#### EUROPEAN MASTER IN LAW AND ECONOMICS - THESIS

Title: Law & Economics and Market Failure: A Constructive Critique

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#### **ABSTRACT**

Drawing upon neoclassical welfare economics, mainstream law & economics has strongly advocated the primacy of markets as the superior mechanism for the efficient allocation of resources. However, Sraffa has convincingly shown that the marginal method leading to this premise is inherently flawed. Extending the application of price theory to the legal system in general is therefore epistemologically questionable. An alternative theoretical framework is proposed. "Sraffian law & economics" approaches the legal system holistically from a surplus-perspective. A Sraffian approach is argued to be theoretically more rigorous than its neoclassical counterpart. It is a dynamic theory that transcends the distinction between micro- and macro-economics and does not impose unrealistic assumptions on the demand side, making it compatible with behavioural law & economics. The proposed methodology is likely to provide fresh insights into diverse fields of law & economics such as intellectual property rights, labour law, corporate governance and the regulation of financial markets. The suggested theoretical framework theory predicts that "Sraffian legal change" may boost aggregate demand and investment.

#### A. Introduction

The difficulty lies, not in the new ideas, but in escaping from the old ones, which ramify, [...], into every corner of our minds

- John Maynard Keynes, Preface to the General Theory

#### I. The market failure approach of mainstream law & economics

One of the key tenets of mainstream law & economics (hereafter "ML&E") is the application of price theory to human behaviour. Legal rules are considered "prices" for certain behaviour on a wide range of (sometimes fictitious) market places. ML&E extensively draws on neoclassical welfare economics to legitimize the existence of legal rules. Markets are quasi-automatic considered Pareto efficient, with few but narrowly defined exceptions called "market failure". It is argued that government should intervene in markets only in the case of market failure, arising from asymmetric information, externalities, concentration of market power and for the provision of public goods. In other cases, "markets clear" and a Pareto efficient result ensues. Therefore, government should step back and let the market work its magic.

#### II. Some inconsistencies in mainstream law & economics

Among the founding fathers of the discipline, there has been considerable debate about whether the assumptions and tools of neoclassical economics are the only ones appropriate. While Posner seems to believe so, Coase showed himself critical of price theory and defended more realistic assumptions. Both Coase and Calabresi furthermore emphasized the importance of positive transaction costs. Already in his early writings, Calabresi moreover demonstrated an interest for issues such as distribution and justice, a concern coming to full bloom in *The Pointlessness of Pareto*. In this seminal contribution, Calabresi argues that society is *always already* operating at the Pareto frontier, since if there was a change by which everyone could be made better off, such a move would

already have been made. As a consequence, in a world of positive transaction costs, the Pareto principle is pointless.

# III. An alternative approach: reviving the classics for a new law & economics

Despite these criticisms, ML&E remains permeated by the neoclassical view. However, lawyer-economists are mostly ignorant as to the potential contribution of classical economics. This thesis seeks to develop a classical framework for thinking about the interaction between legal rules and the economy. It will be shown how a Sraffian theory of value and distribution can inform such an alternative framework.

#### IV. Plan of the thesis

This thesis proposes a Sraffian approach to law & economics. The organisation of the paper will be as follows. First, in chapter B, I review the mainstream law & economics (hereafter "ML&E") literature on market failure and retrace its origins to neoclassical welfare economics. In chapter C, the first section answers the question what is "mainstream" law & economics. Then, after having made the neoclassical theory of value explicit, I explore classical theories of value, as to illustrate the contrast between the two. Lastly, in the final section I propose an alternative to the neoclassical market failure approach, building on Sraffa's theory of value and distribution. The epilogue shortly discusses whether a "Sraffian legal theory" is feasible.

To conclude, the research question this thesis seeks to answer is as follows: how can classical theories of value and distribution, meaningfully contribute to law & economics and provide an alternative/complementary theoretical framework for the analysis of legal rules?

#### B. <u>Literature survey</u>

I. "Markets rule": Origins of the law & economics-approach to market failure

[I]t is only by making heroic assumptions that normative economics has survived at all as a prescriptive discipline

- Charles Rowley, Social sciences and law

Before delving into law & economics itself, it is worthwhile to investigate neoclassical welfare economics, where ML&E found its inspiration. Welfare economics is a special branch of neoclassical theory: it is a normative (rather than a positive) branch of economics (*contra* Ng, 1983; Dobb, 1973, 240-246). As such, it aims to formulate propositions of what is good and bad, what is better or worse, as opposed to what simply is. Welfare economics comprises value judgements of which policies are desirable, and which are not (Johansson, 1991; Feldman & Serrano, 2006).

Kenneth Arrow and Gerard Debreu revolutionized welfare economics through their particular conception of the social welfare function and subsequently formulated the two "Fundamental Theorems of Welfare Economics". The First Theorem proposes that "every competitive equilibrium is Pareto efficient" (Backhouse, 2002). For this reason, the first welfare theorem is also known as the invisible hand theorem (Mas-Colell, Whinston, & Green, 1995, 545-546). The idea is that a competitive equilibrium necessarily maximizes social welfare and no government intervention is needed. The Second Theorem states that any Pareto efficient allocation can be achieved by a competitive equilibrium through appropriate redistribution of wealth (Mas-Colell, Whinston, & Green, 1995, 546; *compare* Backhouse, 2002). These theorems are particularly powerful, because they prove that in a perfectly competitive market, no individual's welfare can be increased, without making another individual worse off,

implying that government intervention is unnecessary as it moves the market away from competitive equilibrium (Johansson, 1991). The Pareto criterion furthermore consists of a supposedly weak value judgment, which therefore finds general moral acceptance (Ng, 1983).

In short, the Arrow-Debreu theorems prove that a competitive market is the most superior market form in allocating resources. It is striking that the Second Theorem draws attention to the distribution of income, a point which is often forgotten when economists talk about Pareto optimality. Indeed, Dobb (1973) notes that the emphasis of the "new" welfare economics on the impossibility of interpersonal comparisons had much to do with the aversion vis-à-vis Pigou's proposition that, given the law of diminishing utility, the total sum of utility in a less unequal society would be higher than in an unequal society (240-241). In addition, even within the mainstream literature some criticisms were advanced (Lipsey & Lancaster, 1956-57; Peacock & Rowley, 1975; Rowley, 1985; for an overview, Johansson, 1991), in particular because of the strict conditions underlying the attainment of Pareto optimality (Ng, 1983). An overview of each of these critiques is however outside the scope of this thesis. For now, it suffices that the basic theorems of welfare economics support competitive markets as an ideal to be attained.

# II. Mimicking the market: the curious case of mainstream law & economics

Where [a perfect market] is not practical, an alternative path would be to have 'other social institutions such as the legal system or government... mimic [...] the market mechanism and therefore achieve Pareto efficiency'

- Anwar Shaikh, Capitalism

# 1) Welfare economics in disguise: The transformation of market failure in mainstream law & economics

ML&E built its own more radical (albeit neoclassical) theory of market failure (Backhouse & Medema, 2012). The starting point of the analysis in ML&E is the theory of perfect competition. Where reality departs from the ideal model of perfect competition, social welfare is not maximized, and thus legal intervention by government is called for (Pacces & Visscher, 2011). Then, such a departure from perfect competition is called "market failure", indicating that "the assumptions underpinning perfect competition fail to hold" (Rowley, 1981). Market failure consequently implies that resources are not allocated efficiently, which justifies government to step in and correct the market, in order to maximize welfare. The goal is thus *allocative* efficiency (i.e. a Pareto optimal allocation of resources). The means to this end is a "market-mimicking" legal framework (Shaikh, 2016).<sup>1</sup>

In essence, for lawyer-economists a market fails in case there is market power (in particular monopoly), asymmetric information, externalities and the provision of public goods (Rowley, 1985; Posner, 1993b; Pacces & Visscher, 2011; Cooter & Ulen, 2016, 38-42; *compare* Pindyck & Rubinfeld, 2018, 638-641). References to the mathematical properties of Pareto optimality are absent, but the overall approach consists of the

<sup>&</sup>lt;sup>1</sup> In addition, public choice theory has done much to discredit the idea that government can successfully correct markets. The basic argument is that politicians and bureaucrats are self-interested individuals and seeks to do away with the idea of "benevolent government". Public choice theorists argue that, if left to themselves, markets will correct failures themselves. On the contrary, it is government that impedes markets from correcting such failures through unwarranted regulation. Tullock, Seldon & Brady (2002) comprises a good overview. The (early) public choice literature has been shown to lack empirical credibility (Ginsburg, 2002) and subsequent empirical research, such as by Ostrom (2000), shows a more nuanced picture. In market settings, the rational egoist assumption predicts outcomes fairly well, but in non-market settings social norms, "such as reciprocity, trust, and fairness" determine human behaviour as well. Hence, it seems to me preferable that a theory is developed under which conditions government can benevolently intervene, and under which circumstances it is bound to fail. This is however outside the scope of this thesis, and any proposals furthermore made as to government intervention should be understood with the *caveat* of government failure in mind, while *not* adhering to the general proposition that markets are better off left to themselves.

identification of market failures, to be corrected through the government intervention. Clearly, the inspiration is neoclassical welfare economics (Van den Hauwe, 1999; Cooter & Ulen, 2016, 37-43).

