DISTRIBUTION THROUGH TAXATION VERSUS LEGAL RULES, AND THE EPISTEMIC LIMITS OF LAW-AND-ECONOMICS

by

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Abstract: This Article develops an epistemic critique of the view, widely held in law-and-economics, that legal rules should always be chosen for efficiency and that redistribution to produce a fair distribution should be conducted solely through the tax-and-transfer system. In place of this orthodox view, I develop an alternative distributive theory.

The canonical 'double distortion' argument for the orthodox position, formulated by Kaplow and Shavell (1994), claims that opting for efficient legal rules minimizes economic distortions and maximizes aggregate social wealth, some of which can then be redistributed via the tax-and-transfer system to those who would have been better off under the distributionally fair rules, thereby producing Pareto improvements relative to that latter regime.

My epistemic critique begins with the observation that to create such Pareto improvements, the state must know the hypothetical distribution that would have resulted from adopting the fair legal rules, since it needs to identify (i) which individuals are to receive (and finance) transfer payments, and (ii) in exactly what amounts. In this respect, the form of reasoning employed by Kaplow and Shavell is the most epistemically demanding of all those commonly utilized in normative law-and-economics. Drawing on literature from the methodology of economics, I develop a number of arguments for why predictions of precise distributions are typically not possible. In practice, policymakers must generally be content to elicit more modest empirical inferences from economic models, such as directional impact of policies or other coarse-grained properties of outcomes. In the course of this analysis, the epistemic limits of law-and-economics are duly located.

This critique has far-reaching implications for the role of the legal system in the institutional realization of distributive justice. I conclude that on a realistic view of the predictive power of economic and social science, a pluralist approach, which recruits many slightly redistributive legal rules to support the tax-and-transfer system, will be most epistemically feasible. A novel version of this pluralist approach, which I call the 'prudent investor' framework, is developed to replace the orthodox distributive method.

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Deep thanks to Matthew Adler, Mala Chatterjee, William Eskridge, John Ferejohn, Leslie Francis, Mitchell Kane, Alvin Klevorick, Anthony Kronman, Zachary Liscow, Yair Listokin, Daniel Markovits, Liam Murphy, Jeesoo Nam, Daniel Shaviro, and Lawrence Zelenak for helpful comments and conversations.

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Introduction

Ought the laws be fair or efficient? Arguably, there is no more fundamental question in law and public policy. Within the discipline of law-and-economics, conventional wisdom offers a seemingly compelling answer: we should opt for efficient laws, albeit in the pursuit of fairness. By choosing legal rules exclusively based upon efficiency, so the argument goes, society can maximize its total wealth, some of which may then be redistributed through the tax-and-transfer system to bring about a fair distribution of resources, welfare or opportunities—whatever we ultimately understand 'fairness' to require.

The canonical statement of this approach was articulated by the economists Louis Kaplow and Steven Shavell (hereafter, 'KS') in a seminal 1994 article.[2] KS claimed that because (re)distribution[3] through the tax-and-transfer system distorts economic activity less than when conducted through the legal system or other government policies, taxation is the less costly distributive instrumentality. By opting for wealth maximizing laws and policies, and relying exclusively on taxes-and-transfers to pursue distributive objectives, we can always create Pareto improvements relative to a regime of fair non-tax laws. Our initial question therefore bespeaks a false dichotomy: if we abide by the economists' dictum, one may achieve the best of both worlds. Efficiency and equity meet as comrades, not competitors.

Since the appearance of their classic article, KS have often found themselves on the receiving end of criticism, and their argument has given rise to a vigorous debate over the optimal institutional method(s) of (re)distribution. Nevertheless, their view has displayed astounding resilience, and it continues to ride high. Open any of the textbooks, and one will find their reasoning recited as a central justification for law-and-economics' single minded concentration on legal efficiency.[4] While this methodological focus certainly predated KS's work, and has found refuge in an evolving lineage of purported justifications, their argument has emerged as a keystone of the modern approach to the discipline.

Little was it appreciated that, years prior to its debut, the fatal lacunae in KS's reasoning had already been tacitly identified by a public finance economist of no less repute. In his pioneering work on the theory of optimal taxation,[5] the Nobel Laureate James Mirrlees observed that the tax-and-transfer system is subject to certain practical constraints stemming from the epistemic limitations of lawmakers. In particular, Mirrlees noted that individually tailored transfer payments, which make their recipients as well-off as they would have been under some benchmark state of affairs, will frequently be infeasible. The reason? It often cannot be known precisely how well

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[2] Louis Kaplow & Steven Shavell, *Why the Legal System Is Less Efficient that the Income Tax in Redistributing Income*, 23 J. LEGAL STUD. 667 (1994). For earlier articulations of the basic idea, see Steven Shavell, *A Note on Efficiency Vs. Distributional Equity in Legal Rulemaking: Should Distributional Equity Matter Given Optimal Income Taxation*?, 71 Am. ECON. REV. (PAPERS AND PROC.) 414 (1981); Aanund Hylland & Richard Zeckhouser, *Distributional Objectives Should Affect Taxes but Not Program Choice or Design*, 81 SCANDINAVIAN J. ECON. 264 (1979).

[3] In this Article, I'll generally use the terms "distribution" and "redistribution" interchangeably.

[4] *See* RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW 731 (2014 9th ed.); A. MITCHELL POLINSKY, AN INTRODUCTION TO LAW AND ECONOMICS 161-62 (2019 5th ed.); ROBERT COOTER AND THOMAS ULEN, LAW AND ECONOMICS 7-8 (2012 6th ed.)

[5] As explained infra at section I.A.2, optimal tax theory is an equally important component of the modern approach to law-and-economics.

each such person would have fared under the relevant counterfactual scenario.[6] Because KS's method critically relies on the use of such custom transfers to create Pareto improvements, this observation suffices to block their conclusion that redistribution should always occur through the tax-and-transfer system.

Mirrlees's acknowledgement of these epistemic constraints was narrowly predicated upon the '*problem of private information'*[7]: in essence, because economic theories frequently take publicly unobservable information about individuals as inputs (such as earning ability, in the case of his optimal tax theory), their predictive capacity is subject to an upper bound.[8] Yet these observations only scratch at the surface of much deeper epistemological issues. In intervening years, foundationally oriented economists and philosophers have identified a litany of obstacles to prediction in the realm of human affairs, any of which could serve as a similarly formidable roadblock to the use of KS's method. Although this literature on the methodology of economics therefore has an enormous bearing on taxation policy and on the economic analysis of law more generally, it has largely been overlooked within legal scholarship. In large measure, lawyer-economists have been content to employ the standard tools of their trade under the happy illusion that they admit of few, if any, limits on predictive resolution.[9]

These oversights bear critically on public policy. In a recent article, the tax scholar Alex Raskolnikov documents a multitude of federal policies adopted over the last several decades due to their alleged efficiency. Drawing on the latest empirical research, he builds the case that these measures resulted in significant losses to certain classes, as measured against the prior status quo. While there are a number of potential explanations for this apparent lack of indemnification, none are as plausible or as fundamental as the generalized Mirrleesian insight. If there are principled epistemological roadblocks to the compensation of 'distributive losers,' then these obstacles must be brought out into the light of day. Otherwise, the blind pursuit of efficiency in law and public policy shall inevitably leave one half the lawyer-economist's social contract unfulfilled.[10]

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[6] *See* J.A. Mirrlees, *The Theory of Optimal Taxation*, in HANDBOOK OF MATHEMATICAL ECONOMICS, VOLUME III 1197, 1197-98 (Kenneth J. Arrow & Michael D. Intrilligater eds. 1986). Specifically, Mirrlees denied the epistemic feasibility of individualized lump-sum transfers based on income earning ability, which are considered first-best in his theory of optimal taxation. According to that framework, the most efficient regime is one where individuals are taxed (positively or negatively) on their highest potential income, as determined by this ability; and the benchmark that is thereby improved upon is one where they are instead taxed on their actual earned income. See section I.A.2.

