation of GDP growth and wellbeing improvement.<sup>1</sup> Whereas our primary purpose is not to evaluate or critique it, we find that the confusion between growth and wellbeing improvement is directly relevant to the quantity bias and to its relationship with orthodox economics. We contend that GDP growth and quantitative biases are inextricably

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<sup>1</sup> While we take for granted that the perceived imperative for GDP growth in economics is problematic from both a social and ecological perspective, it is not our purpose here to argue the point. The literature on this is abundant, and reflects many different perspectives (see, for example, Cobb and Halstead 1994; Daly 1991; Hirsch 1976).

linked to the point that the two mutually reinforce each other. Moreover, orthodox economics plays a key role in this relationship of cumulative causation, initially catalyzing and subsequently reinforcing it.

Fundamental to the problem is the “logical-deductivist” tack taken by orthodox economics (Lawson 2003), which fails to account for the complexity and emergent properties of the social economy (see also Spash 2012, among others). Its crucial mistake is in representing economics, as exemplified by neoclassical theory, as a scientifically objective enterprise. Recognizing, by contrast, that economics is really a policy science, instrumental value analysis pursues inquiry that is inescapably normative (Tool 1994). The use of instrumental valuation to evaluate both orthodox economics itself and its impact on GDP and quantity biases raises the possibility that our bias for numbers has, to a significant extent, evolved into a quantity fetish. We conclude by briefly discussing how instrumental value analysis might assist us in seeking alternative economic approaches.

A brief note on what we mean by orthodox economics is in order, since it may differ from the definitions used by others. We use it in a broad sense to suggest the main current of economic thought and practice at a particular time. It is not synonymous with neoclassical economics, though it does subsume it. Econometrics and national income accounting, for example, also fit into our definition. While consistent over the decades in its emphasis on production, efficiency, and welfare, the function and methods of orthodox economics have evolved considerably over time. As we will argue, such evolution was not necessarily in the direction of human progress.

### ***Classifying Economic Approaches as Orthodox or Heterodox***

The orthodox economics of two hundred years ago would not be recognized as such today. Prior to the so-called marginal revolution, economic theory and analysis were largely interdisciplinary pursuits, mostly literary in the sense that economics was nearly devoid of graphs, equations, and other forms of abstraction (Table 1). It was highly imprecise, but concrete and transparent. The economics of this period served mostly to illuminate qualitative functional relationships between different socioeconomic variables, although it was also used for crude analysis of real world markets and economies at times.

Starting more or less with the work of William Stanley Jevons, Francis Y. Edgeworth, and Léon Walras in the 1870s, economic theory and analysis began to develop increasingly in mathematical terms. The growing use of formal models and abstract theory lent it a guise of rigor and scientific objectivity. Since the influence of science had been rising throughout the nineteenth century, the impetus for more mathematics was largely driven by a desire to confer on economics a greater measure of prestige.

It is here that we find the origins of neoclassical economics. Focusing on the notion of market equilibrium, neoclassical theory borrows equilibrium equations from physics and essentially substitutes utility for energy – likening utility to potential

energy and expenditure to kinetic energy.<sup>2</sup> Furthermore, firm profit is treated analogously to consumer utility, and the related notions of consumer and producer surplus is the foundation of orthodox welfare economics.

**Table 1. Orthodox and Heterodox Economics: A Provisional Classification**

Type	Description
Literary	Narrative, it is mostly used either to describe economic phenomena or to establish some economic relationships (albeit crudely). It is mostly qualitative in nature. Literary economics <i>was</i> economic orthodoxy prior to the marginal revolution, but today endures in heterodox forms, such as institutional, radical, and feminist economics.
Mathematical	Formal models are used to abstract from economic reality. A few choice variables are isolated for study. It requires simplifying (and often unrealistic) assumptions. Ideally, it is useful for both explanation and prediction. Neoclassical economics is its exemplar and the defining paradigm for orthodox economics. Heterodox examples might include input-output analysis, some game theory, miscellaneous studies on chaos or non-linearity in economics, or even some post-Keynesian economic models.
Empirical	In principle, it refers to the acquisition and analysis of economic data for purposes of testing the validity of economic theories. Data acquisition sometimes relies on surveys or a variety of other methodologies for estimating values that might appear less than tangible. The construction of indicators is a chief example of this. Orthodox empirical economics is mostly confined to econometrics or other forms of statistical analysis. The heterodox form is mostly literary or qualitative, and includes case study or comparative historical approaches to economic problems.
Policy analysis	The main purpose is to evaluate possible future outcomes of competing policy strategies. Orthodox approaches, for the most part, rely on the analytical toolkit from “applied” neoclassical economics – e.g., fields like environmental economics, labor economics, and industrial organization – econometric “forecasting,” or predictive computational models that model uncertainty as a quantitative risk. Any heterodox approaches in this category would necessarily entail a literary form of analysis or at least one that is more balanced between quantitative and qualitative inputs.