In short, ML&E has abandoned the mathematical properties of neoclassical welfare economics and its Theorems. It has constructed a similar, albeit verbal theory for the evaluation of legal rules. In addition, reference to the Second Theorem's caveat regarding an adequate distribution of income is absent in ML&E. Arguably, discarding the mathematics of Arrow-Debreu makes the theory more easily digestible for the audience of ML&E, which includes lawyers with little to no knowledge of algebra and calculus. However, this approach entails obscuring what the Fundamental Theorems in essence are: a highly abstract, mathematical theory, based on symbolic logic. The analysis proceeds by logical deduction from a set of axioms, unconcerned with the empirical evaluation of markets (Kaupa, 2016, 231-235; *compare* Bharadwaj, 1986, fn. 44). In the next section, I will review how the market failure approach of the mainstream leads to an efficiency "straightjacket" for legal rules.

#### 2) The efficiency "straightjacket" of ML&E

The "market-mimicking"-thesis was further developed into the "efficiency as justice"paradigm. In his handbook *Economic analysis of law*, Richard Posner paradigmatically argues that "the legal process [...] has been shaped by a concern with maximizing economic efficiency", since its participants are continuously maximizing their own utility. According to Posner, not only should the waste of scarce resources be considered immoral (i.e. the question of efficiency), but within this scheme "noneconomic ideals of justice" have their price (Posner, 1986, 22-26). According to Posner, wealth maximization is and should be the goal of both legislation and jurisprudence, and justice can have its costs in terms of efficiency (Renda, 2011, 98-103). As such, law is firmly tucked within an efficiency "straightjacket" (*compare* Mattei, 2005; Golecki, 2014): markets are generally seen as better apt to reach Pareto efficient outcomes, efficiency moreover being the main (normative) goal of legislation and jurisprudence. Consequently, the necessary conclusion is that in order for society to maximize wealth, every area of life wherein exchange takes place, should be organized according to the principle of a competitive market, leading to Pareto efficient outcomes, *unless* there is market failure (to be corrected by market-mimicking government intervention).<sup>2</sup> Indeed, if we accept that "the equilibrium conditions which characterize a system of competitive markets will exactly correspond to the requirements of Paretian efficiency" (Bator, 1958, 351), anything outside such a system will be seen to impede on the attainment of Pareto optimality, including "noneconomic ideals of justice" (*compare* Mattei, 2005).

## C. In Sraffa's shadow: Reviving classical political economy for a <u>"new" law & economics</u>

I. Prolegomenon: What is "mainstream" law & economics?

#### 1) The center parable: maximization, equilibrium and efficiency

If people are busy maximizing their unhappiness and markets are never in equilibrium, one might suppose that there was a lot of work for government to do

- Richard Posner, Coase and Keynes

Some of my colleagues quote a statement of Bentham's to the effect that madmen also calculate

• Ronald Coase, The New Institutional Economics

<sup>&</sup>lt;sup>2</sup> Many lawyer-economists do not adhere to such an extreme view, and they would be right to criticize this paper for misrepresenting their positions and ignoring more nuanced propositions present in the literature. However, I have merely sought to draw out the logical implications of neoclassical welfare economics and the efficiency-paradigm that characterizes the law & economics movement, if taken to its logical extremes.

Criticizing the "mainstream" requires one to first identify what this "mainstream" consists of. In doing so, many may find their discipline is misrepresented here (for example, Hoeppner & Depoorter, 2014; Cserne, 2019). It is however not possible to completely describe the rich discipline of law & economics. Thus, we will focus on the basic paradigm(s). This is not an easy task, since law & economics is a diverse field, characterized by a fair degree of eclecticism (Kerkmeester, 1999).

The basic paradigm of mainstream law & economics is the application of microeconomic reasoning to legal issues (Sheffrin, 2017). In the preface of his celebrated handbook, Posner refers to the application of "price theory" to the legal system, including nonmarket behaviour (Posner, 1986). Legal rules are thus analysed through the lens of neoclassical microeconomics. As such, ML&E adheres to Becker's precept that economics is to be distinguished by its method, rather than its subject (Kerkmeester, 1999). Rational choice takes center stage: humans maximize expected utility and respond to legal rules as if they were prices for given behaviour (Ulen, 1999; Golecki, 2014). This is so because a rational individual decides whether to follow the law after having made a cost-benefit analysis, the legal rule being a price for certain behaviour (Renda, 2011, 95-98; Golecki, 2014). Consequently, human behaviour can be analysed by means of a supply and demand schedule, with prices as the guiding signal for coordination. This emphasis on microeconomic reasoning is exemplified by one of the most popular and widely-used handbooks in the field by Cooter & Ulen, which comprises a lengthy introduction to neoclassical microeconomic theory. The only exception is a brief digression on behavioural economics (Cooter & Ulen, 2016, 11-54). As such, Cooter & Ulen posit three concepts as essential to ML&E: "maximization, equilibrium, and efficiency" (2016, 14).

To conclude, we consider the application of price theory to the legal system as ML&E's center parable, and its maxim "maximization, efficiency and equilibrium". There are

however substantial differences in approaches, even amongst the founding fathers (Landes & Lahr-Pastor, 2011). More recent scholarship has moreover sought to include behaviouralism, neuro- and experimental economics as well as social norms (Hoeppner & Depoorter, 2014). As to the founding fathers, while Chicagoans like Richard Posner hold a neoclassical view, others such as Ronald Coase and Guido Calabresi (Van den Bergh, 2008; *compare* Kalman, 2015) advocate a more nuanced approach to law & economics. It is to the latter two's critique of the "mainstream" we now turn, to provide a sound basis for the critique that follows.

#### 2) Ronald Coase and Posnerian price theory: friend or foe?

I had no intention of equating Posner with Marshall, still less with any kind of snake, although I must confess the wicked thought did flicker through my mind as I studied his paper with more care and ceased to be amused

- Ronald Coase, Coase on Posner on Coase

Ronald Coase's most influential article on the "Problem of Social Cost" (Coase, 1960) started the whole law & economics movement. In addition, for a long time Coase served as editor of the *Journal of Law & Economics* (Posner, 1993a). In 2011, the *Journal of Law & Economics* published a special issue numbering more than 400 pages, celebrating Coase's legacy fifty years (Epstein, 2011). Next to a Nobel prize, citation analysis reveals that Coase over the years received almost 8000 citations (Landes & Lahr-Pastor, 2011). His pre-eminence in law & economics is therefore undisputed.

From early on, Coase showed himself critical towards what he considered more mainstream economics (Coase, 1978). In fact, he already articulated his dissatisfaction with the mainstream in his seminal article of 1960: "A better approach would be to start our analysis with a situation approximating that which actually exists, to examine the

effects of a proposed policy change, and to attempt to decide whether the new situation would be, in total, better or worse than the original one" (Coase, 1960, 43). Although his work was well-received, Coase was disappointed with the way most extended his analysis. Most seemed to have missed the crux of his argument,<sup>3</sup> which was to emphasize that in the real world transaction costs matter. Thus, for the design of legal rules and institutions, transaction costs should be taken into account. Most law & economics literature on the contrary focused on his assumption of zero transaction costs (from which the Coase Theorem was derived) and what would happen in such a(n) (imaginary) world (Coase, 1988b, 13-16; *contra* Demsetz, 2011; *compare* Golecki, 2014). In other words, the point Coase sought to criticize was precisely the one which was taken up by subsequent literature, much to his own disappointment.

It therefore comes as no surprise that there are methodological differences between Coase and the aforementioned Posner, which led to heated debates in the literature (Coase, 1984; Coase, 1988a; Posner, 1993a; Posner, 1993b; Coase, 1993; Coase 1998; Mäki, 1998; Posner, 2011). While emphasizing the commonalities between ML&E and new institutional economics, Posner defended the use of unrealistic assumptions and attacked Coase's rejection of formalism and abstraction (Posner, 1993a). Coase however argued that Posner misrepresented his views. He submitted that his point is not the complete rejection of unrealistic assumptions, but rather that assumptions should be *more* realistic than they usually are in neoclassical theory, which should not be mistaken for *complete* realism (Coase, 1993; *compare* Van den Bergh, 2018, 11-12).

The differences should however not be overstated. Coase's dissatisfaction with the utilitymaximizer paradigm never led to the full rejection of price theory. As Coase put it: "this

<sup>&</sup>lt;sup>3</sup> Calabresi (1991, 1213) confirms this assertion: "Many economists mistook the article [i.e. The Problem of Social Cost] to be a justification for the primacy of markets and for the absence of any need for law or command, [...] while legal scholars also missed its full force and subtlety [...]".

dissatisfaction is not with the basic economic theory itself but with how it is used" (Coase, 1984, 230; Mäki, 1998). Demsetz indeed states that the neoclassical and Coasean approach complement rather than contradict one another (Demsetz, 2011, 11). Posner also argues that NIE and law & economics share a common paradigm (Posner, 1993a). The problem is thus not marginalist price theory itself, but merely the way it is applied. The main issue for Coase is that the "mainstream" builds an ideal state of the world to which it compares the real economy. In reality, policy is about "a choice of institutions", and about deciding which institutions will create the better or more desired effects (Coase, 1984, 230; compare Coase, 1964; Posner, 1993b). Interestingly, while retracting from his original objections to Coasean methodology, Posner points out that Coase in his most influential writings relied on "the standard assumptions of rational choice theory" (Posner, 2011, 33). The latter point is crucial: it is not Coase's remarks on methodology that are remembered by the vast majority of lawyer-economists, but his main contributions, in which his critique of price theory is not as prominent. Even then, where such criticisms were present in his main contributions, his work has often been misunderstood (Coase, 1988b; compare Demsetz, 2011). In short, Coase both criticized rational choice and price theory, but in practice worked within an analytical framework incorporating both.