This situation is slightly different than the type concentrated upon in this Article. In the cases Mirrlees considers, it is the economically efficient regime that constitutes an epistemically intractable counterfactual: due to the unobservability of earning ability, the state generally cannot determine people's maximum potential earnings and compute their corresponding lump-sum transfers. By comparison, in the cases concentrated on herein, it is the benchmark regime to be Pareto-improved on that, I will contend, frequently cannot be known with precision. As discussed infra at section II.A.1, Mirrlees's general point applies in these inverse scenarios as well, and to custom tailored transfers in general, including the compensatory payments employed in KS's method. Without access to the information required to determine how well off heterogeneous individuals would fare under the counterfactual fair legal regime, these payments will not be computable. The broader relevance of Mirrlees's observation is noted, but not developed, by Chris William Sanchirico, *Deconstructing the New Efficiency Rationale* 86 CORNELL L. REV. 1003, 1006-07, fn. 5 (2001) [hereinafter, Sanchirico, *New Efficiency Rationale*].

[7] *See* Mirrlees, *supra* note 6, at 1197-1200.

[8] *See id*. at 1244-45 (noting calculation and approximation problems that arise when optimal tax theory is applied to populations whose members differ in their attributes).

[9] An important exception is the recent behavioral law-and-economics movement, although this sub-discipline faces its own methodological challenges. See infra at section I.B.2.b and Appendix II, note 271.

[10] Alex Raskolnikov, *Distributional Arguments, in Reverse*, 105 MINN. L. REV. 1583 (2020), which is discussed infra at section I.B.2.c.

Conversely, coming to terms with these epistemic constraints may have important implications for the most effective institutional means of pursuing fair distribution.

From a bird's eye perspective, coming to terms with these epistemic constraints is the primary ambition of this Article. On a somewhat more granular level, this Article has the following aims. Its narrowest objective is to develop Mirrlees's core insight, regarding the infeasibility of individually-tailored transfers, to rebut KS's argument for the '*tax-only' view* of distributional mechanism.[11] So doing reveals that the generic style of reasoning employed by KS makes epistemic demands of lawmakers that cannot normally be met.

To accomplish these feats, I synthesize important work on the methodology of economics, and make further progress in delineating the *epistemic limits of law-and-economics*. This analysis reveals that critiques of positive and normative economics are far more intimately related than previously appreciated.[12] By getting clear on the predictive limitations of positive economic science, we discover that certain evaluative criteria and modes of reasoning employed in normative economic analysis of law are ultimately inadequate. While KS's argument serves as our prime case study of this critical confluence, we'll see that even some their most prominent interlocutors have fallen prey to similar pitfalls.

Finally, as an institutional alternative to KS's 'tax-only' method, this Article draws on these epistemic limits to motivate a *pluralist approach* to distribution policy. On the advocated framework the tax-and-transfer system should be assigned a significant share of responsibility for pursuing distributive objectives, but a large number of (at least) slightly redistributive non-tax rules and policies are also recruited to play supporting roles.[13] These might include any number of doctrinal devices that commentators have suggested could play a redistributive role,[14] among others. The basic justification for this '*prudent investor'* framework, which diversifies the government's distributive efforts across a range of instruments, is that we can be more confident in the overall directional effect of a large number of rules and policies working together, than in the precise outcome produced by any individual tax or non-tax instrument considered alone.[15]

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[11] This is the term used by MATHEW D. ADLER, MEASURING SOCIAL WELFARE: AN INTRODUCTION 226 (2019) [hereinafter, ADLER, MEASURING SOCIAL WELFARE].

[12] For instance, the two are largely treated as separate in RICHARD A. POSNER, THE PROBLEMS OF JURISPRUDENCE ch. 12 (1990).

[13] Similar proposals are advanced by Chris William Sanchirico, *Taxes Versus Legal Rules as Instruments for Equity: A More Equitable View*, 29 J. LEGAL STUD. 797 (2000) [hereinafter, Sanchirico, *Instruments for Equity*]; Sanchirico, *New Efficiency Rationale*, *supra* note 6; and Zachary Liscow, *Redistribution for Realists*, 107 IOWA L. REV. 495 (2022). However, Sanchirico and Liscow offer justifications that are different than those epistemic arguments developed in this Article, and which I argue below are indecisive. See infra at section I.B.2. A weaker pluralist view, that at least some legal rules should be employed to promote distributive objectives, is defended on efficiency grounds by David Gamage*, How Should Governments Promote Distributive Justice?: A Framework for Analyzing the Optimal Choice of Tax Instruments*, 68 TAX L. REV 1, 72-84 (2014).

[14] Legal doctrines that it has been suggested might play a redistributive role include: the contractual unconscionability doctrine; usury laws, warranties of quality, minimum wage laws, and other forms of contractual regulation; antipoverty measures in property law, such as housing codes, subsidies and rent control; product liability rules in tort law; situational use of strict liability over negligence; anti-discrimination requirements in civil rights law; labor laws granting employees the right to form unions, and requiring employers to negotiate with them in good faith; prohibitions on the denial of health insurance coverage on the basis of genetically determined illness; and damages for tortiously causing pain-and-suffering. For further discussion and citations, see infra at section II.C.

[15] Of note, this Article does not take a direct stand on *how much* redistribution there should be, or on the appropriate normative criteria for making such determinations. Rather, it concentrates on epistemic issues that tacitly undergird this normative debate, but which have received insufficient attention; and it works to elicit some of their key

With these general aims in mind, the Article unfolds as follows.

To contextualize our inquiry, Part I provides an overview of the contemporary debate over the use of taxes versus legal rules and policies for pursuing distributive objectives. Our first order of business is to explain the modern approach to law-and-economics, which instructs lawmakers to choose non-tax laws and policies based upon efficiency (I.A.1) and then redistribute pursuant to the principles of optimal taxation theory in order to maximize social welfare (I.A.2). Having characterized this method, section I.B then turns to its alleged justification, which differs from older economic rationales for the pursuit of legal efficiency. After noting two alternative arguments for the modern economic approach, and finding them wanting (Appendix I), I walk through KS's Pareto argument in some detail (I.B.1). I then evaluate some of the most important responses to KS from the literature, which I refer to as the heterogeneity objection, behavioral objection, and political objections (I.B.2). Although these ripostes collectively take a bit of the sting out of KS's argument, none are decisive. This mixed assessment leads us to the Article's main event.

In Part II, I develop an extended epistemic critique of KS, which generalizes and builds on the Mirrleesian insight regarding the infeasibility of custom transfer payments. After formulating the basic epistemic objection in section II.A.1, this analysis proceeds through two main stages.

In the first stage, I distinguish several types of prediction that economic theories may be used to generate (II.A.2), and show how these prediction-types serve as 'inputs' to the application of a number of evaluative criteria commonly used in normative law-and-economics (II.A.3). While these criteria are subject to distinct gradations of epistemic difficulty, it is demonstrated that the form of reasoning employed by KS has the most demanding epistemic prerequisites of the lot. Therefore, I conditionally conclude that *if any* brand of normative economic of analysis of law is beyond the epistemic ken of policymakers, it will be the variety exemplified by KS's argument.

In the second stage, I show that KS's epistemic burden cannot, in fact, be met. To that end, I begin by citing several noted authorities for this claim—including KS themselves, in other work (II.A.4.a). Because I am unwilling to rest my case on these authorities, however, I proceed to offer reasons why prediction in the realm of human affairs is necessarily quite delimited in its resolution. Ten formidable obstacles to prediction are enumerated in section II.A.4.b, and discussed at greater lengths in Appendix II. Given these methodological roadblocks, this Article endorses a *moderate epistemic view,* according to which economic (and social scientific) theories seldom yield predictions of precise distributions, but can often be used to forecast the directional movement of economic variables, or course-grained properties of economic outcomes.

Having laid out this critique, section II.B seeks to insulate it from several potential objections, and in so doing fleshes out some important details of my account. Finally, as a positive institutional alternative to KS's tax-only method, section II.C argues that a pluralist approach to distribution is justified in light of the epistemic limits of law-and-economics, and elicits a number of more specific doctrinal and policy implications.

institutional ramifications. However, one such implication is that there are limits to the precision with which one might hope to address the 'how much' question in practice.

Part I: Distribution Through Taxation Versus Legal Rules

A. The Modern Economic Approach

Before laying out my epistemic critique of KS's argument, I must first survey the existing intellectual landscape to contextualize this inquiry. To that end, Part I of this Article offers an overview of the contemporary debate over the use of taxes versus non-tax rules and policies as distributive instruments.