Despite becoming the dominant theory – indeed the *sine qua non* of orthodox economics – neoclassical theory is fraught with misleading ontological presuppositions. It assumes, for example, that economic actors are rational in the sense of being purely self-interested, and that they have perfect foresight. Perhaps most important is the idea that economies naturally tend toward equilibrium. Within the profession, it is generally well understood that such assumptions are simplifications undertaken to facilitate the use of mathematical analysis. But because neoclassical theory has grown so influential, the ideas that people are invariably rational or that markets generally tend toward equilibrium (the perfect foresight assumption is usually not made explicit) are fairly widespread even outside of economics. It is in this way that the theory is greatly misleading.<sup>3</sup>

<sup>2</sup> According to Robert Nadeau (2008), Jevons, Edgeworth, Walras, and Vilfredo Pareto borrowed Hermann von Helmholtz’s conservation of energy field equations from the mid-19th century as a template for neoclassical economic theory and stuck with them, ignoring subsequent improvements by other physicists like James Clerk Maxwell and Ludwig Boltzmann. Philip Mirowski (1989, 1991) claims that, during their lives, these scholars’ efforts were mostly discredited by economists and physicists alike, and that it was not until the middle of the twentieth century that neoclassical theory made a huge leap in mathematical sophistication (due mostly to a wave of physicists and engineers into the field of economics).

<sup>3</sup> It is beyond our present scope to further argue this point, although we do return to it briefly in section five of this article. (For an excellent critique of neoclassical economics, see Lawson 2003.)

In discussing these faults, we are not saying that mathematics has no place in economics. Mathematical modeling always requires abstraction and simplifying assumptions, even if at the expense of realism. It is nevertheless potentially quite useful because of its ability to provide valuable insights into economic relationships, and it is a powerful tool that, when used judiciously, has the potential to advance the field. Examples that we have seen are input-output analysis, studies on chaos or nonlinearity, and some game theory models. Neoclassical economics, with its misplaced emphasis on market equilibrium, just happens to have become the dominant theory.

Not merely content to theorize through the use of mathematical models, researchers seek to subject existing theories to empirical scrutiny. Indeed, doing so is widely considered the hallmark of scientific practice.<sup>4</sup> For economics, this became much easier during the twentieth century, with the rapidly growing availability of economic statistics. While empirical economics might include case studies or comparative approaches that are literary in nature, “orthodox” empirical economics frequently involves subjecting statistics to econometric analysis of some sort.

Finally, policy analysis has been an important part of economics since the mid-twentieth century, more or less following John Maynard Keynes’s landmark macroeconomic analysis during the Great Depression. It was only during this time that the mainstream of the profession caught on to the idea that there might be a role for government policy in economic matters (previously, *laissez faire* had been the conventional wisdom). Although policy analysis generally involves the use of both qualitative and quantitative information, it is increasingly the latter. Indeed, today it is overwhelmingly informed by orthodox economics.

While there is a sequential chronology to the appearance of the categories surveyed above, none has supplanted or subsumed any other. In particular, while neoclassical theory may have displaced other, more literary approaches as the mainstay of orthodox economics, the latter type has endured. The heterodox traditions of institutional, radical, and feminist economics are but a few examples, and literary economics also plays a part in heterodox approaches to empirical economics and policy analysis. Nevertheless, orthodox economics continues to exert dominance in the field, and contemporary policy analysis overwhelmingly makes use of its mathematical and quantitative tools.

### ***Orthodox Economics and Quantity Bias***

Such dominance has only helped burnish the image of economics as a scientific discipline, and the annual awarding of a Nobel Memorial Prize in economics appears to reinforce this view. But is it warranted? Consider that, as with the physical sciences, the main functions of economic theory should be to explain and predict. While orthodox economics is arguably adequate in the former, it falls short in the latter.

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<sup>4</sup> For example, seventeenth-century philosopher Francis Bacon thought only qualitatively, which served rationalistic models, but did not cut muster even in his time, during which the fledgling scientific revolution was increasingly demanding quantitative precision (Whitehead 1925, 45).

Mathematical economics, even in its neoclassical form, is better at explaining than at predicting, since mathematical modeling offers an effective means of breaking a problem down to its essential components. In terms of predictive purposes, however, oversimplified models are too unreliable on account of the irreducible complexity of the social economy. Mathematics is so important to orthodox economics that Tony Lawson (2003) believes it to be the only thing holding the latter together. Agreement within the mainstream of the profession is, in other words, on method only.

Heavy use of mathematics in economics, however, imparts two important biases. First, orthodox economists have, over time, allowed modeling possibilities to entice them to disproportionately study problems that are amenable to simplification and abstraction and thus are more tractable mathematically. As a result, they often ignore more complex (and often more relevant) problems. As noted by Clive L. Spash (2012), even though the idea of a complex, fallible, and multiply motivated economic actor is realistic enough, assuming one in economic analysis would require us to abandon mathematical formalism. Another example is the case of consumer utility. In theory, we should be able to cardinally compare utility levels among different actors (so-called interpersonal utility comparisons), but mathematical expediency rules this out as well.

