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Working Paper

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Working Paper, No. 893

Provided in Cooperation with:
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Suggested Citation: Valdes Viera, Oscar (2017) : The neoclassicals' conundrum: If Adam Smith is the father of economics, it is a bastard child, Working Paper, No. 893, Levy Economics Institute of Bard College, Annandale-on-Hudson, NY

This Version is available at:
https://hdl.handle.net/10419/173502

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Working Paper No. 893

The Neoclassicals' Conundrum: If Adam Smith Is the Father of Economics, It Is a Bastard Child

by

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July 2017

* The author would like to thank John F. Henry for his most helpful comments on earlier drafts. All errors, however, are the author's own.

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ISSN 1547-366X

ABSTRACT

Neoclassical economists of the current era frequently pay lip service to Adam Smith's theories to certify the validity of natural-laws-based, laissez-faire policies. However, neoclassical theories are fundamentally disconnected from Adam Smith's notion of value, his understanding of the economic individual and their interactions in society, his methodology, and the field of study he afforded to political economy. Instead, early neoclassical economists parted ways with the theories of Adam Smith in an effort to construct economic laws that would validate the existing capitalist order as universal, natural, and harmonious.

Keywords: Economic Thought; Classical School; Neoclassical Economics; Adam Smith; Economists

JEL Classifications: A11; A13; B12; B13; B16; B20; B31

> "But coherence doesn't mean 'equilibrium'," Alice objected.
> "When I use mathematics," Humpty Dumpty said, in a rather scornful tone, "it means what I choose it to mean—neither more nor less."
> "The question is," said Alice, "whether you *can* make mathematics mean so many different things."
> "The question is," said Humpty Dumpty, "which is to be the master—that's all."
>
> —A corruption of an exchange in Lewis Carrol's *Through the Looking Glass*
> (Minsky 1985, epigraph)

I. INTRODUCTION

Modern orthodox economists frequently theorize and propose their models wrapped in algebraic expressions and econometrics symbols that make their theories incomprehensible to anyone without significant training in mathematics. These complicated mathematical models rely on sets of assumptions about human behavior, institutional frameworks, and the way society works as whole, i.e., theoretical underpinnings developed through history. Yet, more frequently than not, their assumptions go to such great lengths that the models turn out to be utterly detached from reality.

The mathematical approach was brought to the forefront of economics during the 1870s, in an effort to emulate the success of the natural sciences in explaining the world around us, and so transform *political economy* into the "exact" science of *economics*. The new discipline, born with a scientific aura, would provide a legitimate doctrine for rationalizing the existing system and state of affairs as universal, natural, and harmonious.

It is frequently claimed that orthodox economic theory is traceable to the theories of Adam Smith and his "invisible hand" metaphor (Henry 2008). However, Adam Smith argued that the scientific method should be an attempt of the imagination to solve observable problems; the scientist could use mathematical tools or models to propose laws, but they should subordinate to observed phenomena (Fleischacker 2004, ch. 2). Smith's notion falls more along the lines of the ideas proposed by heterodox economists like Hyman Minsky, who argued that any scientific

theory disconnected from observations should be rejected, because in "sciences theory is a servant of observations" (Minsky 1985, 1).

Nevertheless, the "invisible hand" metaphor seems to be the most pervasive misrepresentation of Adam Smith and is taken literally by high-ranked economists in their understanding of economics. Smith's hypothesis of how the economy works, as if governed by an "invisible hand," has been disguised behind scientific-mathematical formulations that tend to reduce our complex world and irrational society to a small, rational scheme, where the profit motive and competition align the self-interests of individuals to produce a collective good. Then, because such process is natural and inevitable, all that is needed to guarantee the proper functioning of the economy is to remove any barriers (i.e., the government and its regulations) and allow the system to work freely.

In short, this paper argues that the advent of rigorous mathematical models was the turning point in the transformation of political economy into the science of economics. On the basis of economic laws that would confirm those characteristics, the new science—epitomized by the neoclassical Marginal Revolution—parted ways with the theories of Adam Smith in an effort to validate the existing capitalist order as universal and natural. However, neoclassical economists of the current era still pay lip service to Smith and his theories to certify their laissez-faire policies, representing an incongruence that is at the foundations of orthodox economic theory.