## Guido Calabresi and "the world in which lawyers must live": the importance of positive transaction costs

It may well be that tomorrow transaction costs will be lower, that our knowledge or organization will be better, that our envy will be less, that superconductors will reduce friction, and that it will rain manna. It may then be possible to help some and hurt no one  $[\ldots]$ 

- Guido Calabresi, The Pointlessness of Pareto

Despite Coase's lament on how *economists* misunderstood his insistence on the existence of *positive* transaction costs within the economy, Guido Calabresi, perhaps not coincidentally a *legal* scholar did grasp the gist of "The Problem of Social Costs". In "Property Rules, Liability Rules, and Inalienability: One View of the Cathedral", Calabresi elaborated on the Coase Theorem and developed a more sophisticated analytical framework, one apt in capturing situations in which transactions costs do matter (arguably most part of the real world) (Van den Bergh, 2008).<sup>4</sup>

Calabresi has managed to take a middle road in between on the one hand the efficiencyoriented approach by Chicagoans like Posner, and on the other hand the methodological criticisms advanced by Coase (Van den Bergh, 2008). Interestingly, Harris (2003, fn. 6; *compare* Kalman, 2015) distinguishes between a neoclassical price theory-inspired "Chicago School of Law and Economics", founded by Posner and Coase, as opposed to the "New Haven School of Law and Economics", driven by Calabresi at Yale. In light of the foregoing debate between Posner and Coase, such a distinction at best misses the theoretical nuances of the methodological discussion, since Coase was quite critical of price theory. It seems therefore more appropriate to distinguish between Posnerian "economic analysis of law" and Calabresian–Coasean "law and economics" (Silber, 2012; Kalman, 2015; Ramello, 2016; Schwab, 2017).<sup>5</sup> Calabresi is nevertheless different from Coase: his perspective is more that of the economic-minded legal scholar, while Coase's is distinctly an economists' view.

Since examining the influence of "One view of the cathedral" on the law & economics movement is unlikely to yield new insights, - others have done so more thoroughly -, this

<sup>&</sup>lt;sup>4</sup> Calabresi's position on the Coase Theorem is ambiguous, which is well-described by Medema (2014). While the differences between Coase and Calabresi's approach to the Coase Theorem are certainly relevant for this study, the sheer amount of literature (according to Medema some 6000 articles and a couple of hundreds of books) makes such an analysis impossible.

<sup>&</sup>lt;sup>5</sup> Like Harris, Renda (2011) also seems to favour a distinction between on the one hand Posner and Coase and on the other hand Calabresi. This paper does not subscribe to such a view.

paper takes an alternative route. The article itself towers over much of the subsequent literature, but a brief look at the footnotes reveals the intellectual breadth of Calabresi's argument, something law & economics scholars have largely overlooked. The following paragraph therefore briefly draws attention to Calabresi's sophisticated apparatus of footnotes, focusing on the issues that are particularly relevant for this paper. The footnotes cited hereafter are reproduced in the table "Hidden treasures in the Cathedral". The reader is kindly advised to consult the appendix while going through the following paragraphs to arrive at a better understanding of "the Cathedral" and Calabresi's subsequent work.

In footnotes 3 and 4, Calabresi anticipates the debate on the role of "power" in economic theory (compare Piccione & Rubinstein, 2007; Ozanne, 2016). He also touches upon the relations between law, morality and social norms. Footnote 10 is equally interesting. It criticizes Pareto efficiency for its limited usefulness in the "world in which lawyers must live". He continues in footnote 13 by saying that in a world of perfect knowledge, Pareto optimality can be achieved *both* through the market process and collective fiat, since perfect knowledge is assumed. At the same time, he notes that by taking a broader concept of efficiency in some cases "the state, for paternalistic reasons [...] is better able to determine whether the total gain of the winners is greater than the total loss of the losers" (fn. 10). By this statement, Calabresi anticipates the behavioural revolution and Sunstein's libertarian paternalism (Thaler & Sunstein, 2003). Indeed, Faure (2008) notes that "[m]any of the ideas of behavioural law and economics were [...] already implicit in Calabresi's writings". Calabresi's distrust of Pareto optimality and inclination towards distributional issues furthermore shows in footnote 15. His approach to market failure is also far from the concept welfare economics (see *supra*) defends. In fact, he acknowledges the collective's inability correct the market (fn. 16), pointing to Coasean "comparative institutional analysis" and the danger of "government failure".

The subsequent work of Calabresi leaves no doubt as to whether distributional issues were his concern when writing "One view of the cathedral". Indeed, this is also in accordance with Mattei's (2005, 242-243) view on the Cost of accidents. At the occasion of the symposium on "Property Rules, Liability Rules, and Inalienability: A Twenty-Five Year Retrospective", Calabresi indeed confesses to have "relatively little patience with the debate over which is more efficient, a property rule or a liability rule when transaction costs are high or low" (Calabresi, 1997, 2204). His concern was with distribution and concrete policy-making from the start. Perhaps his rejection of efficiency is most clear in his seminal paper "The Pointlessness of Pareto: Carrying Coase further" (Calabresi, 1991). The title in itself shows the intellectual affiliation between the two founding fathers and discredits the aforementioned distinction between Chicago and Yale-style law & economics, proposed by Harris (2003). In addition, as the title suggests, the gist of the article is indeed the rejection of Posnerian Pareto efficiency as utterly "pointless". The crux of Calabresi's argument comes down to the assertion that "in the world in which lawyers must live" (Calabresi, 1972), society is always already operating at the Pareto frontier. This is so because "[transaction costs] define what is currently achievable in any society" (Calabresi, 1991, 1212). Pareto efficiency is a requirement of unanimity: if a Pareto-improving policy-change is possible, no-one will object, and hence a Pareto optimal situation will always ensue, Calabresi argues. The criterion therefore fails to be of any practical value. Importantly, he furthermore shows that the Kaldor-Hicks test fails to provide an alternative. As such, the distinction between eliminating inefficiencies ("making moves to the frontier") and innovation ("pushing the frontier outward") falls apart. What remains to be done is therefore to develop "a taxonomy of possible types of innovations", acknowledging that any such innovation has its repercussions for the distribution of wealth in society (Calabresi, 1991). Medema (2014, 91) rightly concludes that Calabresi's move in The Pointlessness of Pareto "reveals the bankruptcy of neoclassical welfare economics". Thus, according to Calabresi, law & economics should abandon the efficiency paradigm and henceforth consider interpersonal comparisons<sup>6</sup> and distributional issues. Rather, any policy change consists of a movement along the Pareto frontier, each move entailing winners and losers, for if there were no losers, society would already have made such a move.

#### 4) Summary: what is "mainstream law & economics"?

Indeed, since man is not the only animal that chooses, it is to be expected that the same approach can be applied to the rat, cat and octopus, all of whom are no doubt engaged in maximizing their utilities in much the same way as does man

- Ronald Coase, The firm, the market, and the law

We now turn our attention to the quest with which this section started: the identification of the "center parable" of ML&E. We can now safely conclude that the maxim of "maximization, equilibrium and efficiency" is the key proposition. The core of "mainstream law & economics" is the application of price theory to the legal system. The nucleus of ML&E is the idea that legal rules are to be considered prices, to which people will respond by means of an internal cost-benefit analysis. Rational actors internalize these "legal" prices, which incentives them to act or not act in a certain way.

Taking aim at price theory as the nucleus of ML&E does not preclude that other approaches have not been incorporated into law & economics scholarship. Behavioural economics and NIE<sup>7</sup> are increasingly accepted within the mainstream. However, the basic

<sup>&</sup>lt;sup>6</sup> Indeed, one of the underlying assumptions of Pareto optimality (at least in its original conception by Vilfredo Pareto himself) is the impossibility of interpersonal comparisons. In other words, the utility function being maximized in a state of Pareto optimality is an ordinal utility function, as opposed to a cardinal utility function (Feldman, 1998).

<sup>&</sup>lt;sup>7</sup> Hoffman & Spitzer (2011) claim that the new institutional economics movement, led by O. Williamson and E. Ostrom has spawned a literature as large as the law & economics literature itself. The question is in how far a distinction between the two is meaningful, since law & economics often deals with institutional issues and vice versa. Certainly there is a considerable overlap between the two.

paradigm has not changed: people will maximize and markets will clear, sometimes obstructed by their cognitive limitations (behavioural economics), sometimes aided by transaction cost-minimizing institutions (NIE). This thesis seeks to add another perspective to the plurality of existing approaches, namely the views of the classical economists.

#### II. The neoclassical theory of value: De gustibus non est disputandum

The theory of decreasing productivity was always dealt with by classical writers in relation to the rent of land, and was therefore included, [...], in the theory of 'distribution'. Increasing returns on the other hand was discussed in relation to the division of labour, that is in the analysis of 'production'. But nobody, until comparatively recently, had thought of unifying these two tendencies in one single law of non-proportional productivity

- Piero Sraffa, Sulle relazioni fra costo e quantità prodotta

Interestingly, the neoclassical theory of value is often not discussed in the most widely used mainstream microeconomic textbooks. In its introductory chapter of some sixty pages (25-86), Pindyck & Rubinfeld (2018) do not mention "theory of value" once. Instead, the analysis immediately moves to the construction of supply and demand curves, the functioning of competitive markets and equilibrium prices. Mankiw (2017) neither addresses theories of value and distribution. Mas-Colell, Whinston & Green (1995) take off with the neoclassical theory of individual decision-making. The mainstream law & economics textbooks do not fare much better (Shavell, 2004; Posner, 2014; Cooter & Ulen, 2016).<sup>8</sup> Theories of value are conspicuously absent in all three of them. This confirms Bharadwaj's assertion that "the theory [i.e. the subjective theory of value] is

<sup>&</sup>lt;sup>8</sup> Admittedly, Shavell (2004, at 647-660) does comprise a subchapter on income distribution, but mainly addresses distribution through the lens of redistribution through taxation.

unconsciously accepted in such analyses as indisputably established or even as a selfevident, universally valid premise" (Bharadwaj, 1986, 1-2).<sup>9</sup>

Unfortunately, the most heterodox studies on value do not care to define "theory of value" either. Instead, prominent authors such as Dobb (1973), Shaikh (1973) and Hollander (1987)<sup>10</sup> immediately move to analysing the neoclassical theory of value and then jump to its critique, without ever defining what theories of value are. The definition provided by Wikipedia in fact covers the essence of theories of value: "A theory of value is any economic theory that attempts to explain the exchange value or price of goods and services. Key questions in [value] theory include why goods and services are priced as they are, how the value of goods and services comes about, and—for normative value theories—how to calculate the correct price of goods and services (if such a value exists)."<sup>11</sup> We may add to this that theories of value 1) are concerned with "the *social measure* of the 'worth' of a thing" (Sinha, 2003) and 2) address the long-run determinants of prices and abstract from day-to-day fluctuations (Taylor, 2001; *compare* Judson, 1989). Furthermore, a theory of value usually also entails distributional consequences.