I begin by considering the dominant analytic paradigm in contemporary law-and-economics. The defining feature of this '*modern economic approach,*'[16] as I'll refer to it, is the strict division of labor it prescribes between non-tax rules and government policies, on the one hand, and the tax-and-transfer system, on the other. Specifically, this approach demands the following of social decision-makers:

(1) Adoption of efficient non-tax legal rules and policies without regard to such rules' distributive consequences[17] or intrinsic fairness;[18] and

(2) Exclusive use of the tax-and-transfer system to bring about a distribution of resources that maximizes social welfare.[19]

The basic idea is to first maximize aggregate wealth by adopting efficient laws and policies, and then divvy up this sum using the tax-and-transfer system to produce greater social welfare than could otherwise have been achieved.[20] In the following two sections, we will inspect each of these pillars in turn.

1. Pillar One: Adopt Efficient Non-Tax Rules and Policies To Maximize Social Wealth

The first step in the modern economic approach is to adopt efficient non-tax rules and policies, understood in the sense of *Kaldor-Hicks (KH) efficiency*.[21] As background, a certain legal or policy regime R_1 represents a KH improvement with respect to another regime R_2 just in case those who gain from the adoption of R_1 could, in principle, compensate all individuals who would have been better off under R_2, thereby leaving all parties at least as well off under R_1 as under R_2, and some better off.[22] A state of affairs is KH efficient if there are no feasible KH improvements in the circumstances. Because this will generally be true when aggregate wealth has been maximized, KH efficiency and the criterion of *wealth maximization* (*WM*) normally converge in their prescriptions.[23] Use of KH/WM to evaluate government projects often involves the method of *cost-*

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[16] Liscow refers to this as the "standard economic approach." Liscow, *supra* note 13, at 503. I prefer my terminology because it highlights the evolution in economists' purported justifications for pursuing legal efficiency.

[17] Kaplow and Shavell, *supra* note 2, at 675.

[18] *See generally* LOUIS KAPLOW AND STEVEN SHAVELL, FAIRNESS VERSUS WELFARE (2002).

[19] Kaplow and Shavell, *supra* note 2, at 677.

[20] Liscow, *supra* note 13, at 503; N. GREGORY MANKIW, PRINCIPLES OF ECONOMICS 145 (7th ed 2015).

[21] Liscow, *supra* note 13, at 504; POSNER, ECONOMIC ANALYSIS OF LAW, *supra* note 4, at 14.

[22] POSNER, ECONOMIC ANALYSIS OF LAW, *supra* note 4, at 14. For this reason, KH improvements are also sometimes referred to as 'potential-Pareto' improvements. *Id*.

[23] *See id*.

benefit analysis (*CBA*),[24] which prescribes policies that members of the relevant population would be willing to pay the most for in the aggregate.[25]

While economists have long advocated for the use of KH/WM to evaluate legal rules and policies, their justifications for doing so have evolved over time. Historically, a major driving force behind the adoption of these criteria was that they do not presuppose the ability to make interpersonal comparisons of welfare,[26] the conceptual coherence of which has long been questioned by some economists and philosophers. Even if such comparisons prove cogent, in practice their assessment still presents major epistemic challenges. In essence, KH/WM circumvent these theoretical and practical difficulties by translating preference satisfaction to a monetary scale.[27] While the *Pareto efficiency* criterion also sidesteps these thorny issues, it is far more limited in its application, since there are very few rules or policies that will not adversely impact at least a few individuals.[28]

In contrast to this largely epistemic justification, in his seminal early work, Richard Posner offered a bevy of arguments for the view that KH/WM represent inherently attractive normative criteria.[29] However, by Posner's own admission, these arguments have been shown to be indecisive.[30] Furthermore, use of KH/WM has been subject to withering criticisms from philosophically-oriented legal scholars, three of which merit brief consideration.

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[24] *Id*. at 514.

[25] In CBA, social decisionmakers first determine how much each individual comprising the population of concern would be willing to pay for the adoption of a certain policy P; or alternatively, how much each would be willing to accept to forgo P and maintain the status quo. These cash amounts are called the person's '*monetary equivalent'* for P: that is, the amount of money that would leave one indifferent between P's adoption and the prevailing baseline. For all policies under consideration, each individual's monetary equivalent is ascertained, and these quantities are then summed. If the sum of a certain policy P's monetary equivalents is positive, then P represents an improvement over the status quo. And if the sum of P's monetary equivalents is higher than the sum of monetary equivalents for every other policy under consideration, then CBA will rank P as the most desirable of these alternatives. For detailed treatments, see ADLER, MEASURING SOCIAL WELFARE, *supra* note 11, at 30-39, 192-200; MATTHEW D. ALDER, WELL-BEING AND FAIR DISTRIBUTION: BEYOND COST BENEFIT ANALYSIS 88-111 (2012); MATTHEW D. ADLER AND ERIC POSNER, NEW FOUNDATIONS OF COST BENEFIT ANALYSIS (2006).

[26] *E.g*., RICHARD A. POSNER, THE ECONOMICS OF JUSTICE 79 (1983); ADLER, MEASURING SOCIAL WELFARE, at 8, 33, 76-79.

[27] ADLER, MEASURING SOCIAL WELFARE, *supra* note 11, at 32.

[28] *E.g.*, POSNER, ECONOMIC ANALYSIS OF LAW, *supra* note 4, at 14-15.

[29] *See* Richard A. Posner, *Utilitarianism, Economics and Legal Theory*, 8 J. LEGAL STUD. 103 (1979); Ricard A. Posner, *The Ethical and Political Basis of the Efficiency Norm in Common Law Adjudication*, 8 HOFSTRA L. REV. 487 (1980). Both of these articles are reprinted in POSNER, THE ECONOMICS JUSTICE, *supra* note 26. Consider three of his main arguments. First, Posner contends that because personal wealth can only be acquired through consensual transactions, which deliver something of value to others, KH/WM represents an adventitiously constrained form of consequentialism, which avoids certain counterexamples afflicting classical utilitarianism. Id. at 66, 68. Second, because free markets tend to maximize aggregate wealth, KH/WM can be grounded in the value of economic liberty. Id. at 67. Third, when wealth maximizing legal rules and policies are adopted, almost all individuals enjoy ex ante compensation in the form of greater expected wealth. By voluntarily participating in a system that confers these expected benefits, individuals can be deemed to consent to that system, at least implicitly. Id. at 94-96.

[30] *See id.* at vi. Posner's early views were met by influential critiques in Ronald Dworkin*, Is Wealth a Value?* 9 J. LEGAL STUD. 191 (1980), reprinted in RONALD DWORKIN, A MATTER OF PRINCIPLE (1985); Jules Coleman, MARKETS, MORALS AND THE LAW, part 2 (1988); Anthony T. Kronman, *Wealth Maximization As a Normative Principle*, 9 J. LEGAL STUD. 227 (1980); among others. Although Posner responded to some of these criticisms in Richard A. Posner, *The Value of Wealth: A Comment on Dworkin and Kronman*, 9 J. LEGAL STUD. 71 (1980), his views have since evolved. He now embraces a view that maximizing wealth is instrumentally justified on the grounds that, over the long run, it brings about outcomes that are desirable by the lights of independently attractive normative criteria, such as overall utility. See POSNER, THE PROBLEMS OF JURISPRUDENCE, *supra* note 12, at 382; Richard A.

First, KH/WM are wholly insensitive to distribution, as well as to fundamental rights. All that matters from the standpoint of these efficiency standards is aggregate wealth, and not how that wealth is apportioned. As a consequence, KH/WM succumb to the objection, frequently leveled against classical utilitarianism, that they do not respect the separateness of persons,[31] and therefore may prescribe unequal and intuitively unjust outcomes.[32]

Second, because the amount of money that one is willing to pay for a certain policy (or willing to accept to forgo its adoption) is often an increasing function of one's present wealth, KH/WM, as implemented through CBA, accords greater weight to the policy preferences of the rich than to those of the poor.[33]

Third, *if* interpersonal comparisons of welfare are ultimately coherent (as most philosophers and welfare economists, at least, [34] now believe that they are), then policies favored by KH/WM will frequently fail to maximize aggregate utility. Why is that? A pervasive working assumption in economic theory is that wealth is generally subject to declining marginal utility: that is, the more wealth that one has, the less marginal utility the person will gain from one extra dollar. Consequently, by transferring resources from better to worse off individuals, aggregate utility can normally be increased, at least from a static perspective.[35] However, as we have just seen, KH/WM are insensitive to distribution, and even grant extra weight to the policy preferences of the wealthy. For the combination of these reasons, KH/WM frequently favor outcomes that are insufficiently egalitarian, even according to utilitarianism. And a fortiori, such prescriptions will also fail to maximize social welfare from the standpoint of distributionally sensitive consequentialist views.[36]

In light of these sorts of objections, most legal scholars now concede that KH/WM are not *inherently attractive* normative standards, although their epistemic and practical advantages continue to earn them a few adherents. By contrast, it is now exceedingly common to justify KH/WM's use on purely *instrumental* grounds. Under the modern economic approach, KH/WM are employed as a part of the two-step strategy ultimately aimed at maximizing social welfare, not wealth. When utilized in this instrumental capacity, all three objections above are circumvented. That's because the satisfaction of these efficiency standards is not regarded as a desirable end in its own right, but rather as an ingredient in a larger social plan sensitive to both efficiency and distributive justice.[37] This is what differentiates the modern economic approach from its ideological predecessors. In the next section, we turn to the second stage of its sequence.