II. ON THE POLITICAL ECONOMY AND METHODOLOGY OF ADAM SMITH

As put forward above, modern neoclassical economists frequently invoke the spirit of Adam Smith, and his "invisible hand" metaphor, when they claim that the government is an intruder that only interferes with the natural workings of the economy. In short, the "invisible hand" hypothesis would explain how the pressures of competition align the behavior of self-loving, rational individuals—chasing only after their own interest in the marketplace—to produce socially beneficial outcomes. Put in another way, left on their own, market mechanisms

operating through the laws of supply and demand would equilibrate prices and generate the socially desired amount of goods.

From the above, neoclassicals gathered that the required conditions for the market to gravitate towards an equilibrium are rational, self-interested individuals and unhindered competition. The former is illustrated by the widely quoted passage in *The Wealth of Nations*: "It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their humanity but to their self-love, and never talk to them of our necessities but of their advantages" (Smith [1776] 2007, 16).

And the latter can also be exemplified from the same book, as Smith (256–57) says that generally, "if any branch of trade, or any division of labour, be advantageous to the public, the freer and more general the competition, it will always be the more so."

It seems that neoclassical economists considered that these two notions from the political economy of Adam Smith were a sufficient condition for considering their efforts of devising mathematical models that would provide the ultimate laws of economics as descendants of the Classical tradition. However, atomistic competition in the marketplace is not the only concept Smith set out to explain, nor is self-love the only human quality discussed in his writings.

Does Smith's "Invisible Hand" Work in a Vacuum-like Marketplace?

Adam Smith did not abstract his theories—and more specifically, his economic individual—from the society he put under examination. The problem was to uncover the complex mechanisms that allow members of society and institutions to interact and keep moving forward through history. In the words of Heilbroner (1992, 53) in his book, *The Worldly Philosophers*, the question that attracted Smith's attention was: "How is it possible for a *community* [emphasis added] in which everyone is busily following his self-interest not to fly apart from sheer centrifugal force?" In other words, how is it that the incipient capitalist system of production of Smith's time aligns the particular interests of individuals with the collective interest of society?

In this alignment of the individual and collective interests, it is important to notice the influence that society exerts over its members. In Smith's theories, individuals are not considered in a social vacuum in the way that neoclassicals would later assume. Even if neoclassical economists want to use the famous metaphor and its players, the butcher, the brewer, and the baker have to be regarded as social beings, interacting in a collective setting with each other and social institutions. The "invisible hand" would not work without social pressures that alter individuals' behaviors and judgments, and it is precisely through the interplay between individuals and institutions that these pressures would bring about coherence. A "socialization of the individual," to borrow Heilbroner's (1982) term, is needed to amalgamate self-interested actions with other moral traits—namely, empathy and the economic behavior of individuals.

Moreover, society not only influences the behavior of individuals, but *is* the framework that creates the opportunities for them to enjoy the benefits of the division of labor. The "invisible hand" is more a manifestation of social influences than of a divine force or intervention (Fleischacker 2004). In Smith's ([1776] 2007, 349) famous passage involving the "invisible hand," he says that "[every individual] intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention." Readers can choose to take this enunciation literally, but a critical reading can make the case that in this passage Smith is not consistent—or is vague—with the general theme in *The Wealth Nations*.

Take Smith's (350) description of the division of labor, just two paragraphs later:

> It is the maxim of every prudent master of a family never to attempt to make at home what it will cost him more to make than to buy. The tailor does not attempt to make his own shoes, but buys them of the shoemaker. The shoemaker does not attempt to make his own clothes, but employs a tailor. The farmer attempts to make neither the one nor the other, but employs those different artificers. All of them find it for their interest to employ their whole industry in a way in which they have some advantage over their neighbours, and to purchase with a part of its produce […] whatever else they have occasion for.

This "prudence," as Smith calls it, is a conscious effort of individuals to employ their own industry in a manner that allows them to benefit from that of their neighbor. In other words, *it is*

part of their intention to produce an end that benefits their community—despite Smith not explicitly including it in the famous "invisible hand" excerpt. Thus, Fleischacker (2004, 141) correctly points out that, "The invisible hand sentence depends on the fundamental economic principle of WN [*The Wealth of Nations*] […] [that men] realize they can get more for themselves by participating in a system in which each one labors to produce goods for all."