Second, focusing on problems that more readily yield to mathematics causes many economists to favor measurable quantities over qualitative variables in their empirical work. Many would regard this as an unambiguously positive development since, as noted, using quantitative tools to scrutinize formal economic theories is considered the mark of scientific endeavor. Quantitative data are widely believed to be objective, and objectivity is deemed indispensable in scientific inquiry. Yet, as we will see, excessive focus on quantitative data lands orthodox economics on a precarious slippery slope that (ironically) undermines its credibility as an objective science.

Economists should resist the understandable temptation to quantitatively represent as many variables as possible. Not everything should be measured or counted. Lawson (2003), among others, has noted that society is “emergent” or multilayered in a way that physical science is not, complicating the analysis by orders of magnitude, and thus militating against any reasonable efforts to quantify. Ernst F. Schumacher (1973) goes further, arguing that, by allowing us to make calculations, figures exempt us from actually having to think. He expands on this point:

Quality is more difficult to “handle” than quantity, *just as exercise of judgment is a higher function than the ability to count and calculate*. Quantitative differences can be more easily grasped and certainly more easily defined than qualitative differences; their concreteness is beguiling and gives them the appearance of scientific precision, even when this precision has been purchased by the suppression of vital differences of quality. The great majority of economists are still pursuing the absurd ideal of making their “science” as scientific and precise as physics, as if there were no qualitative difference between mindless atoms and men made in the image of God. (Schumacher (1973, 33, emphasis added)

We agree that, in its emphasis on quantitative data and numbers, orthodox economics pushes the scientific metaphor much too far. Examples abound. For instance, environmental values are, with growing frequency, expressed monetarily despite the fact that it is impossible to render such monetary values objectively.<sup>5</sup> Or consider critics of the social goal of GDP growth (details below), known for a variety of alternative indexes or indicators that account not only for the above environmental variables, but also for other dimensions of wellbeing, such as health, literacy, happiness, or democracy (e.g., Abdallah et al. 2012; Cobb and Halstead 1994; McLellan et al. 2014; Prescott-Allen 2001).

At the heart of these and other related approaches is the idea that placing a dollar value on forms of capital other than human-made (i.e., fixed) capital – e.g., natural capital, social capital – would keep them from being ignored or neglected. In reality, doing so only cheapens them by implying that they are substitutable with traditional fixed capital. The very notion of capital or wealth depends on how we define it. Do we mean monetary assets, economically productive capacity, or an aggregate of all use-values? These are matters routinely avoided by orthodox economics. Indeed, Frederick Soddy (1933) was possibly among the first to note that the use of money to measure the exchange value of wealth (to him, a qualitative concept) was the one thing necessary to reduce economics, by sleight of hand, to a quantitative science.

Any discussion of quantitative bias in economics must include econometrics. Frequently used and increasingly powerful, it strongly reinforces the drive for quantitative expression. Yet, its limitations in terms of model misspecification and other forms of bias are well known. Placing dubious numbers on the right-hand side of the regression equation – including artificial figures representing phenomena that are fundamentally qualitative – only compounds the inaccuracy of the estimated beta coefficients. Moreover, researchers often mine datasets for interesting patterns that they then use to back into pre-proven hypotheses. All told, a sizable share of all econometrics studies betrays misunderstanding of basic statistical premises (Erceg-Hurn and Miroseovich 2008; McCloskey and Ziliak 1996; Morgenstern 1950).

The quantity bias is also increasingly evident in policy analysis. In addition to the aforementioned cases, policy analysis must – since it deals with potential future outcomes – confront the problem of uncertainty. Here, we are concerned not simply with not knowing which of a set of outcomes is most likely, but rather with not knowing which outcomes constitute the set, or often even ignorance over the number of possible outcomes. In other words, when dealing with economics and society, the ontological issue of strong uncertainty is unavoidable (Spash 2012).

Orthodox economists are fond of modeling (i.e., quantifying) uncertainty by assigning probabilities to certain heuristically established outcomes. It is something that Paul Davidson (1991) cautions against, arguing that economists should steer away

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<sup>5</sup> In a follow-up piece in *Nature Magazine*, Robert Costanza et al. (2014) rather ambitiously estimate the dollar value of all the world's ecosystems. The authors are well aware of the subjectivity involved in such measurement, but firmly believe that their estimates – however imperfect or imprecise – constitute useful information.

from basing economic decisions on probability distributions of truly uncertain events. Many economic problems – climate change, for example – are so complex that we are simply not competent to assess the relevant probabilities of alternative outcomes. But the idea of strong uncertainty is incompatible with the orthodox economics project, since it would detract from the quantitative precision of its projections. The mere mention of the word “uncertainty” in the mainstream economics literature continues to decline in frequency (Hodgson 2011).

The notion that using numbers generally makes empirical and policy analysis more reliable is only an illusion. As we obtain more knowledge, we grow increasingly aware of the difficulties inherent in quantifying many economic variables, and of the unavoidable biases and inaccuracies that often result from trying to do so. Simplifying things by isolating economics from other disciplines – as neoclassical theory tends to do – is based on a mistaken premise that economics stands apart from other social sciences. Much of the unavoidable subjectivity bedeviling the study of economics is precisely due to its inseparability from other disciplines and dimensions of reality. From a policy standpoint, the consequences of failure to heed this could be stark.