Posner, *Wealth Maximization in Tort Law: A Philosophical Inquiry*, in PHILOSOPHICAL FOUNDATIONS OF TORT LAW, ed. David G. Owen 104-06 (1995). This instrumentalist view resembles the modern economic approach, which views the adoption of efficient rules and policies as a mere means to social welfare maximization when coupled with an appropriately redistributive tax scheme.

[31] JOHN RAWLS, A THEORY OF JUSTICE (1971).

[32] Indeed, if it would maximize B's economic output to be sold into slavery to A, and there were no offsetting effects on social wealth, KH/WM would even sanction this reassignment of self-ownership rights. See DWORKIN, *supra* note 30, at 252-54.

[33] *See id*. at 245; ADLER, MEASURING SOCIAL WELFARE, *supra* note 11, at 34. See POSNER, THE PROBLEMS OF JURISPRUDENCE, *supra* note 12, at 380, for a tacit concession of the combined force of these distributive objections.

[34] ADLER, MEASURING SOCIAL WELFARE, *supra* note 11, at 76.

[35] *E.g.*, HARVEY S. ROSEN AND TED GAYER, PUBLIC FINANCE 262 (9th ed 2010). We'll consider the dynamic incentive effects of redistributive transfers below in our discussion of optimal taxation principles.

[36] *See* ADLER, MEASURING SOCIAL WELFARE, *supra* note 11, at 7, 34-36. But note that these objections can be ameliorated by adopting a modified version of CBA that employs distributional weights. See ADLER AND POSNER, *supra* note 25.

[37] Because KH/WM are merely a means to maximizing social welfare, the modern economic approach *presumes* the possibility of interpersonal comparisons of welfare. It is beyond the scope of this Article to settle the matter of

2. *Pillar Two: Tax-and-Transfer to Maximize Social Welfare*

Having maximized total wealth by adopting KH efficient legal rules and policies, the modern economic approach next directs the state to use the tax-and-transfer system to redistribute these resources in order to maximize social welfare. The *theory of optimal taxation*, pioneered by James Mirrlees,[38] provides a mathematical framework for doing so.[39] As the cornerstone of modern public finance, we would do well to consider some of its main principles.

The first step in optimal tax analysis is always specification of the *social welfare function* (SWF),[40] which is a rule for ranking the social desirability of states of affairs based on the well-being[41] levels of individuals therein. The SWF approach is '*welfarist*,' meaning that only individual well-being and its distribution matter for purpose of evaluating policy; other considerations are deemed irrelevant.[42] The SWF can take a variety of forms,[43] which reflect different degrees of sensitivity to equality or fair distribution. Among the more popular SWFs are the:

- Utilitarian SWF, which sums individual welfare levels and favors policies that produce the highest total amounts, irrespective of distribution;[44]
- Prioritarian SWF, which modifies the utilitarian approach by assigning greater moral weight to improvements in the welfare levels of worse-off individuals;[45]
- Egalitarian SWF, which accords independent moral importance to decreasing gaps in the welfare levels of different individuals;[46]

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whether such comparisons are coherent. For purposes of our discussion, I'll simply assume that they are, but that their assessment is difficult in practice. One of the strongest defenses of interpersonal comparisons of welfare is developed by JOHN HARSANYI, RATIONAL BEHAVIOR AND BARGAINING IN GAMES AND SOCIAL SITUATIONS (1977).

38 James A. Mirrlees, *An Exploration in the Theory of Optimum Income Taxation* 38 REV. ECON. STUD. 175 (1971).

39 Overviews of the theory are offered by LOUIS KAPLOW, THE THEORY OF TAXATION AND PUBLIC ECONOMICS 53-121 (2008); MATTI TUOMALA, OPTIMAL INCOME TAX AND REDISTRIBUTION (1990).

40 KAPLOW, *supra* note 39, at 35-50; TUOMALA, *supra* note 39, at 5, 21-37.

41 The SWF approach is compatible with different philosophical theories of welfare. ADLER, MEASURING SOCIAL WELFARE, *supra* note 11, at ch. 2. The classic survey is DEREK PARFIT, REASONS AND PERSONS 493-502 (1984).

42 KAPLOW AND SHAVELL, supra note 18, defend welfarism and the SWF approach with an argument that is structurally similar to the one they develop against redistributive legal rules. In particular, they claim that if fairness-based considerations that do not relate to welfare are given weight in policymaking, outcomes that violate the Pareto criterion can result. Indeed, there will even be possible situations where *everyone* is made worse off. Responses are offered in Michael C. Dorff, *Why Welfare Depends on Fairness* 75 SOUTH. CAL. L. REV. 847 (2002) (arguing that choice of the appropriate SWF turns on fairness considerations and cannot themselves be grounded in welfare economics.); and Howard F. Chang, *A Liberal Theory of Social Welfare: Fairness, Utility and the Pareto Principle* 110 YALE L. REV. 173 (2000) (demonstrating that tie-breaker theories, which give weight to fairness in situations where multiple policies produce equal social welfare, do not lead to violations of the Pareto constraint.)

43 ADLER, MEASURING SOCIAL WELFARE, *supra* note 11, at ch. 3; KAPLOW, *supra* note 39, at ch 2.

44 For defense, see JOHN HARSANYI, ESSAYS ON ETHICS, SOCIAL BEHAVIOR, AND SCIENTIFIC EXPLANATION, ch. 1-5 (1976). While not taking a firm stance, KAPLOW, *supra* note 39, at 370-78, offers several considerations favoring a utilitarian SFW.

45 For defense and development of the technical details, see ADLER, WELL-BEING AND FAIR DISTRIBUTION, *supra* note 25. The classic philosophical statement of prioritarianism is Derek Parfit, *Equality or Priority*? (1991).

46 For philosophical defense, see LARRY TEMKIN, INEQUALITY (1993).

- Rawlsian (or Leximin) SWF, which prescribes policies that maximize the welfare levels of the worst-off individual (or representative class of individuals) in the population of concern.[47]

Because an SWF is essentially a formally specified theory of distributive justice, tax policy and normative philosophy are inseparably joined at the hip.[48] For while Mirrlees's original presentation of optimal tax theory employed a utilitarian SWF, his mathematical framework is compatible with the choice of any of these forms, among others, which must be justified by moral considerations.

Having specified the SWF, the optimal tax problem becomes the question of how to set tax rates to maximize social welfare, given the economic costs of redistribution.[49] As noted above, from a strictly static perspective, transfers from better to worse off individuals normally increase total utility due to the *declining marginal utility of wealth*.[50] In the limit, aggregate utility will often be maximized under a perfectly equal distribution. However, this static point of view ignores the dynamic incentive effects of taxation, which pose social costs.

Most importantly, because an income tax reduces a person's effective wages, it also reduces the opportunity cost of leisure. This incentive, referred to as the *substitution effect*,[51] can prompt an individual to work fewer hours, to work a lower paying but more enjoyable job, or to exert less effort on the job, among other behavioral responses.[52] Often, the individual will earn less taxable income as a result. Accordingly, raising tax rates does not always lead to greater tax revenue available for redistribution. At a certain point, an increase in rates will be offset by a reduction in the tax base. Precisely where this inflection point occurs depends on *labor supply and effort elasticities*,[53] the magnitude of which are subject to empirical dispute. But even when income taxation does not reduce labor supply/effort, it still distorts economic behavior in other ways, thereby reducing economic surplus and leading to *deadweight loss*.[54]

In theory, the distortionary effects of taxation could be averted if the state were able to observe individuals' income earning abilities, and levy lump-sum '*ability taxes'* based on these characteristics. Since one's ability tax obligation is purportedly fixed by her innate and socioeconomic endowment, it would not influence her behavior, and would thereby avoid the deadweight loss attributable to substitution and income effects.[55] Unfortunately, because earning

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47 For philosophical defense, see RAWLS, *supra* note 31.