Moreover, Smith recognized the need to complement the market with other institutions to provide for public goods, like education and poverty relief. The tasks of political economy, argued Smith ([1776] 2007, 328) in the Introduction to Book IV of *The Wealth of Nations*, included "supply[ing] the state or commonwealth with a revenue sufficient for the public services." Smith's writings even include considerations on state intervention and regulations, which he deemed fair as long as they favor the poor and the working class. In this regard Smith explains that, "when the regulation […] is in favour of the workmen, it is always just and equitable" (115). Furthermore, in *The Wealth of Nations*, Smith presents an argument in favor of institutions—including direct government participation—that would direct and allocate capital to the hands of those who are "most likely to make a profitable and advantageous use of it," instead of to those who are "most likely to waste and destroy it" (279), thus reinforcing the notion that the mechanisms aligning individual and collective interests to produce socially beneficial outcomes are more likely to be the *visible* influences of social forces, the government, and other institutions—rather than the "invisible hand" of the market.

Are Smith's Humans Eminently Rational, Self-interested Individuals?

As discussed above, we can interpret the "invisible hand" as a manifestation of the influences that society as a whole exerts over individuals—hardly a representation of atomistic competition. However, even if individuals realize that they must not produce only for themselves, but also for their neighbors and community, they do it only because it is logically in their own interest—a rational response to maximize their well-being. This interpretation of the hypothetical individual has become a hallmark of neoclassical theories, to which they added profit maximization as the logical objective of any rational individual.

Amartya Sen (2011) takes issue with the adequacy of the profit motive as the basis of rational behavior. To Sen, it is clear that Smith saw limitations to relying entirely on the profit motive and, moreover, that he did not even consider human behavior to be strictly governed by rationality. Smith, Sen (2011, 262) argues, considered emotions and sentiments to have an influence over our actions and, thus, "a great deal more than self-interest and selfishness" enters his argument.

It is extremely bold to divorce the theoretical economic individual from all morality and still claim to be a disciple of the author of *The Theory of Moral Sentiments*. In this book, which preceded *The Wealth of Nations*, Smith lays the ground for what would be the philosophical, psychological, and ethical considerations of his hypothetical individual in later works. And, by no means is this individual presented as amoral, as Smith ([1759] 1853, 3) starts his book noting that: "How selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortunes of others, and render their happiness necessary to him, though he derives nothing from it, except the pleasure of seeing it."

Smith goes on to mention pity, compassion, and sorrow as examples of emotions and sentiments that are so evidently present in humans that not even "the greatest ruffian, the most hardened violator of the laws of society, is not altogether without [them]" (3)—although the sensitivity to certain emotions is not the same for all. Naturally, individuals are more concerned with their own affairs than with those of others, but that does not mean a complete disregard for others. In fact, Smith builds his theory of morality not on egoism, but on the basis of empathy (Heilbroner 1982, 431).

In *The Theory of Moral Sentiments*, Smith puts forward the idea that self-interested behavior is constantly relegated to a secondary role when individuals form moral judgments from different perspectives and points of view. Not only that, but individuals usually examine their actions considering what others might think of them and those considerations can alter their actions. Smith gave life to these notions with his "impartial observer," which would allow individuals to "put [them]selves in the position of a third person […] and in this way to form a sympathetic

notion of the objective (as opposed to the *selfish*) merits of a case" (Heilbroner 1992, 47; emphasis added).

It might be true that an individual's self-interested actions can be used to draw insights about the motivations for exchange and trade. However, that is only a piece of society; self-interest is not adequate for explaining the success of society as whole, or even the entirety of market processes, for that matter (Sen 2011). The notion that humans are always self-interested individuals, and that this trait guarantees the proper functioning of the market, is one of the most persistent misrepresentations of Smith, according to Sen (2011), who also argues that Smith considered other human virtues—e.g., humanity, justice, public spirit, trust—to be just as needed as self-love in order to have a prosperous market economy and a successful society. Furthermore, Fleischacker (2004, chs. 4–6) arrives at the same conclusion, answering with a resounding "no" when confronted with the question: According to Smith, are individuals purely self-interested?

In the previous sections it is argued that Adam Smith regarded humans as much more than strictly egoist beings who are always rationally maximizing pleasure vis-à-vis pain—or simply, maximizing profits—in atomistic competition within a society devoid of everything but the individuals themselves in the marketplace. But still, propositions to the contrary, misrepresentations, and misuses of Smith' theories and writings abound in the work of neoclassical economists. However, one issue of vital importance, which completely separates neoclassical economics from the Smithian tradition, is their opposing theories of value. Smith, as in the Classical tradition, understood that labor was at center of the creation of value; that is, he adopted a labor theory of value (LTOV). In short, the LTOV argues that human labor is the common element that allows physically heterogeneous commodities to be compared or traded on an equal standing. More specifically, Smith's hypothesis was that the value of a commodity is equal to the quantities of labor that the commodity can buy or "command," i.e., a labor-commanded theory of value. The LTOV would later evolve as Ricardo and Marx moved from the amount of labor a commodity could command to the amount of socially necessary labor embodied in a commodity as the basis of value. While the specifics and evolution of the LTOV are beyond the scope of this argument, the important point for the issue under examination is

that Smith and those of the Classical tradition understood that value was created by labor in the sphere of production, while the so-called "neo"-classicals would abandon the LTOV in favor of a *utility* theory of value (to which we will come back soon).