Now that issues of definition are out of our way, we can move the analysis towards neoclassical price theory itself, also known as "marginalism" or "marginism" (Marcuzzo & Rosselli, 2011). In fact, marginalism is broader than the *neoclassical* theory of price. Austrians also adhere to marginalism and were deeply involved in its original conception (Dobb, 1973, 33-34; Kirzner, 2018). The marginal theory of value is wholly occupied with *relative* prices. Price is determined through the relative scarcity of the commodity produced (or, if not through the relative scarcity itself, through the scarcity of the factor

<sup>&</sup>lt;sup>9</sup> To which she subsequently adds: "Caution is, therefore, necessary; for there is nothing more intellectually stultifying than uncritical and sometimes unconscious acquisition of habitual molds of thought".

<sup>&</sup>lt;sup>10</sup> Mazzucato (2018) offers a clear exposition of value, but does not define value theory as such.

<sup>&</sup>lt;sup>11</sup> <u>https://en.wikipedia.org/wiki/Theory\_of\_value\_(economics)</u>

services used to produce the commodity). The more easily available a commodity, the lower its price will be, and vice versa, under the important assumption that other things remain equal ("ceteris paribus") (Shaikh, 1973). Costs of production are seen as irrelevant (Eatwell, 2018). It is the value the consumer attaches to a commodity which determines its value, not the costs of production (Backhouse, 2018). Therefore, prices merely mirror the utility a consumer derives from consumption of the commodity (Mazzucato, 2018, 54-55), rather than the underlying conditions of production. Exchange relations, as opposed to production, take centre stage in the neoclassical story of value. As a consequence, the neoclassical explanation of price is to be situated at the level of circulation of commodities, contrary to the level of production. The latter is to be seen as incorporating the former.

In terms of distribution, marginalism is at the surface neutral, but in fact introduces a symmetry between capitalists and wage-earners, contrary to classical political economy. Capital and labour are conceptualized as crucial for production to take place, and consequently, profit (for capitalists) or the wage (for labour) is considered to reflect the marginal productivity of capital and labor respectively (Bharadwaj, 1986; Mazzucato, 2018, 53). In other words, both profit and the wage reflect the marginal productivity of either capital or labour. Class distinctions are rejected (Shaikh, 1973; Taylor, 2001) and each individual is seen as a free individual making economic decisions, pursuing rational self-interest. These decisions constitute the forces of supply and demand, which in turn determines *both* relative prices and distribution (for a complete description see Bharadwaj, 1986, 20-22). In short, "[t]he theory of price itself subsumed the theory of distribution [...]" (Bharadwaj, 1986, 31).

Being concerned with the study of human choice (Coase, 1978), neoclassical theory makes use of a *ceteris paribus* assumption ("holding all else constant") and allows for –

in theory infinitesimally - small variations in one variable, to seek out the optimal choice of the rational, utility-maximizing economic agent (Marcuzzo & Rosselli, 2011; Marcuzzo, 2014; *compare* Mazzucato, 2018, 54). The consumer ranks his alternatives according to the law of diminishing marginal utility and chooses an optimal market basket to satisfy his preferences (Shaikh, 1973). By doing so, a "utility-based demand curve" can be constructed (Bharadwaj, 1986, 43; *compare* Mazzucato, 2018, 54). It is important to note that this utility-maximizing exercise takes the initial endowments upon which the self-interested acts is taken as given (Shaikh, 1973, 3-4). Symmetrically, the law of diminishing marginal returns is applied to production *in general* to construct a supply curve (Bharadwaj, 1986, 44-45; Taylor, 2001; Mazzucato, 2018, 55), rendering a supply and demand schedule with an equilibrium price at the intersection. This equilibrium price moreover represents a Pareto optimal allocation of resources, since it is assumed that at equilibrium, each individual has voluntarily exchanged her initial endowments in a manner such that nobody can be made better off without making somebody worse off (Shaikh, 1973, 4-5).

In short, the neoclassical theory of price – and one should hasten to add, value and distribution, since both are subsumed under the former – analyses human behaviour in response to changes at the margins. Rational economic agents maximize either preferences (consumers) or returns (firms) subject to some constraint (budget or technology), through which a supply and demand schedule can be construed. At the intersection of supply and demand, the neoclassical economist then finds the Pareto efficient equilibrium price. *Absent market failure*, there is thus no reason for government intervention nor law more generally.

Neoclassical theory furthermore adheres to methodological individualism (*compare* Pearson, 2005): human action is explained in terms of individual decisions and behaviour.

Hence, marginalism eschews class distinctions and subsumes both theories of value and distribution. In terms of value theory, the exchange price (i.e. market price) reflects the *sole* value of the commodity (costs of production are irrelevant). Value and utility are two sides of the same coin: a commodity derives it value from the price a rational, utility-maximizing consumer is willing to pay for it. Given the link of utility to value, the neoclassical theory of value is also known as the *subjective* theory of value (or "marginal utility theory of value"). Lastly, again following methodological individualism, the neoclassical theory of distribution implicitly transforms capitalists and wage-earners into individual consumers and producers, whose share in the total wealth is seen to reflect each's marginal productivity.<sup>12</sup>

#### III. Classical theories of value: The primacy of production

#### 1) A short introduction to classical theories of value

If it usually cost twice the labour to kill a beaver which it does to kill a deer, one beaver should naturally exchange for, or be worth two deer - Adam Smith, *The Wealth of Nations* 

The starting point of classical theories of value is the process of production. Hence, classical theories of value are also known as *objective* theories of value. In classical political economy, value is found in the conditions of production: the value of a commodity is determined in the factory, as opposed to the market place (as is the case for neoclassical economics) (Taylor, 2001; Mazzucato, 2018). Hence, *value* and *price* ought not to be confused. Land, labour and capital were considered the basic requirements for production, from which the distributive categories of *rents*, *wages* and *profits* were derived (Dobb, 1973, 54-56; Bharadwaj, 1986; Sinha, 2003). A crucial difference between marginalism and classical theory consists in the treatment of the relationship

<sup>&</sup>lt;sup>12</sup> Shaikh (1973, 7) puts it eloquently as follows: "Thus at any time distant from the Garden of Eden, the initial endowments of individuals will reflect their personal efficiency and thrift [...]"

between production and consumption (Bharadwaj, 1986, 56-64). For the neoclassicals, prices are formed through the symmetrical opposition of demand and supply, with consumers maximizing their preferences (subject to a given budget) and producers choosing between alternative technologies to maximize output and returns. In classical theory, the price formation story works very differently. In absence of production, there can be no consumption, and in absence of consumers for a product, there can be no production. The starting point is thus production, which creates demand by making products available. The classical theory of value does not entail any assumptions with regards to individual behaviour. Within the framework *for their theory of value*, classical economists considered consumption as given (Bharadwaj, 1986, 56-64). Consequently, a separate theory of consumption, not necessarily based on methodological individualism can be constructed (*compare* Judson, 1989; Pearson, 2005), for example by analysing consumption in terms of classes, rather than "consumers" as a homogeneous group.

Furthermore, classical economists consider the wage as exogenously determined by historical forces (which does *not* imply that wages are fixed or invariant), independent of how the prices of production are determined (Bharadwaj, 1986, 61-62). A shared trait of classical theories of value is the adherence to a subsistence theory of wages: the cost of labour inputs will be close to or equal to the value of commodities and services necessary for the survival of workers (Taylor, 2001; *contra* Dobb, 1973, 152-153).<sup>13</sup> An important consequence of this approach is that, contrary to the neoclassical school, there is no functional relation between output and wages. Neoclassical theory tends to explain distribution in terms of marginal productivity, based on the relative price determined through the intersection of a supply and demand curve (Bharadwaj, 1986, 61-62). If

<sup>&</sup>lt;sup>13</sup> Some authors deny that Marx followed the subsistence theory of wages. In any case, he remains close to the notion, see Sinha (2003, 10-11).

wages are taken to be outside the system, the marginal productivity theory of distribution falls apart.