48 *See* TUOMALA, *supra* note 39, at 2.

49 *See id.* at 4-6

50 And under most distributionally sensitive SWFs listed, social welfare as well.

51 ROSEN AND GAYER, *supra* note 35, at 417.

52 This will not always be the case, since the substitution effect must contend with a second and opposing incentive produced by an income tax. Because an income tax leaves the taxpayer poorer, she is pushed to work more than she would have in the tax's absence. This is called the '*income effect.*' Id. In general, whether a taxpayer will work a greater, equal, or lesser number of hours turns on the comparative sizes of the income and substitution effects.

53 For details, see KAPLOW, *supra* note 39, at 80-90. In economics, an *elasticity* is defined as a percentage change in one variable in response to the percentage change in another. So, in the discrete case, the X-elasticity of Y is given by the formula: $(X_2\text{-}X_1 / X_1) / (Y_2\text{-}Y_1 / Y_1)$. Thus, a high X-elasticity of Y indicates great responsiveness of X to a change in Y; while a low elasticity means the opposite.

54 These distortions occur because of the altered ratio of 'prices' of leisure and consumption that would prevail in a world with no taxation. See ROSEN AND GAYER, *supra* note 35, at 336, 341–43.

55 The ability tax is therefore generally regarded as a first-best ideal by public finance economists. Mirrlees, *supra* note 38, at 175; KAPLOW, *supra* note 39, at 96; ROSEN AND GAYER, *supra* note 35, at 332-34; ANTHONY B. ATKINSON & JOSEPH STIGLITZ, LECTURES ON PUBLIC ECONOMICS 356-62 (1980). But for a critique of ability taxation, see Erick J. Sam, *From Each According to Their Ability? An Analysis of Endowment Taxation and Potential Earnings*, 35 CAN. J.L. & JURIS. 241 (2022).

ability is not directly observable, the state inevitably must rely on imperfect proxies (or signals) for earning ability,[56] the most important of which is likely earned income itself.[57] This is the central welfarist justification for taxing income rather than, say, consumption or wealth. To more closely approximate a first-best ability tax, an income tax could also be supplemented with taxes on other observable attributes found to correlate with earning ability.[58]

Since Mirrlees introduced this basic framework in the 1970s, optimal tax theory has been used to analyze social-welfare-maximizing income tax rates given a wide variety of background assumptions. While the theory's prescriptions vary depending upon the exact parameters, a number of common trends[59] have emerged from conducting simulations over a broad range of assumptions, the basic intuitions for which are explained in the note below.[60]

B. **Justifying the Modern Economic Approach**

Having characterized the modern economic approach to law-and-economics, we now turn to a central question pertaining to its justification. Namely, why is it that the tax-and-transfer system is a more effective means of redistributing than legal rules and policies? Why not stand this approach on its head and choose tax rates that maximize total wealth, while employing non-tax rules and policies to redistribute to promote social welfare? Call this the '*head-standing' objection*.

Prior to KS's seminal article, two main arguments were offered as support for the modern economic approach's preferred division of labor. In my assessment, these '*contracting-around'*[61] *and 'haphazardness'*[62] *arguments* have been persuasively rebutted, and so I reserve only a brief discussion of their merits for Appendix I of this Article. Even were they successful, these arguments only purport to establish that taxes-and-transfers should typically be relied upon for distributive objectives. In their seminal article, KS developed an argument more ambitious in scope, as it concluded that redistribution should nearly always be effected through the income tax system. It is to that line of reasoning, which today stands as the central justification for the modern economic approach, that we now turn.

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[56] KAPLOW, *supra* note 39, at 101-03.

[57] Mirrlees, *supra* note 38, at 175.

[58] Liscow, *supra* note 13, at 521.

[59] In general, it has been found that there should be: (1) a large demogrant, which is equivalent to a negative income tax, for individuals on the low end of the income distribution; (2) high marginal tax rates for moderately-low-to-middle income earners; (3) a progressive tax schedule with increasing average tax rates, but falling marginal tax rates, for higher income earners; and (4) higher marginal rates, ceteris paribus, whenever there is greater inequality in earning abilities or wealth levels, stronger social preferences for equality (as reflected in the operative SWF), or lower labor supply and taxable income elasticities. See KAPLOW, *supra* note 39, at 53-79; Liscow, *supra* note 13, at 519-23.

[60] The key intuition, which largely explains results (1), (2) and (3) above, is that high marginal rates for moderately-low-to-middle-income brackets raise significant tax revenue for redistribution, since many individuals earn at least this amount of income, and therefore pay tax on some portion of their income at significant rates. At the same time, because these high rates are *inframarginal*—that is, not marginal—for many high-earners, they cause comparatively little distortion in labor-leisure decisions. To be sure, the combination of a large demogrant and high marginal rates at moderately-low income brackets produces significant work disincentives for individuals only capable of earning these incomes. However, the amount of revenue lost as a result typically pales in comparison to the revenue raised from the rest of the population by the structuring rates in this way. See KAPLOW, *supra* note 39, at ch. 4, and 64, 75, 77-79 in particular; STEVEN M. SHEFFRIN, TAX FAIRNESS AND FOLK JUSTICE 134 (2013); Liscow, *supra* note 13, at 521.

[61] Which claims that redistributive legal rules can often be contracted around in a way that blunts their intended distributive impact.

[62] Which claims that legal rules are a less systematic and comprehensive means of redistribution than the tax-and-transfer system.

1. Kaplow and Shavell's Pareto Argument

KS's argument[63] begins innocently with the observation, just noted in our discussion of optimal tax principles,[64] that income taxation distorts labor-leisure decisions relative to a no-tax baseline, and therefore produces deadweight loss. But, they continue, work incentives will be distorted in *precisely the same way* if redistributive legal rules are relied upon in place of an income tax. To see this, consider a redistributive tort regime, which makes damages for causing harm in an accident depend on one's income. Suppose, in particular, that injurers who earn less than $200,000 are liable for the amount of harm that they cause, while those who earn more than $200,000 are liable for harm caused plus some premium (the 'tort tax'). We may stipulate that this premium, which is intended to transfer wealth from better- to worse-off individuals, is set so that the *expected increase* in liability for those earning more than $200,000 is equal to the revenue that would be collected under a redistributive income tax on incomes in excess of $200,000. Because the expected 'penalty' for earning over $200,000 is precisely the same under both regimes, labor-leisure choices will be subject to identical distortions.

Now comes the crucial step in KS's argument. For in addition to distorting decisions about how much and how hard to work, a redistributive legal rule will *also distort activity in the domain that it governs*. So, in our example, individuals earning over $200,000 will alter how much care they take in avoiding accidents. More precisely, they will likely take care in excess of the efficient level which would be elicited by a rule setting damages equal to harm caused for all tortfeasors.[65] Redistributive legal rules therefore produce *two types of distortion*, while income taxation produces *only one*. Furthermore, there is no reason to think that these distortions would generally offset each other, as sometimes occurs according to the economic 'theory of the second best.'[66] Consequently, redistributing through the tax-and-transfer system poses fewer total efficiency costs than relying on legal rules, and therefore maximizes aggregate social wealth.

In the final leg of their argument, KS purport to demonstrate that an income tax can always be modified to transfer some portion of this additional wealth to individuals who would have been better off under the redistributive legal rules than under the efficient ones, thereby creating *Pareto improvements* relative to that former regime. Because no individual ends up worse off under

Regime 1 = efficient legal rules + redistributive income tax with compensatory adjustments

than under

Regime 2 = redistributive legal rules + non-redistributive income tax

and some end up better off, KS conclude that the state should always opt for Regime 1. QED, so they claim.

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63 *See generally* Kaplow and Shavell, *supra* note 2.
64 *See* discussion *supra*, at section I.A.2.
65 *E.g.,* POLINSKY, *supra* note 4, at 46.
66 Richard G. Lipsey and Kelvin Lancaster, *The General Theory of the Second Best*, 24 REV. ECON. STUD. 11 (1956).