Before concluding this section, is important to notice that Smith did approve of the capitalist system of his time (Fleischacker 2004).[1] However, his theories do not offer a "scientific" road map to some immutable laws of the system, nor do they validate capitalism as universal and natural. Moreover, Smith seemed wary of the use of mathematical laws to explain practical matters and had a tendency of appealing to empirical facts and observations instead. Fleischacker (2004, 28) argues that Smith avoided mathematical models in political economy and rather relied on common sense, which would respond "quickly and precisely to empirical data." Finally, Smith's writings remind the reader that scientific models are mostly a creation of the imagination and that no model can possibly offer a final verdict or infallible explanation on any subject (Fleischacker 2004, 27–40). Once again Fleischacker hammered away at this point when he observes that "[Smith] is ill-served by those who use his authority to promote models of social science in which calculation, and the reduction of human events to 'raw data,' lie at the heart of the enterprise" (44).

III. BENTHAM, SAY, AND THE MARGINALIST REVOLUTION

Orthodox economists usually conceptualize economics as the science of the efficient allocation of scarce resources among unlimited wants or competing needs. They follow this concept with mathematical models, laws, and principles that are supposed to explain the way economies work at all times, everywhere. And, the results of these models frequently find that the most efficient allocation of resources is accomplished by unfettered markets under a capitalist system, as long as there are no interferences with the natural functioning of those markets—i.e., if the

[1] See Fleischacker (2004, ch. 3) for Smith's moral assessment of capitalism and the reasons for his approval.

government assumes an attitude of *laissez faire et laissez passer, le monde va de lui même!* [Let do and let pass, the world goes on by itself!].

We will start our examination of such approaches to economic theory from the end of the 18th century and early 19th century with the works of Jeremy Bentham and Jean-Baptiste Say. These authors would set the stage for the metamorphosis of political economy into the modern science of economics, which would later find its maximum expression with the Marginalist Revolution of the 1870s.

Bentham and the Utility Principle

Jeremy Bentham set the foundations from where Say, the Marginalist Revolution, and neoclassicals in general would build their theoretical edifice. In his writings we can find not only the roots of what became orthodox economics, but also a clear differentiation with the political economy of Adam Smith. In *An Introduction to the Principles of Morals and Legislation*, Bentham ([1789] 1999) puts forward the notions that humans are essentially egoist beings dominated by their self-interest above all and that humans are at all times rationally calculating how to maximize pleasure against pain. He represented this with the principle of utility. Bentham (14) explains in the opening of the book:

> Nature has placed mankind under the governance of two sovereign masters, *pain* and *pleasure*. It is for them alone to point out what we ought to do, as well as to determine what we shall do […]. They govern us in all we do, in all we say, in all we think […]. In words a man may pretend to abjure their empire: but in reality he will remain subject to it all the while. The *principle of utility* recognizes this subjection, and assumes it for the foundation of that system, the object of which is to rear the fabric of felicity by the hands of reason and law. [emphases in original]

Starting with Bentham we see a break with the political economy of Adam Smith discussed in the previous sections. As opposed to Smith's theories, in Bentham's ([1789] 1999, 15; emphases in original) the individual loses its social setting: "The community is a fictitious *body*, composed of the individual persons who are considered as constituting as it were its *members*. The interest of the community then is, what?—the sum of the interests of the several members who compose it."

In short, according to Bentham—and contrary to what Smith argued—ultimately all human actions can be understood by the principle of utility: that is, a rational subjective calculation to maximize one's own pleasure in a world of fiction where only individual men and women exist. Adding together the interests of these individuals is, then, what makes the community (note the similarity with what later would become the so-called "micro foundations" of macroeconomics). These were all ideas that William Stanley Jevons ([1871] 1965, XXVI)—one of the protagonists of the Marginalists Revolution, as we will see—would later adopt as the "starting point" of *The Theory of Political Economy*, making Bentham a precursor of marginal and neoclassical theories. It should be remarked, however, that Bentham lacked the quantitative skills that the marginalists would later exhibit and there is substantial evidence that he never took seriously the mathematical aspects of his theories (Mirowski 1989, ch. 5).