As such, the classical political economists maintain a very different view on distribution from their neoclassical successors. Indeed, as Shaikh (1973, 6-7; compare Dobb, 1973, 33-34) cleverly points out neoclassical theory essentially assumes that the initial endowments of market actors are given. In fact, before the price mechanism kicks in, there must be some initial distribution of wealth, which endows each individual with some tradeable good: either land, capital or labour. Then, according to the neoclassical "parable", a conclusive allocation of factors of production is arrived at in conformity with each's utility function: land and capital may be bought and sold, rented and rented out. Only labour cannot be bought and sold, since the rules of the game prohibit slavery. In short, Shaikh's account of the neoclassical paradigm shows that the equal treatment of all factors of production is questionable. The one factor of production (labour) that every individual *initially* possesses is treated differently from those (land and capital) that may ab initio (i.e. before the price mechanism works its magic) be distributed unequally. Relatedly, an implicit difference is therefore that classical political economy conceives of the distribution of income as the consequence of social relations and social institutions (in particular the law), the latter potentially amenable to change. Marginalism on the contrary merely approaches income distribution as dependent on the conditions of exchange, and therefore the initial distribution becomes of no concern for price theory (Dobb, 1973, 34-35).

Third, at the heart of classical political economy is the concept of "surplus". Surplus can be defined as "the social output *minus* the replacement of materials used in its production and the wage goods paid to the labourers employed" (Eatwell, 2018, 5-6; *compare* Garegnani, 1984). In order for there to be a surplus at the end of the production cycle, the

means of production expended during the previous cycle have to be restored, so that a new cycle may take off. Then, whatever commodities are left for consumption, net investment or waste constitute the surplus (Montani, 2018). Questions such as how surplus is defined, its determinants and growth, its distribution and how distributive relations affect the process of accumulation take centre stage (Bharadwaj, 1986). As such, the key problem for the classical economists was how to explain how surplus originates and its distribution.

In the next sections, the theory of respectively Ricardo and Marx will be reviewed briefly. Adam Smith is omitted, partly due to confinements of space, partly due to his theory of value being ambiguous and incomplete (Dobb, 1973; Bharadwaj, 1986; Taylor, 2001; Peukert, 2005; Mazzucato, 2018). Next, we will discuss Sraffa's neo-Ricardian refinement of classical political economy. Then, in the next and final chapter ("D. Towards "Sraffian Law & Economics"), the implications of Sraffian theory for law & economics will be drawn out.

#### 2) David Ricardo and the quest for an invariable measure of value

If we had an invariable standard, by which we could measure the variation in other commodities, we should find that the utmost limit to which they could permanently rise was proportioned to the additional quantity of labour required

- Maurice Dobb, Theories of value and distribution since Adam Smith

Ricardo took aim at landowners in the formulation of his theory of value and distribution (Dobb, 1973; Bharadwaj, 1986). For Ricardo, following Smith, it is labour that produces value. He claimed that value is created through production and distributed in three categories of income: wages, profits and rents. However, Smith did not offer an explanation as to why the share of labour in the distribution of value differed in time,

place and professional context (Mazzucato, 2018, 39-40). Ricardo then set out to find such an explanation. He argued that the value of a commodity is strictly proportional to the units of labour time required to produce the good (Dobb, 1973, 73-82). In other words, he adhered to a labour theory of value (Taylor, 2001; Sinha, 2019). Since workers gain a subsistence wage, Ricardo sees high food prices as detrimental to economic growth. Such high prices will lead to a higher subsistence wage, reducing the rate of profit and ultimately investments in new capital stock (Mazzucato, 2018, 40). In sum, a higher wage due to higher costs of sustenance would lead to lower profits and less investments.

So far however we have not explained the third category of income: rents. Rent is "the possibility of obtaining an income from the ownership of scarce natural resources" (Montani, 2018). For Ricardo, the landlord class and rents were closely associated. Land being the ultimate scarce good, property owners were in a position of power vis-à-vis other classes and could leverage their monopoly position to extract rents from tenants. The extraction of rents has a double negative effect on the economy. First, as economic development proceeds, land becomes more and more scarce, such as to increase the overall level of rent. This is due to the law of diminishing returns. Second, higher rents lead to higher food prices, and ultimately a higher subsistence wage. Consequently, in Ricardo's scheme, as economic development accelerates, the rate of profit would go down, due to rising rents, rising food prices and a rising subsistence wage. This tendency would ultimately choke investments due to a decreasing rate of profit, until the economy comes to a standstill (Mazzucato, 2018, 41-43).

Contrary to Smith, Ricardo made a consistent attempt at devising an "invariable measure" of value, based on his labour theory of value. Making the necessary assumption of no

technological innovation,<sup>14</sup> it would always take the same amount of units of labour to produce a given commodity, regardless of the rate of profit, rents and the wage level (Taylor, 2001). Nevertheless, Ricardo never managed to work out his "invariable measure" (Dobb, 1973, 82-84). His theory of value is flawed in the sense that it only has explanatory power when the "ratio of labor costs to capital costs [is] the same in all industries" (Taylor, 2001). This is a major drawback, since in reality most industries vary as to the amount of capital and labour used for production. As a consequence, an altered distribution of income in terms of profits and wages will affect industries with different cost-structures asymmetrically, and hence labour cannot be the invariable measure of value Ricardo sought.

#### 3) Karl Marx' labour theory of value and the transformation problem

Marx spoke of the school of classical political economy as the 'bourgeois school'. But in saying this he by no means intended to dismiss their doctrines as entirely negative

- Maurice Dobb, Theories of value and distribution since Adam Smith

Marx – despite his radical convictions – endeavoured to analyse capitalism objectively as to have a firm ground for his political philosophy (Mazzucato, 2018, 44; *compare* Boulding, 1971). As such, his writings remain relevant for economic theory. Unfortunately, although Marx did engage in a(n) (premature) analysis of law, lawyer-economists seem not to recognize his potential contribution to the discipline (Pearson, 2005).

Marx clearly distinguished between *use* value and *exchange* value. It is through trade that the value of a commodity becomes definite, but this value merely reflects the *exchange* 

<sup>&</sup>lt;sup>14</sup> In a labour theory of value, technological innovation, e.g. the introduction of steam power, changes the value of labour, since what took x units of labour to produce now takes x-t labour units, making the commodity produced less valuable, since it is through labour that value is derived.

value of the good, not its use value. He traced the inherent value of a commodity to labour power. Marx furthermore made an important distinction between labour as such and labour power (Dobb, 1973, 150-152). It is labour power, in itself a commodity (Shaikh, 1973, 29) that is bought by capitalists, not *labour*. Following the subsistence theory of wages, Marx argued that workers are paid a wage which suffices to restore their labour power (i.e. capacity to work), not labour as such. Labour as such is broader, since workers produce more value (hence there is a surplus) than is necessary to restore their capacity to work (Shaikh, 1973, 30-31; compare Taylor, 2001; Hahnel, 2017, 22-23). This is because of the difference between the use value and exchange value of labour power. The former being higher than the latter, there is a surplus if exchange is realized (Sinha, 2003, 10; compare Hahnel, 2017, 8). Any value produced over and above what is needed to maintain the capacity to work is then appropriated by the capitalist as profits. In simpler terms, according to Marx profit arises because the direct labour is not paid all that it produces. Thus, surplus comes from the exploitation of labour. It is this point which makes Marx different from Ricardo. The latter considered profits necessary for investment and the continuous growth of the economy. In Marx' account the appropriation of surplus by capitalists was observed negatively as the exploitation of workers, based on the capitalist class legally backed monopoly on the means of production (Shaikh, 1973, 28-29; Mazzucato, 2018, 44-46).

The crux of Marxian price theory is thus as follows. Like Ricardo, he explained relative prices in terms of the labour time expended (directly as well indirectly) to produce a commodity. Marx moreover claimed to have explained profit in doing so: the *price* at which the capitalist buys the commodity of labour power is *lower* than the *value* this labour power creates (Hahnel, 2017, 8). As such, production results in a commodity ingrained with surplus value, which the capitalists accordingly claims as profit.

Marx' theory remains nonetheless incomplete. Empirically, labour values simply do not translate to prices (Hahnel, 2017, 9). This problem is known as the "transformation problem"<sup>15</sup>, an issue on which neoclassical and Marxist economists alike have spilled much ink (for example, Samuelson, 1971; Baumol, 1974a; Samuelson, 1974a; Morishima, 1974; Samuelson, 1974b; Baumol, 1974b) which has much to do with the fact that Marx himself never managed to solve the transformation puzzle. Sinha (2010, 187-188) argues that the root of the problem is the assertion that it is labour alone that creates value. In fact, this is not so: it is the combination of labour, capital and raw materials that constitutes productive activity. Hence, value cannot be attributed to labour *alone*. According to Sinha, it is rather "the system of production as a whole" that generates value. Sinha furthermore concludes that Marx was not completely wrong, but the transformation problem simply shows that the distribution of income cannot be dependent on a theory of price.

As to the transformation problem itself, a core proposition in classical political economy is the assertion that competition creates a tendency for the rate of profit to equalize (Shaikh, 2016, 327-340). However, equalization of profits and the claim that only labour creates value are irreconcilable. By nature, different industries will have a different ratio of capital and labour. Consequently, under the double assumption that it is labour that creates value and that labour value determines prices, different industries will have different rates of profit (depending on their respective capital-labour ratio). However, this conclusion runs contrary to the core proposition of a uniform rate of profit (Hahnel, 2017, 15-19). As mentioned, the Marxist economic literature has gone at great lengths to solve the "transformation problem", and indeed some have claimed to have solved it (for example, Shaikh, 1973; *compare* Shaikh, 2016). However, it may also be that labour

<sup>&</sup>lt;sup>15</sup> See Appendix F for a mathematical proof.

values simply do not directly translate to prices, an issue taken up by Sraffa, which we will discuss in the next section.