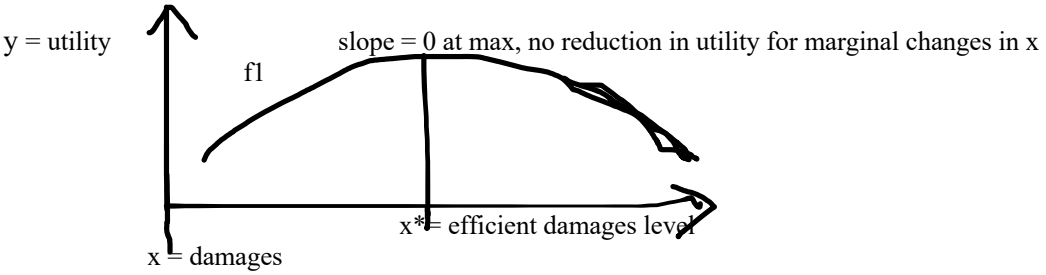
2. Responses to Kaplow and Shavell

Within law-and-economics, this Pareto argument has taken on the status of conventional wisdom. Open the disciplinary textbooks,[67] and one will find KS's reasoning recited as a central justification for the modern economic approach. Notwithstanding this general reception, the argument has met a number of objections—some even from fellow legal economists. In this section I.B.2, I consider several of the most important such responses, before developing my own epistemic critique of KS's argument in Part II. I'll refer to these as the (a) heterogeneity, (b) behavioral, and (c) political objections, and consider them in turn.

a. <u>The Heterogeneity Objection</u>

Let's first consider the *heterogeneity objection*, developed by the legal economist Chris Sanchirico. In a pair of important articles,[68] Sanchirico observes that KS's model is driven by a '*homogeneity assumption'* that all individuals within a given income class are otherwise identical. If this simplifying assumption is relaxed, he contends, and differences in other attributes (e.g., ability to take care in avoiding accidents, susceptibility to injury, etc.) are introduced, then legal rules can efficiently redistribute with respect to welfare inequalities produced by these intra-income-class differences. In fact, Sanchirico offers a mathematical argument that given such '*heterogeneity*,*'* and use of a SWF that grants some weight to fair distribution, social welfare will be maximized by making *all* legal rules *at least slightly* redistributive. Sanchirico's argument, which employs tools from the theory of optimal commodity taxation, may be summarized as follows, employing graphs as visualization tools in place of the mathematics.

Begin by considering a legal rule that we may stipulate maximizes the sum of individual utilities in the population of concern—say, a tort rule that sets damages equal to harm caused for all injurers. If we graph total individual utility on the y-axis as a function (f1) of some legal parameter of interest (here, damages), as measured along the x-axis, we see that total utility is maximized at a point where this function's curve is flat.[69]



Since the slope (or first derivative) at this maximum is zero, *marginal changes*[70] in either direction along the x-axis produce no reduction in total utility. So, in our example, if tort damages are adjusted upward or downward by an infinitesimal amount away from their efficient level x*, where they are set equal to harm, no utility will be sacrificed.

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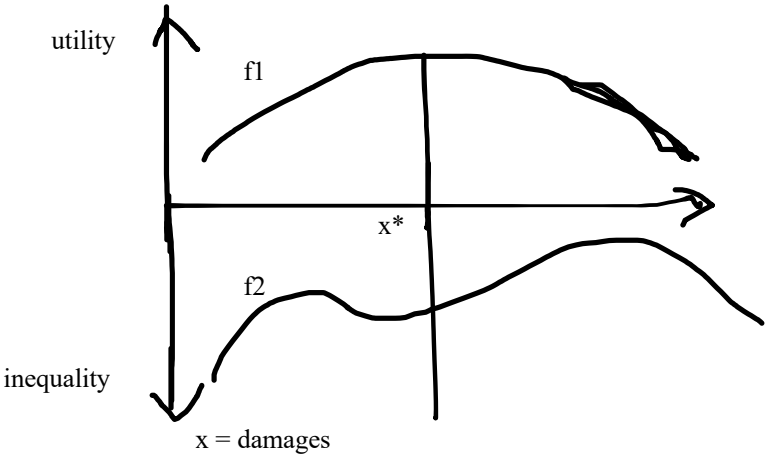
67 *See supra* at note 4.

68 Sanchirico, *Instruments for Equity, supra* note 13; Sanchirico, *New Efficiency Rationale*, *supra* note 6.

69 These graphs are presented in Sanchirico, *New Efficiency Rationale*, *supra* note 6, at 1022.

70 That is, infinitesimal or arbitrarily small changes.

The next premise in Sanchirico's argument is that a utility-maximizing or otherwise efficient legal rule will not generally be a perfectly equitable one. Indeed, this would be a highly unusual coincidence. Because maxima for efficiency and equity will hardly ever coincide, if we also graph inequality as a function (f2) of the same legal parameter as before, in almost all instances the resulting curve will *not* be flat at the independent variable's efficient value (that is, at x*).



Because this second curve has a non-zero slope at x*, marginal movements along the x-axis in the correct direction (in our graph above, to the right) will produce discrete reductions in inequality. And since non-utilitarian SWFs take into account both total utility, which (as explained above) is *not compromised* by these marginal adjustments away from the efficient parameter,[71] as well as equitable distribution, which *is improved*, overall social welfare will be increased by this marginal change from the efficient rule.

Drawing the argument to a close, Sanchirico observes that the "existence of such marginally improving movements implies the existence of *discrete adjustments* for which the equity gains outweigh the efficiency losses."[72] In other words, the fact that (i) every marginal adjustment in the equity-increasing direction is social welfare enhancing, mathematically implies that (ii) at least some discrete (non-marginal) adjustments in this direction are as well. For any legal rule, then, there will be discrete adjustments away from its efficient parameters where resulting utility losses are more than offset in the SWF calculus by corresponding gains in equity. The upshot is that social welfare will be maximized by making every legal rule at least slightly redistributive, whenever a distributionally sensitive SWF is employed.

What are we to make of this argument? I believe that we may grant its mathematical validity, while questioning its practical pertinence.[73] By relaxing KS's homogeneity assumption, and positing differences in non-income attributes, Sanchirico's model fares favorably versus KS's with regards to its realism. Yet in embracing heterogeneity, it concurrently takes on informational requirements that cannot plausibly be met.

As Sanchirico concedes,[74] aggregate utility curves need not be smooth, and therefore continuously differentiable. If they exhibits kinks, then the calculus techniques he marshals would

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71 Sanchirico, *New Efficiency Rationale*, *supra* note 6, at 1023.

72 *Id.* at 1024.

73 This objection is made by Kyle Logue and Rohen Avraham, *Redistributing Optimally: Of Tax Rules, Legal Rules, and Insurance*, 56 TAX L. REV. 157, 203 (2003).

74 *See* Sanchirico, *New Efficiency Rationale*, *supra* note 6, at 1026 fn. 56.

lose applicability, and he would lack welfarist justification for deviating from KS's prescriptions, at least by default.[75] Furthermore, because only rough interpersonal comparisons of utility between heterogeneous individuals are feasible in practice, his pivotal assumption that the aggregate utility curve exhibits the requisite contour lacks empirical basis.[76]

Even if this smooth contour were somehow confirmed, it would remain difficult, if not impossible, for policymakers to determine the magnitude of those departures from the efficient legal parameters required to maximize social welfare. Since optimal adjustments can be *extremely subtle* on Sanchirico's model, these tweaks would require a level of precision beyond the capacity of cognitively bounded human beings.[77] Confronting this sort of worry, Sanchirico urges that we need to make *some* choice in crafting rules and policies, since even inaction amounts to an implicit decision to maintain the status quo. We should therefore act on our best guesses, even if we cannot be terribly confident them.[78] But in taking this line, Sanchirico tacitly concedes that social welfare maximization is not actually a realistic expectation of his approach, and flirts with a pragmatic rationale emphasizing the inevitability of hard choices under uncertainty.[79]

In Part II.C of this Article, I too advocate for a pluralist approach, which dictates that many rules and policies be employed for distributive ends. But whereas Sanchirico's tacit pragmatism represents an economist's afterthought, offered in response to the messy complexities of the world only after he has set forth his equations, epistemic limitations feature centrally in my own justification for pluralism. Given the limits on our capacity for foreknowledge, I contend, we must not overestimate the precision of our distributive methods, nor blithely pursue optimization with single-minded focus. Rather, pluralism is justified on the grounds that we can be more confident in the overall directional effect of a large number of rules and policies working together than in the precise outcome of any particular tax or non-tax instrument considered in isolation.

b. The Behavioral Objection

Whereas Sanchirico meets KS on their home terrain of theoretical public finance, Christine Jolls draws on two empirical findings from behavioral economics,[80] referred to as 'optimism' and 'mental accounting,' in an effort to parry their conclusion.[81]

By way of background, *neoclassical economics*—and by extension, orthodox public finance and economic analysis of law—operates from the core methodological assumption that people are rational maximizers of expected utility.[82] This presupposition is axiomatized by rational choice

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[75] As Sanchirico notes, given kinks, equity gains from redistributive rules *could* still outweigh efficiency losses, but they will not *always* do so. *Id*. Our discussion below serves as a response to this weaker possibility claim.