J. B. Say and the Scope of Economics

Be that as it may, the utility principle lingered around and it would be the French economist Jean-Baptiste Say who would bring the utility theory of value (UTOV) full force to the forefront of economic theory. Say's ([1803] 1971, XL) *A Treatise on Political Economy* evidences the sharp break with Smith's theories—including with the LTOV, which Say considers "an error." Say ([1803] 1971, 62) argues that the value of things does not come from human labor but from:

> the use it can make of them […]. It is *universally* [emphasis added] true, that, where men attribute value to any thing, it is in consideration of its useful properties […]. To this inherent fitness or capability of certain things to satisfy the various wants of mankind, I shall take leave to affix the name of utility. And I will go on the say, that, to create objects which have any kind of utility, is to create wealth; for the utility of things is the ground-work of their value, and their value constitutes wealth.

Here Say is not only departing from the LTOV; he is also putting forward the universality of the utility principle and, hence, his theory. The passage above is by no means the only reference Say will make to the idea of universal theories; here he is just setting the stage. Undisputable facts, axioms, and absolute truths, to name a few, are all characteristics at the very center of a quest to present political economy as an exact science—standing on the same grounds as physics, biology, and the like. These characteristics are indispensable in order to present laws readily applicable everywhere, at any time:

> Should [public authorities], however, be desirous of ascertaining the good or evil consequences likely to result from any favourite project, they may consult this science, exactly as they would consult hydraulics upon the construction of a pump or sluice. All that can be required from political economy is to furnish governments with a correct representation of the nature of things, and the general laws necessarily resulting from it. (Say [1803] 1971, LVIII)

But where is he trying to go with these universal laws of political economy? An answer to this question can be found in the paragraph following the quote above:

> Certainly, if political economy discloses the sources of wealth, points out the means of rendering it more abundant, and teaches the art of daily obtaining a still greater amount without ever exhausting it […] if it satisfactorily *proves* [emphasis added] that the interest of the rich and poor, and of different nations, are not opposed to each other, and that all rivalships are mere folly […] it must be acknowledged that there are few studies of greater importance. (Say [1803] 1971, LVIII–LIX)

From this passage we should note that Say's thesis is that a confluence of interests between the rich and poor and among nations *already exists*, and the science needs but "prove" it. And he seems ready to embark on the journey to verify it.

In other words, what Say is saying here is that the universal laws of political economy would show a natural harmony of interests within and across nations, where conflicts between capitalists and workers, or between (for example) England and its colonies, are irrational. But these laws had to be put in some form that "once well established and accurately described, can no longer be considered as mere opinions, but must be received as absolute truths" (XLIX). The best way to accomplish this would be to present the universal laws in mathematical terms—emptied of "mere opinions" and value judgment—to which we will come back.

It is important to remark that by initiating the metamorphosis of political economy into the "science" of economics, it seems as if Say was devising a theory of political economy that would explain the status quo of his time as natural, axiomatic, and rational. But in order to "discover" laws of universal applicability, political economy had to narrow its scope, distance itself from the speculative character of philosophy, *and* leave to politics the administrative tasks involved with government. The former is breezily explained by Say ([1803] 1971, XLVII–XLVIII) in the introduction to his *Treatise*: "We, otherwise, should be involved in interminable

controversies, affording no instruction to the enlightened part of society, and inducing the uninformed to believe that nothing is susceptible of proof, inasmuch as everything is made the subject of argument and disputation."

The "enlightened part of society" would be the high class—e.g., princes and ministers—and also government administrators and legislators, while the uninformed and unenlightened would be those individuals who could not afford the leisure time to improve themselves, and that would "only adopt truths when presented to them in the form of *axioms* [emphasis added], requiring no further demonstration" (LIV). This class needed to be educated and guided by the other in order to preserve the status quo. So this creates a dichotomy for Say, between leaving everything to be spontaneously ordered and having the government and legislature intervene to guarantee a stable continuation of the system.

Say is able to resolve this conundrum by drawing a distinction between the spontaneous order of the market versus the calculated organization of society (Forget 2001). That distinction allowed Say to reconcile the notions that individual self-interested behavior (through an "invisible hand") could drive economic activity in the marketplace, while the enlightened administrator and legislation was needed to maintain the order in society—what Forget (2001) called a "refutation of spontaneous order as applied to social order." This distinction effectively separated political economy from the realm of politics—as mentioned above.