#### 4) Piero Sraffa's 'rivoluzione': a non-ideological reappraisal of the surplus approach

[I]f we suppose that a man from another planet came down to see the system postulated by the marginal theory, he would never, by observation, no matter how searching, succeed in discovering the determinants of distribution

- Piero Sraffa, Sraffa Archive (D3/12/42/86)

After Marx, the neoclassical revolution pushed classical political economy to the margins. However, in 1960, classical theory was revived by Piero Sraffa in *Production of commodities by means of commodities: prelude to a critique of economic theory* (hereafter "PCMC"). More than fifty years after its publication, the book remains somewhat of an enigma, much like its author. Sraffa is arguably one of the most fascinating figures in the history of economic thought. Having been invited to teach at Cambridge by Keynes, throughout his life he maintained close friendships with intellectual giants such as Wittgenstein and Gramsci (Sen, 2003).

PCMC is an attempt at undermining the foundations of marginalism (Sraffa, 1960, vi), but also provides a solution for Ricardo's "invariable measure of value" as well as Marx' "transformation problem". In Sraffa's mind, "[neoclassical theory] explains distribution and relative prices by means of the equilibrium of the two opposing sets of forces, demand and supply for factors of production". In other words, the neoclassical supply and demand schedule incorporates price, value and distribution (Marcuzzo, 2014, 52). In stark contrast, classical political economy "determines shares of product other than wages (which are exogenously given) as a residuum or surplus simultaneously with the determination of the relative prices of commodities" (Marcuzzo, 2014, 52). However, the Sraffian theory of value is decidedly *not* a labour theory (Kurz & Salvadori, 1987; Judson,

1989; Taylor, 2001). In Sraffa's framework, value is indeed not directly derived from labour. Relative prices and the rate of profit depend on the wage rate (Hahnel, 2017, 12-13), which is different from the claim that it is labour that produces value, then to be transformed to prices. In other words, by assuming an equal rate of profit, Sraffa shows that prices can be derived straight from a given real wage rate and technology. Transformation is not required.

We will now briefly elaborate some of Sraffa's main propositions.<sup>16</sup> In doing so, we limit ourselves to the first four chapters of PCMC, due to confinements of space. In addition, we abstract from details and focus on how price is determined in the neo-Ricardian framework. Sraffa starts PCMC with a subsistence economy that only provides for itself (Sraffa, 1960, 3-5) and then gradually introduces complexities in later chapters. In chapter one's primitive economy, prices directly derive from "the methods of production". The system is self-reproducing and redistributes resources as they initially were.

In chapter two (1960, 6-11), Sraffa introduces surplus. "Methods of production" no longer determine distribution. This is so because surplus has to be distributed, which is not so in the simple subsistence economy. Sraffa argues that the rate of profit and prices in a surplus economy have to be determined *at the same time by the same mechanism*, in stark contrast to the neoclassical approach where causality runs oppositely: prices determine value and distribution simultaneously. In doing so, Sraffa takes a merely *technical* position: surplus is simply the net output of the system. As such, Sraffians do not subscribe to notions of class, contrary to Ricardo and Marx (Sinha, 2010, 281-283).

<sup>&</sup>lt;sup>16</sup> See Appendix H for the mathematical proofs.

The next step Sraffa (1960, 12-17) takes is to illustrate the effect of wage changes on the rate of profit and prices. Under the assumption of zero profits, the surplus as a whole is distributed in wages: the entire national product goes to wages. The relative value of commodities will then be



(as a proportion of the Standard net product) and the rate of profits. From: Sraffa, 1960, 22

proportionate to labour costs. Such an assumption is of course unrealistic. If we now add a rate of profit to the system, the effect on relative prices of commodities is as follows. First, relative prices will vary according "the proportions in which labour and means of production [i.e. capital] are employed in the various industries" (12). If these proportions were identical in each industry, relative prices would not change. However, in reality this is not so, but if we do assume that prices remain constant, there would emerge industries 1) with a deficit and 2) with a surplus. Those industries with a higher proportion of labour would hence have a surplus, because the surplus is no longer solely fully distributed as a wage. Vice versa the industries with a low proportion of labour would somewhat counterintuitively be confronted with a deficit. There would also be one industry with an even balance (the wage reduction is equal to the newly emerged profits given the labourmeans of production ratio). Second, if we relax the assumption that relative prices remain constant, the system would return to a balance through changes in price. In deficit industries prices will increase; surplus industries will observe lower prices. Next, Sraffa immediately points to a contradiction: the means of production in an industry are the product of some combination of labour and means of production themselves. Thus, if in such a "downstream" industry the proportion of labour and means of production is different from the proportion "upstream", prices may in-, decrease or even alternate. In short, assuming a uniform rate of profit, due to different proportions of labour to means

of production at different stages in the production process, the effect of a change in distribution of the surplus (from *all wages* to *wages and profits*) on relative prices is unpredictable. Prices may either rise, fall or alternate.

The conundrum is that a change in price and a change in distribution occur at the same time, so that price movements can be attributed either to the commodity being measured or its measuring rod (a commodity can only be measured in terms of the value of another commodity). As a solution to this problem, Sraffa constructs a "Standard commodity" (1960, 18-25). He contemplates the above-mentioned industry with an even balance: the wage reduction leads to an "exact balance of wages and profits" (assuming constant prices), and this in each successive layer of production in an identical proportion. The industry that produces such a commodity, is called the "Standard system": "in any actual economic system there is embedded a miniature Standard system which can be brought to light by chipping off the unwarranted parts" (20). In the Standard system, like earlier, the net product is divided between wages and profits. As the wage is reduced, profits will increase by the same proportion. Sraffa argues that the Standard system can be observed in actual economic systems, so that the rate of profit is determined "once the wage is given" and "prices must be such as to make the value of what goes to profits equal to [...] the value of the means of production" (23). In other words, by abstraction any actual economic system can be described in terms of a Standard system, in which it can be shown that an exogenously given wage determines profits and prices at the same time. As such, we come to a coherent theory of value, distribution and price.

The implications of PCMC are far-reaching. First, the Sraffian method deserves closer scrutiny (Marcuzzo, 2014). Sraffa defended that economists should only use "measurable and observable magnitudes". He believed that "marginal magnitudes" are purely hypothetical and cannot be observed in nature. As such, their use should be rejected, since

the *ceteris paribus* assumption in reality never holds true and cannot be controlled for in an experiment. In fact, neoclassical theory compares two alternative states of the world that cannot exist side-by-side at the same time. For example, the marginal product is merely concerned with the *hypothetical* returns of an additional dose to an existing entity and neglects that this additional dose may change the behaviour of this entity. Thus, supply and demand curves cannot be plausibly constructed (Marcuzzo & Rosselli, 2011; *compare* Bharadwaj, 1986, 38-44). For now, it suffices to briefly point out that market failure theory makes similar use of hypotheticals (*compare* Demsetz, 1969). PCMC on the contrary deals only with measurable entities. It describes a circular economy in an abstract manner as to draw out the implications of changes in distribution on value and price, at the same time showing that reasoning from price to value and distribution does not work. This is so because as prices change, distribution is affected, and value can no longer be determined. In sum, the distribution of income determines price (Sinha, 2019). Any notion of efficiency and market failure is alien to this system.

Second, Sraffa shows that wages are determined by factors outside the economic system (*compare* Taylor, 2001). PCMC shows that relative prices are *not* subordinate to demand nor consumption. The Sraffa system indeed undermines the marginal utility theory of value by proving that prices are determined by "technological conditions of production", "the rate of profit" being "a social-political question" (Dobb, 1973, 257-258). In other words, the Sraffian mode of price determination requires that the wage is *ex ante* specified, upon which profits and price depend. As such, it allows for ethical and political considerations to come to the fore and provides a meaningful language for discussing distribution and making value-judgements, rather than leaving these implicit under the disguise of Pareto efficiency. At the same time, it provides a more realistic framework for the analysis of the contemporary economy, where wages through collective bargaining

are no longer at subsistence level (Dobb, 1973, 262-263). More generally, this conclusion is particularly troublesome for mainstream law & economics, which applies neoclassical price theory to the legal system. The key point is that if neoclassical price theory *with regards to production* has to be rejected, which Sraffa proves, the *general* application of price theory to the legal system has to be rejected as well.

Third, a point which we have not taken up earlier, is that in Sraffa's framework (1960, 74-78), rent partakes in the surplus, as a "share of the net income distributed to landlords", or more importantly, other owners of scarce natural resources. Taxation of rent therefore does not affect the rate of profit nor the price of commodities (Montani, 2018). This is a crucial point for our purposes, since many legal rules underpin the extraction of such rents, and the legal system can address such "leakages", as we will discuss in the next chapter.

#### D. <u>Conclusion: Towards "Sraffian law & economics"</u>

#### I. Suggested framework

The classical system [is] more general in scope and versatile in dealing with historic-specific factors; it does not commit itself through its theoretical structure to any rigid form and direction of change

- Krishna Bharadwaj, Classical political economy and rise to dominance of supply and demand theories

An attempt will now be made to answer our research question and suggest a theoretical framework that provides a meaningful language to talk about value, distribution and price, without subsuming one theory into the other. First, the Sraffian approach demonstrates that the marginal method is fundamentally flawed: there is "no measurable and observable" basis for its theory in the real world. Supply and demand schedules, with an equilibrium at the intersection, cannot be logically construed. According to Sraffan

"marginal measures" are merely hypothetical, which echoes Calabresi's critique in *the Pointlessness of Pareto* against "improvements [that] would occur only if certain hypothetical conditions hold true". In short, market failure theory, as an integral part of supply and demand analysis, has to be rejected. The basic method of ML&E, grounded in non-observables, hypotheticals and "if only"-conditions, is epistemologically flawed. Sraffian theory is not. It merely takes a "snapshot" of the economy, through abstraction, at a given point in time (Sinha, 2019). By taking different "snapshots" at different points in time, the theory can be used to explain the effects of *legal change* from one point in time to the next, i.e. dynamically, in stark contrast to the static notion of efficiency.