### ***The Material Consumption Bias***

Fields falling under the economics compass include politics, history, anthropology, cognitive psychology, physics, and biology, among others. We like to think of economics more generally as the field of inquiry that, in spanning a variety of means and ends, bridges the physical world and the realm of philosophy and values (Figure 1).<sup>6</sup> The question, for example, of what combination of labor power, fixed capital, and natural resources produces the greatest amount of some material output is a question of technical efficiency that does not require any value judgments or philosophy (though possibly some engineering judgments). However, the demarcation between these two categories is not as sharp as might appear at first glance. The problem of efficient production entails a value judgment seldom seen on the orthodox economics radar because it is taken for granted – the idea that material output is of predominant importance to wellbeing.

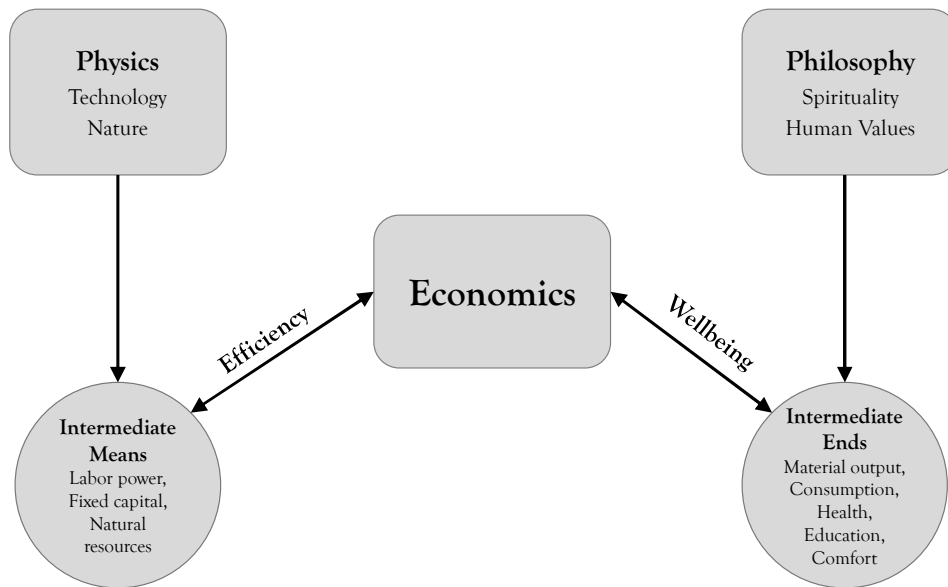
Production and consumption of material output are indeed generally regarded as fundamental to the economic problem. Why? Because they follow from the neoclassical economics model of economic-actor-as-consumer that, in turn, derives from its focus on maximizing consumer utility. It is an especially pernicious example of how neoclassical economics misleads.

Consumption is never truly a final objective. It is an intermediate end in that it functions to serve other ends – akin to what John Dewey (1939), in his advocacy of instrumental valuation, referred to as an “end-in-view.” Specifically, Dewey used the term to describe dynamic ends that are subject to ongoing revision since, by evaluating their consequences, we assess the effectiveness of our means of achieving them as well as their usefulness in achieving other (possibly new) ends (Beckerman 2011; Gordon 1990).

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<sup>6</sup> Our Figure 1 is an adapted version of one found in Herman Daly (1991, 19).

Figure 1. Economics in Disciplinary Context



This form of critical assessment is at the core of instrumental value analysis (Tool 1994). Instrumental valuation entails the continuous reassessment of how things are in relation to how they ought to be. Connections to means and ends are implied everywhere. When applied to economics, instrumental valuation refers specifically to the provisioning process, and what institutions help or hinder it. We say that those that facilitate or bolster the provisioning process are instrumental, while those obstructing or hindering it are “ceremonial” (following Veblen 1898).<sup>7</sup>

Value judgments cannot be avoided. Yet, according to Dewey, this fact does not make instrumental valuation any less scientific. He rejected any normative-positive or subjective-objective dichotomies on grounds that distinguishing means or ends along these lines would silence the debate about what constitutes science and non-science (Bush 2009). This is critically important for anyone who would insist that scientific study could not be conducted in the presence of value judgments. Along similar lines, Paul D. Bush also argues that “true” facts do not exist, but are always “theory-laden,” and that theories are “value-laden” – an idea that recalls Joseph Schumpeter’s concept of a pre-analytic vision (e.g., Braun 2014; Kurtakko 2014). Values underlie everything about which we inquire.<sup>8</sup>

<sup>7</sup> Marc R. Tool (1994) distinguished between institutions that are instrumental and those that are “invidious.” While Thorstein Veblen’s “ceremonial” is not precisely synonymous with Tool’s term, we prefer the former because it conveys the presumably sacrosanct nature of the values he criticizes. More important, ceremonial values are values that are destructive to the provisioning process, not unlike Tool’s use of the word “invidious.”