The detachment of the political economy from philosophy and politics in the name of impartiality has some dangerous implications for the new science of economics that was about to emerge:

> It is the province of speculative philosophy to trace the origin of the right of property; of legislation to regulate its transfer; and of political science to devise the surest means of protecting that right. Political economy recognises the right of property solely as the most powerful of all encouragements to the multiplication of wealth, and is satisfied with its actual stability, *without inquiring about its origin or its safeguards* [emphasis added]. […] There are some truths so completely self-evident, that demonstration is quite superfluous. This is one of that number. (Say [1803] 1971, 127–28)

Remember we have said that it "seems" as if Say was devising a theory of political economy that would portray the existing order as natural and axiomatic; well, by now that should be fairly evident. The theories of J. B. Say narrowed the scope of political economy to a point of disconnecting economic theorizing from social relations, politics, and institutions in a way that would later be epitomized by the Marginal Revolution.

The Marginalist Revolution of the 1870s

As has been mentioned above, the metamorphosis of political economy into the science of universal laws and axioms included a departure from the theories of Adam Smith, as well as a disconnection of economic theory from the holistic conception of society and, to a large extent, reality, all in order to present the existing order and state of affairs as natural and remove the apparent contradictions and conflicts between classes and countries from examination. The next step would be the formalization of the universal laws put forward by Say into mathematical models that would present them as scientific truths, thus emulating the state of the natural sciences at the time.

Notice that in his *Treatise*, J. B. Say, like Smith before him, was skeptical of the applicability of mathematics in the field of political economy. He argued that "the forms of algebra are therefore [due to the influence of moral considerations] inapplicable to this science, and serve only to introduce unnecessary perplexity" (Say [1803] 1971, footnote p. 327). In fact, Say did not need the algebra because he was presenting *axioms* and s*elf-evident truths*, for which mathematical demonstration would have been redundant, or "quite superfluous" (128).

However, by the 1870s the natural sciences had succeed in unraveling many of the mysteries of the universe, with great advances in physics, biology, chemistry, and astronomy, to just name a few. Based on their discoveries, rapid and visible developments were taking place all around the world. It was the time of the Second Industrial Revolution and the transition from rudimentary techniques of production to the extensive use of machines in the production process. The natural character and universality of physics—especially—and its laws and principles, as well as the use of mathematics, were validated to a great extent with the construction of great structures and

inventions that would soon follow, for example, large bridges, steam turbines, transcontinental railroads, the telephone, skyscrapers, ships, automobiles, and electricity.

To make a long—and very interesting—story short, extensive evidence exists establishing that the success of the natural sciences (particularly physics) and the scientific method had more influence on the mathematization of political economy in the 1870s than problems regarding economic theories of value and distribution (Mirowski 1989; Schabas 1989 and 2014). In no subtle way, early neoclassical theorists—not only the 1870s founders of the Marginalist Revolution—misappropriated the mathematical formalism of physics, boldly copied their models, and mostly admitted so (Mirowski 1989).

Having received formal training in the natural sciences, the holy trinity of the Marginalist Revolution—W. S. Jevons, Carl Menger, and Léon Walras—succumbed to what should have been a capital sin for neoclassical economic theory. According to Philip Mirowski (1989, 217–22), these three authors (Jevons and Menger in 1871, and Walras in 1874) who were credited with having arrived at the principle of marginal utility independently were explicitly inspired to derive their theories by the physical-mathematical science.

In *The Theory of Political Economy*, Jevons ([1871] 1965, vi–vii) shows his pretension to "treat *Economy* [emphasis added] as a Calculus of Pleasure and Pain, the form which the science, as it seems to, must ultimately take." Note that he is no longer talking about political economy but the science of "Economy," a science that would become "as exact as many of the physical sciences; as exact, for instance, as Meteorology is likely to be for a very long time to come" (147). Moreover, the concern of this new exact science would be limited to "the mode of employing their [referring to the population] labour which will maximise the utility of the produce," while leaving issues regarding private property rights and other social relations out of the framework (267)—very much à-la Say.