A second finding of Sraffa is that a tax on rent does not affect the rate of profit nor the price of commodities. Rents constitute an income that is not productive, i.e. there is no creation of value underlying the income. In Sraffa's mind, rentiers are the land-owning class, land being the ultimate scarce resource. The scarcity of land allows its owner to extract rents from those who use the land for productive activities. In other words, the available surplus is partly transferred to a class which does not productively contribute to society. The economics of property rights therefore may need reconsideration. An important question here is how the law facilitates and supports rent extraction, by providing legal backing to the monopolization of scarce resources. We may not only think of land in a contemporary society, but knowledge as well. Intellectual property rights constitute the artificial monopolization of knowledge, facilitating the extraction of rents, ultimately squeezing capital investments (*compare* Pagano, 2007; Pagano, 2014). Ultimately, if "leakages" through rent are successfully curtailed, surplus can be fully distributed in terms of wages and profits, which should lead to higher aggregate demand and investment, and thus benefit the economy on a macro-level.

There is nonetheless a double prerequisite to actualize such a boost in aggregate demand and investment. Eliminating rent leads to more surplus being available for distribution, either as wage or as profits. First, one of our main findings is that the wage simultaneously determines profits and prices. In other words, income distribution is exogenously regulated by the wage. The share labour partakes in the surplus is a socio-political question, much of which depends on labour and employment law. Interestingly, the economic analysis of labour law was developed much later than other fields of law (Schwab, 2017). Sraffian economics however seems to suggest that labour and employment law, given its effect on the wage, is a crucial determinant of income distribution. Therefore, the effect of legal rules on the wage needs to be reassessed from a holistic perspective, rather than studying them from within the narrow confines of the labour market.

The second prerequisite for such a boost to occur is that the share of surplus distributed as profits is utilized productively. Ricardo assumed that capitalists would reinvest profits in new capital stocks, accumulating capital and driving growth to ever higher levels. Marx however distinguished between productive and commercial capital. The first category produces commodities and creates value, while the second category ideally merely provides 'oil for the engine' of the first. Commercial capitalists redistribute value created elsewhere and thus do not create surplus value (Barba & De Vivo, 2012), but charge a fee for their service, eating into the part of the surplus to be acquired by productive capital (Mazzucato, 2018, 47-50). While financial intermediation contributes to the reproduction of the system (Barba & De Vivo, 2012), any financial services that go beyond intermediation do not create value, but partake in the surplus and squeeze possible investments by the productive sector. As such, Sraffian law & economics points to

rethinking doctrines such as the efficient capital markets hypothesis and stricter regulation of the financial sector (*compare* Panico, Pinto & Anyul, 2012).

Relatedly, financialization is exacerbated by the dominant paradigm within the theory of the firm: shareholder value maximization ("MSV") (Lazonick, 2014a; Lazonick, 2014b; Lazonick, 2015). Lazonick argues that since the 1970s firms have shifted from a "retainand-reinvest allocation"-policy to a "downsize-and-distribute allocation"-regime, legitimized by MSV-doctrine. This shift mainly favoured top executives and financial interests, at the expense of investments in physical and human capital. He considers MSV part of the same neoclassical framework based on perfect competition and efficiency (Lazonick, 2016) criticized here. Lazonick's theory fits well within the Sraffian framework. When the surplus distributed to firms as profits is not reinvested in new capital stocks, but is instead channelled to managers and financial interests (such as hedge funds), accumulation and economic growth will slow down. This hypothesis has been backed by empirical evidence (Stockhammer, 2004). Thus, for the aforementioned boost in aggregate investment to occur, rethinking the law & economics of corporate governance and the market for corporate control is necessary.

While the previous points may seem but a meagre reward for the lengthy preceding analysis, this is in fact not so. First, the Sraffian framework transcends the distinction between micro- and macro-economics. For a discipline previously preoccupied with a micro-economic analysis of law (Listokin, 2019a; Listokin, 2019b), such a broader framework is not a small reward. Second, the framework can be adapted as to incorporate ecological economics (Judson, 1989; *contra* Patterson, 1998; Martins, 2016; Verger, 2017; Hahnel, 2017). While the literature recognizes that Sraffian and ecological theories are compatible, much work remains to be done and thus the point will not be pursued any further here. However, a case could be made for "green" legislation, regulation or

jurisprudence. Third, as was touched upon *supra*, the Sraffian approach moreover allows moving away from unrealistic assumptions. Neoclassical economics all too often forces reality into the narrow confines of its theoretical framework, ultimately forgetting about the real world, as Calabresi cleverly notes in *The Pointlessness of Pareto*. Fourth, the advantage of "Sraffian law & economics" is that it in essence entails a supply-side analysis. The logical inconsistencies and the impossibility of a neoclassical supply curve (Sraffa, 1925; Sraffa, 1926; Bharadwaj, 1986, 44-55 for an overview) were established well before the law & economics movement began. The Sraffian view thus merely supplants a type of supply-side analysis that has been discredited decades ago.

More important however is the unwillingness of Sraffian economists to impose unrealistic assumptions on the demand side. At the demand side, behavioural law & economics has shown that utility-maximizing is frequently an illusion (*compare* Van den Bergh, 2018, 29-41). "Sraffian law & economics" thus has the potential to solve the inherent contradiction between the strict neoclassical and behavioural approach: "freedom from the marginal approach and supply-and-demand apparatus allows consideration of other factors besides price incentive, exogenous preferences and given endowments" (Marcuzzo, 2014). As such, customs, social norms and class considerations (Bharadwaj, 1986) can be brought within the purview of law & economics. Given that one of the often heard objections against behavioural law & economics is the lack of an overarching theory, the greatest promise of renewed engagement with Sraffian theory by lawyer-economists is its potential to provide a unifying framework.

A last note on the scope of the suggested analysis is warranted. Critics may concede that the Sraffian framework is relevant for the analysis of commodities markets, and thus for the economic analysis of labour law, competition law and other fields closely related to the production of commodities. However, issues such as crime, marriage and the family cannot be analysed through the Sraffian lens. Much work in law & economics indeed purports to explain behaviour on these "markets" through the paradigm of the rational utility-maximizer, so characteristic to Posnerian law & economics. However, if the neoclassical paradigm fails to explain prices on *actual* markets, then it is highly doubtful in how far it is useful at all to elucidate non-market behaviour. To the question "what do economists study?", the founding father of law & economics, Ronald Coase, profoundly answered: "the economic system" (Coase, 1978, 206; Kornhauser, 1950; Golecki, 2014). As such, the "limited" scope of the suggested framework seems to me broad enough to suit the purposes of law & economics. What is won in terms of theoretical rigour and logical consistency easily compensates the loss of generality.

#### II. Epilogue: Towards "Sraffian legal theory"?

When the vivid fictions and metaphors of traditional jurisprudence are thought of as reasons for decisions, rather than poetical or mnemonic devices for formulating decisions reached on other grounds, [one] is apt to forget the social forces which mold the law and the social ideals by which the law is to be judged

- F. Cohen, Transcendental nonsense and the functional approach

So far we have limited ourselves to the theory and methodology of law & economics *as an autonomous discipline*. The history of ideas shows that there seems to be affinity between Coase-Calabresi and classical economic thought. Therefore, we observe no *sharp* break between the analysis proposed here and "traditional" law & economics. In our view, Sraffian law & economics stays within the "law & economics"-paradigm.

Nonetheless, law & economics has challenged "traditional" legal theory on two distinct levels (for example Posner, 1980): one descriptive (the law is efficient) and normative (the law should be efficient). Kornhauser (1980) concludes that neither claims can be uphold. Alternatively, is a Sraffian legal theory feasible? Given the confines of space, it is difficult to answer the question, but at present the answer is no. It is too early for a (normative) Sraffian theory of law. The proposed theory merely offers an abstract framework for analysing value, distribution and price. Sraffa starts from the assumption that a self-reproducing economy will produce a net output over and above what is needed for reproduction and that this surplus has to be distributed, which then determines price. Distribution is therefore a socio-political choice. Obviously, law plays in an important role in the distribution of surplus, but Sraffian law & economics as proposed here does not purport to describe the legal system nor to set a benchmark for how legislation or adjudication should take place. It may merely offer insight as to what the effects of the law on the performance of the economic system could be, given certain legislative, regulatory or adjudicative arrangements and interventions. In short, Sraffian law & economics is solely concerned with propositions *about* law. Propositions *of* law remain wholly within the province of the law (Cserne, 2012). Answers are sought and found within the law itself, not outside by recourse to social facts. As such, economic arguments, both mainstream and Sraffian can only inform but not determine legislation or adjudication. For legal scholars, there is a "canon of legitimate or acceptable arguments", subject to context, the legal system and time (Cserne, 2008, 503; Cserne, 2012). At present, consequentialist reasoning (mainstream or Sraffian) does not belong to this canon.

#### III. Thesis summary

[E] conomics is not the alleged perfect selection mechanism that preserves each and every economic idea that is valid and useful and jettisons all ideas that are not

- Heinz Kurz, Whither the history of economic thought?

The mainstream literature in the economic analysis of law uses the concept of market failure to explain and legitimize legal rules. Market failure implies that resources are not allocated efficiently, which justifies government to step in and correct the market, in order to maximize welfare and achieve a Pareto efficient outcome. In sum, the role of law is limited to supporting and fixing markets in accordance with the Pareto principle.