<sup>8</sup> Whether or not we believe in the extreme form of this – that is, that there can be no objectivity, even in the physical sciences – is immaterial for the purposes of this paper.



Applying this reasoning to our present concern, we could say that there is a need to regularly reassess our objective of growth in material consumption, and how relevant it might be to the human provisioning process – something that orthodox economics most certainly does not do. Many questions would naturally follow: Does consumption come at too high a cost? How effective is such growth at satisfying other human ends? What might some of these other ends be?

Even though specific goals depend on the particular individual, it is safe to say that most people desire comfort or happiness independent of how much they consume. Some might value work in itself (among whom some might insist upon creative work), but others might prefer leisure or even play. No less of an authority than Plato, when asked what is the “right way” of living, responded: “Life must be lived as play, playing ... singing, dancing.”<sup>9</sup> The point is that relevant means and ends depend on our preferences. While neoclassical economics assumes that these are exogenously determined and mostly relate to consumption, reality repeatedly shows these assumptions to be unrealistic.

Marc R. Tool (1994) offers an interpretation of instrumental valuation that is grounded in four useful criteria. The first of these is continuity of human life, which basically means “non-extinction.” While it is a criterion that few would explicitly question, Tool maintains that stating it explicitly as an “ought” keeps us from the complacency that causes us to behave as if – whatever economic path we chose – our species’ survival would never be in question. The fact that legions of researchers in various disciplines are today preoccupied with long-run sustainability is sufficient evidence that non-extinction is not to be taken for granted.<sup>10</sup>

Taken together, Tool’s second and third criteria are non-invidious (more or less, what to Veblen would be “non-ceremonial” – i.e., instrumental) recreation of community. We take this to signify the ongoing identification of new problems and challenges and the adaptation or changing of institutions in a way as to promote economic change for human betterment. In the context of our discussion, it might involve asking who benefits from a human economy that places a premium on consumption, or from an economic orthodoxy that supports it with its ideas and theories. If we found that the beneficiaries impeded the general provisioning process, we would then be identifying a ceremonial institution that would have to be changed or eliminated.

The fourth and final criterion presupposes the other three. Once immediate problems have been addressed through changed and improved economic institutions, it will be necessary to practice the instrumental use of knowledge to ensure not only provisioning, but also flourishing. It might, for starters, involve asking about the extent to which humans “ought” to emphasize material consumption. By not asking this question, orthodox economics exhibits a bias of omission that inevitably favors consumption over other objectives.

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<sup>9</sup> Johan Huizinga (1949, 19).

<sup>10</sup> One might plausibly object that non-sustainability and extinction are not synonymous. While true, it does not follow from this that a non-sustainable path is unlikely to lead to an eventual human extinction. Space limitations, however, preclude our pursuing this argument further.

Knowledge can also be used instrumentally to investigate other theoretical frameworks and to evaluate them in relation to orthodox economics. Since instrumental valuation distinguishes between what is and what should be happening, two seemingly pertinent questions are: Should growth (continue to) be a predominant social goal? To what extent should we favor quantitative over qualitative data in making policy assessments? In considering these questions, the ensuing analysis could motivate further exploration of the contemporary institutional role of orthodox economics, and especially the social consequences of its intensifying quantitative bias.

### ***GDP Growth and the Quantity Bias: Cumulative Causation?***

We begin by asserting two primary driving forces that are responsible for moving orthodox economics in a more quantitative direction. The first is the gradual development of the market system, especially in the period starting in the mid-eighteenth century. As depicted in Figure 2, when markets started to make greater inroads into other aspects of social life, the increased competition that resulted compelled greater efficiency in production. As Andre Gorz (1989) notes, the efficiency imperative required people to become economically rational beings in the sense of needing to calculate the consequences of their choices. Analytical precision through quantification came to be increasingly regarded not only as a boon, but also as a necessity.

Market competition also drove rapid technological change, which aided in the development of more cost-efficient production methods. One important example is the development of fossil fuels (first coal, then petroleum) as a substitute for human energy. Not only were they increasingly abundant and competitive with human labor, but also quite amenable to quantitative measure, since standardized units (e.g., BTU's) could be used. It is, therefore, reasonable that the growing use of fossil fuels reinforced the trend in economics toward greater quantification.