The disconnection between economic theory and the society under examination is further extended in Walras' ([1874] 1977) *Elements of Pure Economics*. As mentioned above, Walras is framing the new "economics" as a pure science, uncontaminated by human interactions and

influences. It is to that end that the "pure theory of economics is a science which resembles the physic-mathematical sciences in every respect" (71). The pure theory of economics would deal with the relation between individuals and things (what he called "industry") in a scientific way, while relations *among individuals* (termed, "institutions") would be the object of study of social economics, which employs nonscientific techniques (63–79). Incidentally, Walras' theory of property falls under the umbrella of social economics (73–80), absolving his pure science from the examination of exploitation and conflicts between classes. The mathematical method is a rational scientific tool, because it is not "an *experimental* method; it is a *rational* method" (71; original emphasis). Finally, following the scientific methods of the other sciences (e.g., geometry), Walras abstracted the pure economic theory from reality to work in an imaginary world of perfection: "an ideal market [… with] ideal prices which stand in an exact relation to an ideal demand and supply" (71).

The extent to which the new science of economics became disconnected from reality in order to present absolute laws that emulated those in physics can also be seen in the work of the American economist Irving Fisher. By the end of the 19th century, Fisher was openly copying physics models, term by term and symbol by symbol, although in no different way than his predecessors had done. Fisher's ([1892] 1991) *Mathematical Investigations* is filled with diagrams and formulations in the spirit of a physics textbook, basically taking the concepts from the latter and changing them to economics jargon. Figure 1, below, exemplifies this, directly stating the correspondences between the terms taken from mechanics—e.g., particle, space, work, force—and their economics counterpart.

Figure 1. Correspondence between the Terms Taken from Mechanics and Their Economics Counterpart in Irving Fisher's *Mathematical Investigations*

§ 2.

In Mechanics.		*In Economics.*
A particle	corresponds to	An individual.
Space	" "	Commodity.
Force	" "	Marg. ut. or disutility.
Work	" "	Disutility.
Energy	" "	Utility.

Work or Energy = force × space.	Disut. or Ut. = marg. ut. × commod.
Force is a vector (directed in space).	Marg. ut. is a vector (directed in com.)
Forces are added by vector addition.	Marg. ut. are added by vector addition.
("parallelogram of forces.")	(parallelogram of marg. ut.)
Work and Energy are scalars.	Disut. and ut. are scalars.

Source: Fisher ([1892] 1991).

Now, if the founders of neoclassical economic theory appropriated the terms and equations from physics, so what? Could the theories be adapted as they proposed? Remember that these economists had assumed a UTOV, following Bentham and Say, so the most important challenge they had was to merge the UTOV with the concepts appropriated from physics. For early neoclassicals, "the question of the 'measurability of utility' […] represented the goal of the final attainment of the status of a science on a par with physics" (Mirowski 1989, 235). And, as argued above, this status was necessary for validating the outcomes of their models as universal and natural.

Much has been debated regarding the measurability of utility—e.g., cardinality vs. cordiality issues, or the subjective, anthropometric character of the utility concept—and it would go beyond the scope of this paper to enter such debates. However, it should be noted that the very founders of neoclassical economics discarded those issues beforehand and *assumed* the measurability of utility without much explanation. According to Mirowski (1989, ch. 5), Jevons simply argued that while utility could not be measured at the time, it might be measurable at some time in the future. Then he flip-flopped to a measurement of utility through prices, and eventually settled on the approach that his theory need not measure the utility of different

individuals, but only needed to describe the behavior of one representative individual (Mirowski 1989, 234). Meanwhile, Walras, as referenced by Mirowski (1989, 235), dismissed the measurability issue without justification. And, on the other side of the Atlantic, Fisher ([1892] 1991, 87) recognized the difficulties of trying to compare and lump together the utilities of different individuals. In reference to the quantification of utility he argued that "if […] differences of age, sex, temperament, etc. enter, comparison becomes relatively difficult and *inappropriate* [emphasis added]." He simply does not deal with this issue, because "it is not incumbent on us to do this [solve this problem]" (86).

Let us recap the previous sections. We began with Bentham and the utility principle as our starting point of the neoclassicals' departure from Smith. Bentham's writings portrayed society as the aggregation of individuals involved in constant, rational, hedonistic competition. With him, the individuals start to lose their social setting, which was presented as a central characteristic of the political economy of Adam Smith. In fact, it was argued that it is precisely through the social setting that the "invisible hand" would align individual and collective interests.