[76] Logue and Avraham, *supra* note 73, at 2003.

[77] In their response to Sanchirico, KS level this sort of objection. Louis Kaplow and Steven Shavell, *Should Legal Rules Favor the Poor? Clarifying the Role of Legal Rules and the Income Tax in Redistributing Income*, 29 J. LEGAL. STUD. 821, 832 (2000) [hereinafter, Kaplow and Shavell, *Should Legal Rules Favor the Poor?*].

[78] *See* Sanchirico, *New Efficiency Rationale*, *supra* note 6, at 1051.

[79] A final worry is that, even if Sanchirico's optimal adjustments could be ascertained, it is possible, a priori, that they would be so minor as to approximate the efficient legal regime advocated by KS.

[80] The behavioral law-and-economics movement was spearheaded by the article Cass Sunstein, Richard Thaler, and Christine Jolls, *A Behavioral Approach to Law and Economics* 50 STANFORD L. REV. 1471 (1998). Richard Posner, a central figure in orthodox economic analysis of law, responds in *Rational Choice, Behavioral Economics and the Law* 50 STANFORD L. REV. 1552 (1998). For an overview of the field, see EYAL ZAMIR AND DORON TEICHMAN, BEHAVIORAL LAW AND ECONOMICS (2018).

[81] Christine Jolls, *Behavioral Economics Analysis of Redistributive Legal Rules*, 51 VAND. L. REV. 1653 (1998).

[82] *E.g.,* POSNER, ECONOMIC ANALYSIS OF LAW, *supra* note 4, at 3.

theory (RCT), which delineates certain formal constraints that rational preferences are presumed to satisfy.[83] The central project of *behavioral economics* (BE), which grew out of the work of cognitive psychologists from the 1970s, is the investigation of systematic deviations from RCT in actual human decision-making. In contrast to the largely a priori method of the neoclassical program, BE proceeds through laboratory experiments, natural experiments, field research and other empirical methods.[84]

Jolls's two arguments are structurally similar, and deliver roughly the same conclusion. We may therefore concentrate on her first argument from *optimism*, which is the psychological tendency of humans to underestimate the chance of low probability adverse events happening to themselves.[85] Jolls claims this bias can affect how people respond to redistributive legal rules that only spring into effect upon the occurrence of a *trigger event*, such as an automobile accident or a contractual dispute. In comparison to an income tax, which transfers wealth from all individuals in a particular income class with certainty, redistributive rules often operate probabilistically, extracting proportionately larger payments when (and only when) their trigger occurs. If this trigger is highly unlikely ex ante, then optimistic individuals may discount its probability even further in their deliberations. As Jolls explains, because

> [p]eople . . tend to underestimate the probability that they will be hit with liability under a redistributive legal rule . . . their *perceived* cost of the rule will be lower. As a result, their work incentives will tend to suffer a lesser degree of distortion than under a tax yielding the same amount of revenue for the government.[86]

For the very same reasons, KS's second layer of distortion (i.e., within the pertinent rule's domain of governance) should also generally be less pronounced than if individuals were to give due weight to low-probability trigger events.[87] Given diminutions in both distortions, legal rules can sometimes be more efficient redistributive instruments than an income tax, which produces a single larger distortion of the labor-leisure tradeoff.

How does this behavioral objection fare? As an initial matter, we should note the scope of its conclusion: legal rules *may* be more efficient than income taxes. Both of Jolls's arguments[88] establish this as a mere possibility. One reason for this is that it cannot be known a priori whether (a) two smaller distortions produced by a redistributive legal rule would yield less deadweight loss than (b) a single, larger distortion produced by an income tax. Given this ambiguity, the behavioral objection's policy implications remain unclear.

A further problem is that BE lacks the robustness one would like from scientific theories. Simply put, many findings from laboratory experiments and field research do not generalize to other real-world contexts.[89] And as the recent replicability crisis in psychology has revealed, a large number of findings cannot even be repeated under substantially similar experimental conditions.[90] In their leading treatise on behavioral law-and-economics, Eyal Zamir and Doron Teichman therefore urge "caution in identifying psychological phenomena, in making assumptions

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83 *See* discussion *infra* at Appendix II.
84 ZAMIR AND TEICHMAN, *supra* note 80, at 20.
85 Jolls, *supra* note 81, at 1659.
86 *Id*. at 1662.
87 Jolls does not make this point, since her focus is on work incentives, but it is a clear implication of her reasoning.
88 When mined for their full set of implications—see prior note.
89 Jolls, *supra* note 81. at 1672-73; Logue and Avraham, *supra* note 73, at 198.
90 *See* ZAMIR AND TEICHMAN, *supra* note 80, at 149.

about their generality and especially in drawing policy conclusions from them."[91] Before letting BE serve as our lodestar to distribution policy, much more research is needed to determine whether the phenomena Jolls contemplates actually occur in the real world settings that count.[92] We thus conclude that Jolls's behavioral objection to KS, like Sanchirico's, falls prey to at least two forms of epistemic indeterminacy.[93]

c. The Political Objection

A third major objection to KS's Pareto argument is that it rests on a dubious political theory. Namely, it falsely presupposes that legislatures will fastidiously monitor the distributive impact of legislation, judicial holdings, and administrative actions, and always implement perfectly offsetting adjustments to the tax-and-transfer system.

In his famous dialogue with Richard Posner over the merits of wealth maximization as a normative criterion, Ronald Dworkin at once anticipated the modern economic approach and offered this objection to its strict division of labor between legal rules and taxes:

> The most eligible [defense of evaluating legal rules solely based on efficiency] considers selective wealth maximization as an ingredient rather than a cause . . . of value. It supposes that if judges decided . . . cases so as to increase the total wealth, other institutions—perhaps the legislatures—would then redistribute the increased total wealth to improve average or total utility. That chain of events is, no doubt, *conceivable* . . . It is not, however, *inevitable*. The political process might, for a variety of reasons, leave those who gain most from wealth maximization with their gains intact.[94]

Shortly thereafter, Dworkin continued:

> [T]he utilitarian-instrumental theory [for justifying wealth maximizing laws] does seem to depend on judgment that the legislature will act in cooperation with courts to redistribute, so as to produce more utility from the wealth the court provides. But if that is so, the theory is seriously incomplete, because so far as I know, that case has never been made. Nor is it immediately plausible. On the contrary, if the familiar assumption is right, that optimal utility would [due to the declining marginal utility of wealth] require much more equality of wealth than now exists in our country, the hypothesis that the legislatures, federal and state have been busy redistributing in search of utility seems embarrassingly disconfirmed.[95]

In a number of recent articles, commentators have developed both the empirical and theoretical bases of this political objection.[96]

Taking the empirical side first, Alex Raskolnikov has argued that the political objection is confirmed by a plethora of government policies adopted over the last several decades on grounds of efficiency.[97] Among his case studies are trade liberalization; increased immigration; certain

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91 *Id.*

92 Jolls anticipates and cedes some ground to this type of objection. See Jolls, *supra* note 81, at 1677.

93 In addition, insurance poses further complications for Jolls's argument. *Id*. at 1663, 1665-66.

94 DWORKIN, *supra* note 30, at 261 [emphasis mine]. See also, Scott Shapiro & Edward F. Mcclennen, *Law and Economics From a Philosophical Perspective*, in 2 THE NEW PALGRAVE DICTIONARY OF ECONOMICS AND THE LAW 460, 463 (Peter Newman ed., 1998).