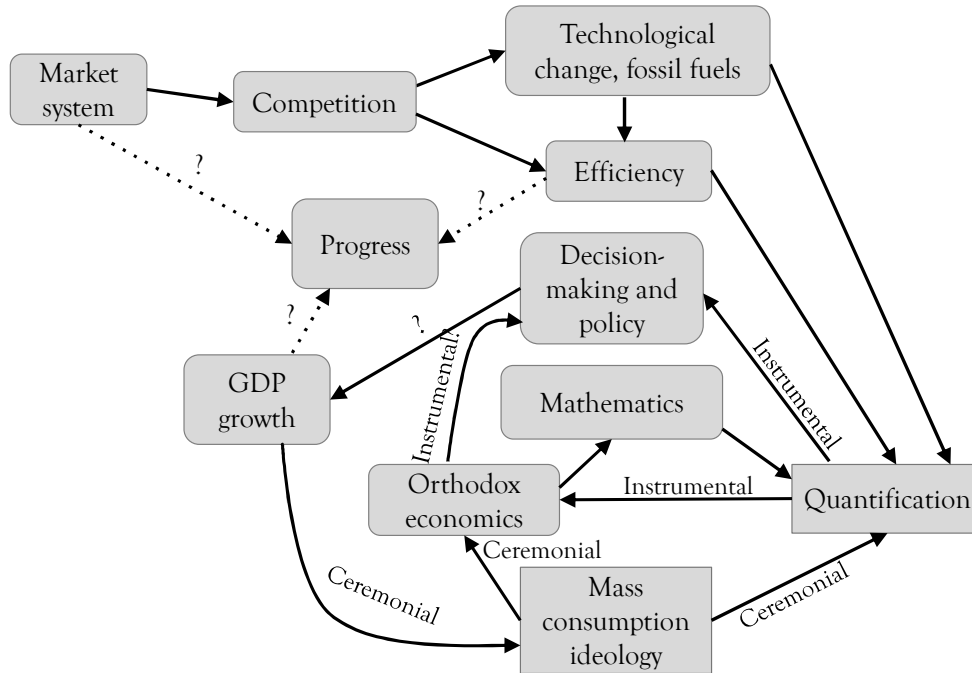
The second driving force, as we have seen, came from within the economics profession itself and about a century later. Pressure from within to make the field more scientific directed orthodox economics toward a greater use of mathematical modeling. It eventually led to a greater reliance on figures as a means of quantifying and testing hypotheses, which pointed the profession into a more empirical direction.

Based on this, we might surmise that (to borrow another expression from Veblen [1898]) sustained economic inquiry, increased use of mathematics, and greater emphasis on quantitative measure cumulatively cause each other in the sense of their being mutually reinforcing. Potentially at least, this cycle of cumulative causation makes two instrumental contributions (both indicated in Figure 2): (i) helping economists test the validity of their mathematical models and (ii) aiding private decision-making and social policy. The latter impacts outcomes external to economics, and our most recent fascination with numbers (e.g., the growing dialogue over “big data”), for better or worse, reflects the influence of this change on society at large.<sup>11</sup>

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<sup>11</sup> Educators increasingly are evaluated, for example, on the basis of students' test scores, and physicians and other care professionals on the number of people they see.

Figure 2. Cumulative Causation Between Orthodox Economics, Quantification, and GDP Growth



Decision-making and policy are aimed – at least in part (though some would say heavily) – at promoting a culture of material consumption. Much of it is due to the influence of the economics profession, which is to say orthodox economics. We will leave open the question of whether or not the link between professional economics and policy is an instrumental one, given an apparent disconnect between potential (theory) and actual (fact). The role of economics also depends heavily on other factors yet to be considered.

Growing access to macroeconomic statistics starting in the first half of the twentieth century helped economists for the first time to represent material consumption or output quantitatively as national income or product. This was a critical development because, thenceforth, policymakers were able to translate an abstract goal (material wellbeing improvement) to a concrete, measurable one (GDP growth). Ever since then, GDP growth has grown increasingly dominant as a policy indicator.

But is GDP growth instrumental to human provisioning? It most certainly has been insofar as it has brought about job creation and general improvement in living standards. Research on this question has frequently found significant cross-country correlation between GDP growth and improvements in other wellbeing dimensions like education and health. It should, therefore, be no surprise that growth has frequently – if mostly implicitly – been equated with progress.

Yet, recent evidence that the richest population groups have garnered the overwhelming majority of income gains over the past three decades casts significant doubt on the overall benefits of growth to society (see, for example, Heathcote, Perri and Violante 2010; Larrimore 2013). Moreover, there is an encyclopedic literature over the past thirty years that has documented the ill effects of growth on the environment as well as society, and has argued that it may not be ecologically or socially sustainable in the long run (e.g., Fritz and Koch 2014; Schneider, Kallis and Martinez-Alier 2010). For this reason, we depict an ambiguous link between policy and GDP growth.

Even today, the connection between growth and progress is not entirely well understood, varies by place, time, and circumstances, and is subject to no small amount of controversy. The same is true about the question of whether markets or productive efficiency necessarily lead to progress. General doubt about these questions is also reflected in Figure 2.

We argue that, these issues notwithstanding, the rise in material living standards, which has accompanied many growth phases in the past, has kindled and helped feed an ideology of mass-consumption. In our view, the ideology is ceremonial and destructive of the provisioning process. It is so not so much because it unequivocally associates markets, efficiency, and growth with progress, but because such values are seldom (if ever) questioned in the mainstream of our culture. In contrast to instrumentally justified values, these are not subject to critical examination by ordinary people. Such examination, however, is vital given the uncertainty and disagreement over the nature of these relationships and their importance for human provisioning. The license for such ceremonial standards of judgment is established precisely by ideology, as noted by Bush (2009).