J. B. Say ([1803] 1971, XL) picked up on the UTOV to correct Smith's "error" that human labor was the source of value. On top of that, Say started presenting political economy in the form of universal laws, axioms, and self-evident truths that were beyond the need for demonstration. Then, in order to reaffirm the axiomatic character of his theories, he distanced political economy from the speculative character of philosophy and reduced the scope of the science by leaving politics to the legislators. And, as we saw, private property was left out of the jurisdiction of political economy, effectively removing the foundations of the capitalist economic system from examination by the economic science.

The Marginalist Revolution follows up by transforming political economy into the pure science of economics in order to formalize all of the above under the charm and authority of mathematical proofs. We argued that such formalization was more of a scam than an actual process of discoveries through scientific methods. But nevertheless, the founders of neoclassical economics went on to produce theories that would portray the existing order as rational, natural,

and just. The social setting of the individual, institutions, and social relations of production continued to be exempt from examination in the name of impartiality and objectivity.

The laws that would be devised—not "discovered"—would show that the economic system operates autonomously and independently of human will and consciousness, and these laws would always find their maximum expression under a capitalist system of production. In fact, they would always do so *by construction*. Walras, for example, sets out an examination of an ideal system where laissez-faire ideals, wage labor, and private property rights are all embedded in his assumptions or exempt from investigation by his pure science—a model where the conclusions include his own assumptions.

The urgency of inventing theories that result in a harmony of interests between classes and countries, as well as across time, is of the utmost importance when Marx and the "specter of communism" are brought into the picture. Marx provided a meticulous study of capitalism, arguably like no other to his time, explaining the system in the way a mechanic would open the hood of a car and explain how the workings of each part contribute to the motion of the car. His theories talked of conflicts of classes and exploitation, not at that time, but throughout history—a historic struggle between workers and capitalists that found its roots in the very institutions neoclassicals were exempting from examination (i.e., private property and the reduction of labor to just another factor of production, like capital and natural resources). These ideas were quickly spreading through the working class in Europe, and powerful counterarguments were needed by the ruling class to preserve the status quo.

IV. BY WAY OF CONCLUSION

The arguments above do not pretend to encompass all the limitations and deficiencies in neoclassical economics, nor is this a paper debunking neoclassical economics. But it should be noted that analyses involving marginalist theories run into several problems that call into question the validity of said theories. Among others, there are issues with exogenously fixed endowments, integrability conditions, aggregation problems, a UTOV that should have impeded

quantitative causal analyses because of the question of the measurability of utility, and issues of differentiability and substitutability with a production function that includes material inputs in addition to labor and capital—all issues that have been extensively discussed elsewhere. Most of these issues, by themselves, invalidate the applicability of marginal analyses in the real world, and they are usually resolved by assumptions. While enough justice cannot be done to an examination of the shortcomings of neoclassical economics in this paper, suffice it to say that Piero Sraffa (as quoted by Schefold [1989, 269]; emphasis added) took these theories to task and concluded that:

> I am trying to find what are the assumptions implicit in Marshall's theory […] the theory cannot be interpreted in a way which makes it logically self-consistent and, at the same time, reconciles it with the facts it sets out to explain. Mr. Robertson's remedy is to discard mathematics, and he suggests that my method is to discard the facts; perhaps I ought to have explained that, in the circumstances, I think it is Marshall's theory that should be discarded.

Instead what we have discussed is that neoclassical economic theories are fundamentally disconnected from Adam Smith's notion of value, his understanding of the economic individual and their social setting, his philosophy, his methodology, and the object of study he afforded to political economy. Indeed, as Henry (2008, 213) puts it, "while continually paying lip-service to Smith as the 'father' of (modern) economics, there are quite fundamental differences between the theoretical stance of Smith and that of neoclassical theory resting on the work of Say, et al."

The argument here was narrowed to the way in which the advent of mathematical economics departed from political economy in the tradition of Adam Smith, but the case can be made as well for other Classical economists. David Ricardo's political economy showed the struggle between classes, as his determination of the profit rate showed a clear trade-off between profits and wages. And John Stuart Mill argued that the economic process is a social one, and any "natural" results could be easily changed if society so decides (Heilbroner 1992). But to become the *new* Classical economists was never the intention of the marginalists. Their intention was to legitimize capitalism as the world's natural economic system and basis of social organization, and that, to a large extent, they accomplished. However, by now it is safe to say that Smith would have rejected economic models where there is a gap between their theoretical

underpinnings and empirical observations. It seems that the methodology of Adam Smith had more to do with that of heterodox economics, where “theory is a servant of observations,” rather than with neoclassical economics, where “theory determines the acceptability of observations” (Minsky 1985, 1).

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