In chapter C, we first elaborated on the dissenting voices among the founding fathers of law & economics. While Coase argues that law & economics should be more in touch with the real world, Calabresi has shown that the language of Pareto is "pointless" and does not provide guidance as to issues of value and distribution. In the second section, we make the neoclassical theory of value explicit, demonstrating that the pointlessness of Pareto as to value and distribution is inherent to the assumptions of the theory. It is shown that the neoclassical theory of value fails to coherently explain price, value and distribution. The third section then moves to classical theory (Ricardo, Marx and Sraffa), emphasizing how value, distribution and price are explained more coherently than by the neoclassical theory. Lastly, a Sraffian approach to law & economics is suggested. Its main implications are as follows. First, the basic method of ML&E is flawed and should be replaced by a holistic approach to the legal system grounded in an observable and measurable basis. The key takeaway is that applying neoclassical price theory to the legal system in general is epistemologically questionable, since neoclassical price theory fails to coherently explain prices, value and distribution. A reappraisal of Sraffa's surplus approach is therefore warranted. Sraffian law & economics may provide insight into issues such as rent-extraction based on legally backed monopolies, regulation of the financial sector and corporate governance. The prediction is that "Sraffian" legal reform may lead to a boost of aggregate demand and investment on a macro-economic level, concluding our second point. Third, the economic analysis of labour law needs to be reassessed from a holistic point of view, given that the wage is the most important determinant for the distribution of income. Fourth, as already mentioned, "Sraffian law & economics" transcends the micro- versus macro-economics distinction, but can easily be modified to incorporate ecological economics. Fifth, Sraffian theory supplants the logical inconsistent neoclassical supply-side curve and does not impose any unrealistic assumptions on the demand side. As such, there is potential synergy between Sraffian and behavioural law & economics. Lastly, at present it seems too early for a convincing Sraffian theory of law, but such a theory may be developed in the future.

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### F. Table: "Hidden treasures in the Cathedral"

Footnote	Text
3	One could of course look at the state as simply a larger coalition of friends designed to enforce rules which merely accomplish the dominant coalition's desires. Rules of law would then be no more than 'might makes right' writ large. Such a view does not strike us as plausible if for no other reason than that the state decides too many issues in response to too many different coalitions. This fact, by itself, would require a different form of analysis from that which would suffice to explain entitlements resulting from more direct and decentralized uses of 'might makes right'.
4	We do not intend to imply that the state relies on force to enforce all or most entitlements. Nor do we imply that absent state intervention only force would win. The use by the state of feelings of obligation and rules of morality as means of enforcing most entitlements is not only crucial but terribly efficient. Conversely, absent the state, individuals would probably agree on rules of behavior which would govern entitlements in whole series of situations on the basis of criteria other than 'might makes right'.
10	Since in the world in which lawyers must live, anything close to Pareto efficiency, even if desirable, is not attainable, these refinements need not detain us even though they are crucial to a full understanding of the concept.
13	It is the capacity of the market to induce disclosure of individual preferences which makes it theoretically possible for the market to bring about exchanges leading to Pareto optimality. But the freeloader situation is just one of many where no such disclosure is achieved by the market. If we assume perfect knowledge, defined more broadly than is normally done to include knowledge of individual preferences, then perhaps implicit in the concept of no transaction costs, would not only make reaching Pareto optimality easy through the market, it would make it equally easy to establish a similar result by collective fiat.
15	There should be no implication that a Pareto optimal solution is in some sense better than a non-Pareto optimal solution which results in a different wealth distribution. The implication is only that given the same wealth distribution Pareto optimal is in some meaningful sense preferable to non-Pareto optimal.
16	The trouble with a term like 'no transaction costs' is that it covers a multitude of market failures. The appropriate collective response, if the aim is to approach Pareto optimality, will vary depending on what the actual impediments to full bargaining are in any given cases. Occasionally the appropriate response may be to ignore the impediments. If the impediments are merely the administrative costs of establishing a market, it may be that doing nothing is preferable to attempting to correct for these costs because the administrative costs of collective action may be even greater. Similarly, if the impediments are due to a failure of the market to cause an accurate disclosure of freeloaders' preferences it may be that the collective can do no better.

### G. Mathematical illustration: Marx' transformation problem

From Sinha (2010, 186-187):

Thus Marx's procedure of transforming values into prices of production can be represented as below:

$$\begin{split} &(\lambda_{11}\pi_1 + \lambda_{12}\pi_2 + \ldots + \lambda_{1n}\pi_n) \left(1 + \mathbf{r}\right) = \lambda_1\pi_1 \\ & \ldots \\ &(\lambda_{n1}\pi_1 + \lambda_{n2}\pi_2 + \ldots + \lambda_{nn}\pi_n) \left(1 + \mathbf{r}\right) = \lambda_n\pi_n \\ & \Sigma \lambda_i\pi_i = \Sigma \lambda_i, \end{split}$$

where i = 1, ...,;  $\lambda_{ij}$  represents labour-value of commodity j needed in the production of one unit of commodity i; r is the equal rate of profits and  $\pi_i$ 's are the multiplication factors that transform the values into prices of production. We have n + 1 equations to solve for n deviation factors  $\pi$ 's and one rate of profits r.

Given this procedure of transforming values into prices of production, it is clear that in general the rate of profits 'r' will not be equal to S/(C + V) and the sum of profits will not be equal to the sum of surplus-values. In other words, the rate of profits

cannot be determined at the level of value accounting.

For mathematical simplification we will assume that the capitalist needs enough money to pay for all raw materials and labor at the start of the period of production. This sum of money is his "capital." Profits are realized at the end of the period of production when the commodities are sold. This simple model has six economic variables: the profit rate (r), the wage rate (w), and a price for each of the four commodities (P<sub>S</sub>, P<sub>W</sub>, P<sub>P</sub>, P<sub>C</sub>). Prices, wages and a profit The Economic Model To turn this into an economic model, rather than simply a technical model, some additional stylized facts must be added. The usual assumption of a single rate of profit throughout the economy will be adopted. ate allow us to turn the input-output table into a set of four equations

 $(1+r)(P_{S'}200+P_{W'}50+P_{P'}25+P_{C'}1000+W\cdot 500) = P_{S'}1500$ 

 $(1+r)(P_S'300+P_{W'}250+P_{P'}75+P_C'200+w.2000)=P_{W'}2500$ 

From Taylor (2001):

 $(1+r)(P_S\cdot 50+P_{W}\cdot 600+P_P\cdot 100+P_C\cdot 100+w\cdot 600)=P_P\cdot 800$ 

 $(1+r)(P_{S'}500+P_{W'}150+P_{P'}50+P_{C'}400+w \cdot 1900) = P_{C'}3000$ 

This gives us a structural picture of the stylized economy. The capitalists in each industry start with a "capital" sufficient to purchase the inputs, including labor. If one starts with \$10 million - with the period of production being one year - and then sells the output for \$12 million, the profit rate is 20% The problem is that there is not enough information to solve this set of equations for the four prices, the wage rate and the profit rate. There can only be a unique solution to such a set of equations when the number of equations is equal to the number of unknowns. [20. Note] Here there are four equations with six unknowns. One of the unknowns can be easily eliminated. It is relative prices that we are after. So we can arbitrarily use any one of the commodities as a standard of price. By declaring the price of steel to be equal to 1, all other prices can be expressed relative to steel. Now we have five unknowns, but still only four equations.

rate. If we use a profit rate of 10%, we can solve for the wage rate and for prices of production of the commodities. In this example, the wage is \$589.36 per period of production, the price of wheat is \$867.52 per ton, pork is \$1,584.78 Returning to the example above, we could arbitrarily pick steel as a standard: simply define the price of a ton of steel as \$1,000. We can then solve the equations for the other prices as long as we first pick either a wage rate or a profit per ton, and coal is \$785.96 per ton. [21. Note] Other profits rates will result in a different set of prices. We can also calculate the value of the total net product. In this case (with a 10% profit rate) it comes to \$3,601, 279. Of this, \$2% goes to workers as wages and 18% to capitalists as profits. Thus far, Sraffa has offered a powerful critique of neoclassical economics. According to neoclassical theory, we should be able to solve this system of equations for profits, wages and prices. But we cannot. The neoclassical economists income for any given system of demands and technologies; the distribution of income is fully determined by demand and technology. Staffa's model provides us with technology and demand as givens. But the system as it stands is not claimed that if we took an economy's final demand and technologies of production as givens, a particular distribution of income between labor and capital would result; that is, that there was only one 'permissible' distribution of determinant Income Distribution is Exogenous. The solution is obvious. It is only the neoclassical insistence that the distribution of income is endogenous that gets in the way. If we accept that some non-economic forces determine how unknowns and four equations. Or pick a rate of profit. Once we bring in either the wage rate or the profit rate from **outside** the economic model, a bit of tedious math solves this set of equations for the prices of production. We can also use this model to solve for certain limiting cases. Set the profit rate at zero, and we get a wage rate and set of prices which allow the workers to purchase all of the net product. Set the wage rate at zero and we get a profit rate and set of the net product gets divided between capitalists and workers, the problem disappears. Pick a wage rate - remember, classical political economy assumed wages would tend toward a socially determined subsistence - and there are four prices which delivers the entire net product to the capitalists.

different qualities of land that give rise to rent. Or we can test the effects of different profit rates in oligopolistic and competitive industries. Unfortunately, as we add realism, we lose transparency - it becomes even more difficult to Sraffa's theory of value also has sufficient flexibility that we can make it more realistic. Fixed capital can be included by treating it as a **joint product**: the capitalist purchases a buildozer, for example, at the start of the period of production. At the end of the period of production the firm has produced a one-year-old bulldozer along with the commodity that it normally produces. Or we can use different processes for producing the same product, such as visualize the structure of our model economy as it becomes more complex - leaving us still more dependent on the results achieved through the mathematical manipulation of matrices.