Mass-consumption is simply assumed to embody our values – if not universal human values, at least those of western economic actors. Since, due to the strength of ideology, few question the perceived need for growth, it is a relatively simple matter to maintain silence about alternative perspectives on what we “should be doing.” The group or groups that gain (i.e., profit) most from a growth-oriented economy are able to ensure – through disproportionate and overwhelming media influence – that messages favoring growth, efficiency, and markets, as well as work ethic, spending, and the like, are repeated until they could scarcely be questioned, at least in the mainstream of society. Such restrictions exemplify ceremonial values and institutions, many of the extant ones in our modern society being part of the ideological structure that we have identified.

The prevailing ideology has effectively suppressed all major challenges to its hegemony over our values and beliefs. Unfavorable outcomes – such as, for example, the general record of the so-called Washington Consensus countries, or the economic recessions of 2000–2001 and 2008–2009 – are rationalized or obfuscated, while the market system is generally celebrated (or at least not questioned) by the mainstream press. When the government intervenes to address the fallout from deregulation – as in the case of the financial collapse of 2007–2008 – it gets blamed by much of the mainstream media. According to Steven R. Hickerson (1987), such false values find

expression in the effort of corporations, conservative politicians, and economists to preserve the illusion that competitive markets continue to be an effective mechanism of social control, despite all the evidence to the contrary.

The link between mass-consumption ideology and orthodox economics – also decidedly ceremonial – is especially important. The latter does little more than sustain ceremonial values, and the entire neoclassical argument centers on the preservation of a ceremonial valuation of the undeniable benefits of rational choice, individualistic consumption, and *laissez faire* social policy (Hickerson 1987). Such values are easily upheld by imparting greater prestige to economists who pursue “scientific” theories, increasingly involving highly abstruse mathematical or sophisticated statistical treatment. Often, the less comprehensible the theory is to outsiders, the better: Anyone seriously disputing the idea, for example, that GDP growth is an unambiguous boon could be summarily discredited on grounds that he does not understand the underlying theory or analysis.

Our mass-consumption ideology also disseminates across society at large the quantitative bias originating from orthodox economics that continues to distort our perspective of “the good life.” As we measure our success in terms of how much we consume or earn, we unwittingly diminish the relative importance of other factors. According to a study by Bruno Frey and Alois Stutzer (2004), people often behave sub-optimally because they “mis-predict” the relative utility levels they will experience from earning more money (overestimated) as opposed to, say, spending time with friends (underestimated). Since income is expressed in measurable units, our success is more visible when we base it on our material achievements. Many competing goals – however relevant to wellbeing – appear less tangible. In short, we have proposed a process through which biases for quantitative data and for GDP growth cumulatively cause each other, with orthodox economics playing a critically influential role. Yet, even if the mass-consumption ideology that interposes itself in the process is largely ceremonial, does it imply that its effect on the quantity bias is also ceremonial? Do numbers and figures not still retain their instrumental purpose?

To an extent, they do. But orthodox economics and modern society may be sliding down the proverbial slippery slope that leads from instrumental to ceremonial use of numbers. Rather than being a means of informing us, obtaining data increasingly appears to be the end in itself. As an example, one need not look far to notice the recent proliferation of rubrics used for quantitative assessments at any level of administration and across professions, often aimed at quantitatively measuring (as opposed to qualitatively judging) whether, for example, employees are doing their jobs or students are following instructions. Even if we viewed the process as fairly innocuous, we would still need to recognize the potentially enormous waste of time and effort resulting from the production of such numbers and reports, not to mention the diversion of skilled workers from other, possibly more productive tasks by the lure of higher salaries.

The phenomenon is ceremonial in the sense that our increased reliance on numbers is ritualistic and – much more important – not subject to any scrutiny. And this is only one example. Given our society’s growing fascination with numbers, there

can be little doubt that their superfluous manufacture can aid the distortion and manipulation of the mass-consumption ideology.

In our assessment, quantitative bias becomes quantity fetish when numbers go from being instrumental means to becoming ceremonial ends. Of course, numbers are not in themselves of a ceremonial nature. Indeed, instances in which numbers, by providing important information to both economists and broader society, remain instrumental to the provisioning process are too many to enumerate. But if we made choices or decisions based upon the mere fact that numbers are involved, we would be fetishizing quantity. The resilience of GDP growth as a wellbeing indicator is a perfect example of this. Because of the relative ease with which it permits output to be rendered quantitatively, it remains alive and well, despite persistent and highly credible attacks from critics.

As noted earlier, orthodox economics plays an important part in this story. Thus, we now conclude by provisionally applying Tool's four criteria to it. We believe that doing so contributes an insight into the extent to which orthodox economics is instrumental or ceremonial to the provisioning process, as well as into possible alternatives to it.

### ***A Provisional Instrumental Evaluation of Orthodox Economics***

Recall Tool's first instrumental value criterion. Can we say that orthodox economics is consistent or in conflict with continuity of human life or non-extinction? While at first glance the question might seem absurd, we are interested in both direct and indirect effects. One of the things we determined is that orthodox economics is heavily biased in favor of quantitative measure. What might some consequences be?

Consider that quantity fetish might play some part, even if a minor one, in our preference for industrial, chemical-dependent food production over organic farming practices. We similarly observe this possibility in our society's emphasis on curative or palliative healthcare over preventive healthcare. As a final example, we have historically manifested a heavy bias in favor of "development" (in the euphemistic sense of new construction, not in the sense of improvement) as opposed to land conservation.

It is highly likely that if the benefits of organic practices, preventive medicine, or land conservation could as easily be expressed quantitatively, our choices would be more balanced. To the extent that we believe chemical-dependent agriculture, palliative medicine, and alteration of ecosystems to be contrary to the long-run interests of humanity, our inherent bias, favoring quantitative measures, is destructive of the provisioning process, at least for future generations of humans. Insofar as it contributes to this manifest quantity bias, we might conclude that orthodox economics fails to satisfy Tool's first criterion ("guilt by association").

Recall Tool's second and third criteria. Can we say that orthodox economics is consistent with the pursuit of non-invidious change? As noted, some of the key values that it upholds – e.g., free markets, individualistic consumption, and profits – are ceremonial in the sense that they continue to be celebrated and are seldom, if ever,

questioned. Pursuit of non-invidious change necessarily entails hitting at ceremonial values – not only those that stem directly from neoclassical economics, but also values that, as a rule, favor the quantitative over the qualitative, or those grounded in Cartesian dichotomous thinking. Yet, despite being ceremonial, it is impossible to say anything definitive at this stage about whether these values are destructive of the provisioning process. Nevertheless, a proper instrumental valuation would give due scrutiny to whether such values are (or ever were) instrumental.

By challenging some of modern society's most exalted values, such an effort would almost inevitably encounter strong resistance from many spheres. Not the least of these would be from within the economics profession itself, where heterodox challenges to the neoclassical paradigm remain precisely that – heterodox. Innovations are admissible only if they can be characterized as “applications” of neoclassical theory. The matter is nevertheless quite clear: If sustained inquiry, using instrumental value theory, determines that orthodox economics and its corollaries – particularly the quantity bias and GDP growth – are at odds with continuity of human life, the values underlying them would need to be confronted.

One example of non-invidious change might be to introduce compelling alternatives to GDP growth as a policy indicator. This might, for instance, involve some combination of quantitative and qualitative indicators. Under such a scheme, GDP growth might still be deemed desirable as long as it were believed to be both ecologically and socially sustainable, according to the new qualitative criteria.

The pursuit of greater balance between quantitative and qualitative data leads us to Tool's fourth and final criterion – instrumental use of information. Luiz-Carlos Bresser-Pereira (2012) has argued that economics needs to become a more “modest and reasonable” science, which we interpret as focusing on the information we have available, instead of taking overambitious logical-deductivist leaps of faith. If, for example, we do not have all the relevant information to conduct a purely quantitative cost-benefit analysis, why not evaluate a prospective policy or problem by weighing both quantitative and qualitative criteria?

The emphasis on “thinking” and judgment, in addition to mere calculation, is more consonant with the emergent and complex properties of the modern social economy. In the realm of policy analysis, we might consider – instead of taking a weighted average of future (usually monetary) outcomes based on presumed probabilities – using as wide as possible a range of reasonable outcomes as input for a reasoned policy deliberation. Such an approach, unlike probabilistic risk, would be compatible with the inescapable ontological reality of strong uncertainty.

Such recommendations are clearly antithetical to the orthodox economics project. But the situation today might be ripe for a paradigm shift. The financial crisis of 2007–2008 and the subsequent and persistent economic slowdown have caused many to criticize economists for their failure to predict these events. As a result, neoclassical economics faces renewed challenges to its hegemony.

Would an alternative paradigm resemble neoclassical theory in its logical-deductivist orientation? Given the growing awareness of the inherent complexity and emergent properties possessed by our social economy, it would seem difficult to

justify. When Lawson (2003) argues that economics has the potential to be not only explanatorily powerful, but scientific in the sense of natural science, we interpret this to mean “with predictive potential.” Yet, predictive ability not only does not require logic and mathematics, but it might very well be better off without them. As Tool notes, economics is a normative policy science and, in this regard, instrumental value theory is a highly suitable candidate to challenge (if not replace) neoclassical economics.

Our purpose has been to call much needed attention to the immoderate reliance on figures in orthodox economics and to the problems that it poses for society. The questions of whether and the extent to which our society’s fascination with numbers has become a full-blown quantity fetish are open and ripe for further investigation. Nevertheless, we believe that economics can only benefit from allowing more literary and qualitative alternatives into the mainstream of the profession. Numbers can truly be instrumental, but – as Herman Daly (1996) has noted – there is a limit to what one can do with numbers, just as there is a limit to what one can do without them. The critical challenge for economics is to find the right balance.

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