95 DWORKIN, *supra* note 30, at 262. It might be argued that even if the precise distribution of wealth that maximizes social welfare cannot realistically be known, the distribution is *far* more unequal than one would estimate to be utility maximizing.

96 Although they generally do not specifically discuss Dworkin's response to Posner.

97 *See generally* Raskolnikov, *supra* note 10.

environmental regulations; deregulation leading to a rise in product, capital, and labor market concentration; and laws weakening employment protections and labor unions.[98] Drawing on recent empirical research, Raskolnikov shows that these policies likely resulted in significant distributive losses to certain classes, as measured against the prior status quo. Because these distributive losers, who generally fell at the lower end of the income distribution, remain worse-off than prior to these policies' adoption,[99] the inference arises that the offsetting adjustments to the tax-and-transfer system demanded by KS's method were never made.[100] Further supporting this conclusion, Raskolnikov observes that the income tax has not been adjusted to neutralize very large changes in national income distribution, as the U.S. Gini coefficient increased by a whopping 23% from 1974-2012 without counteracting tax reform.[101]

On the theoretical front, scholars have proffered several, generally complementary explanations for why frequent offsetting adjustments to the tax-and-transfer system are not only far from inevitable, as Dworkin claimed, but frequently infeasible. Developing perhaps the most general framework, Lee Anne Fennell and Richard McAdams argue that different distributive methods carry different "*political action costs*," which can be conceptualized as transaction costs to government action. Furthermore, there is no reason to expect that the costs associated with use of the tax-and-transfer system will always be less than for other mechanisms. In some instances, the political action costs to offsetting tax adjustments may even be prohibitive. These include costs of (i) overcoming legislative inertia;[102] (ii) ascertaining the distributive impact of non-tax rules and policies on the antecedent status quo;[103] (iii) identifying and executing opportunities to implement offsetting adjustments,[104] which in a federal system often require complex coordination of governmental entities at national, state and local levels;[105] and (iv) overcoming "preferences for fairness," which influence the relative feasibility of certain distributive methods vis-à-vis others.[106]

Arguing along similar lines, Zachary Liscow brings to bear evidence that people often embrace domain specific distributive principles[107] and oppose unitary redistribution through the tax-and-transfer system, which they do not believe can adequately compensate for unfair treatment in other areas of law and policy.[108] Together with widespread beliefs regarding desert-based entitlement to pre-tax income,[109] this policy compartmentalization poses formidable political obstacles to comprehensive tax-based redistribution.[110]

With its empirical and theoretical dimensions bolstered, Dworkin's political objection represents an important response to KS's argument for the modern economic approach.

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98 *Id.* at part II.

99 Therefore, it's plausible that they're also worse off than they would be under the fair legal and policy regime, which may not correspond to the antecedent status quo (and may be even more generous to these 'distributive losers').

100 *Id.* at 1589.

101 *Id.* at 1635; Lee Anne Fennell and Richard H. McAdams, *The Distributive Deficit in Law and Economics*, 100 MINN. L. REV. 1051, 1079-80 (2016).

102 *Id.* at 1085. Similarly, Richard Revez contends that continuous tax reforms are not realistic because of congressional deadlock, for which he offers a number of structural explanations. Richard L. Revez, *Regulation and Distribution*, 93 N.Y.U. L. REV. 1489, 1518-25 (2018).

103 Fennell and McAdams, *supra* note 101, at 1084.

104 *Id*. at 1083-85.

105 *Id.* at 1089.

106 *Id.* at 1099-1102.

107 Liscow, *supra* note 13, at 512-16. Liscow refers to these as "policy silos." *Id*. at 511.

108 *Id.* at 528. For a moral defense of domain-specific norms, see MICHAEL WALZER, SPHERES OF JUSTICE (1983).

109 Liscow, *supra* note 13, at 516-28.

110 *Id.* at 511, 516, 528.

Nevertheless, its success will ultimately be a contingent matter, which turns on a nation's political sensibilities and institutional capabilities at a given time and place. Furthermore, the objection is beset by a '*reflexivity problem'*: if it were shown that KS's Pareto argument is *otherwise sound*, and that everyone could be made better off by adhering to its dictates, *this very fact* could motivate improvements in institutional capacity to implement offsetting tax adjustments, as well as undercut preferences for domain-specific fairness.[111] These preferences, along with beliefs about entitlements to pre-tax income, might be further undermined by a philosophical demonstration that they lack adequate normative justification.[112] Even if these factors presently represent obstacles to unitary tax-based redistribution, KS could argue that we should fastidiously work to educate the public on the implications of their argument, and to move towards this regime over time.

* * *

Having now considered the heterogeneity, behavioral, and political objections, we come away with a decidedly mixed assessment. Together, these objections take some of the bite out of KS's argument. But at best they sometimes result in a draw, where theoretical or empirical indeterminacies prevent us from drawing a firm conclusion about the socially optimal method of distribution. All told, this is probably enough to refute the 'strict reading' of KS's thesis, which asserts that redistribution should be effectuated through the tax-and-transfer system always and everywhere. However, there is not enough ammunition here to take down more charitable extrapolations of their double distortion reasoning: for instance, that distributive objectives should normally be pursued through taxes-and-transfers; that there are plausible empirical circumstances in which the tax-and-transfer system should exclusively be relied upon; or that we should diligently work towards a system of comprehensive tax-based redistribution. As I'll now argue, there is a far more fundamental and lethal defect in KS's reasoning, which sheds light on why policymakers will not just sometimes, but *nearly always* be incapable of making perfectly offsetting adjustments to the tax-and-transfer system.

[111] Liscow concedes the possibility of change in public attitudes, but notes that its views on tax policy have remained quite stable for decades, notwithstanding that optimal tax theory has been around since the 1970s. *Id*. at 552-53. It's implausible, however, that the lay public has been satisfactorily educated on the implications of this theory, and of KS's Pareto argument in particular.

[112] *See* LIAM MURPHY AND THOMAS NAGEL, THE MYTH OF OWNERSHIP: JUSTICE AND TAXES (2002). Liscow cites Murphy and Nagel's own concerns that the intuitions they challenge are deeply ingrained. Liscow, *supra* note 13, at 517-18. If these intuitions were truly impervious to rational revision, however, it seems unlikely that Murphy and Nagel would follow through with their revisionary project.

PART II: THE EPISTEMIC LIMITS OF LAW-AND-ECONOMICS

A. The Epistemic Critique

1. The Basic Objection

The basic epistemic objection to KS's Pareto argument may be stated as follows. Recall KS's claim that adopting efficient legal rules and policies (ER) in lieu of distributively fair ones (FR) minimizes economic distortions and maximizes aggregate social wealth. Some of this wealth can then be redistributed via the tax-and-transfer system to compensate those 'losers' who otherwise would have been better off under FR. Therefore, to produce Pareto improvements relative to FR, the state must *know the precise distribution that would have resulted* from adopting FR, since it needs to identify:

> (1*) which individuals* are entitled to receive (and required to fund) compensatory transfer payments; and in precisely
>
> (2) *what amounts*, so as to ensure that they are left no worse off than under FR.

The need for this information becomes apparent from simply working through cases and attempting to implement KS's method.[113]

However, as shall be a central contention, it is normally impossible to predict the distributive incidence of legal rules and policies with such precision. Rather, economists and social scientists must generally be content to draw more modest empirical inferences from their theories and models. When it comes to prediction in the realm of human affairs, there are a host of formidable obstacles that impose fundamental limits on our capacity for foreknowledge. On this more realistic view of the scope of economic and social scientific prediction, KS's Pareto argument will fail for the above stated reasons: i.e., the state typically lacks the knowledge required to custom tailor its transfer payments to make all individuals at least as well off as they would have been under FR.

Predating the contemporary legal debate over redistributive mechanisms, James Mirrlees anticipated the kernel of this epistemic objection in his seminal work on optimal taxation theory. As discussed below,[114] one daunting barrier to prediction in economics is that its models frequently take as inputs the private information of individuals, which is externally unobservable. Drawing on this fact, Mirrlees observed that:

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[113] To consider one example, suppose that the government is deciding whether to adopt what we shall stipulate to be (i) a fair legal rule requiring employers to pay a $20 per hour minimum wage to its workers, or (ii) an efficient rule of no minimum wage. To apply KS's approach, the government would first adopt the efficient no-minimum-wage rule; then tax the 'winners' (probably employers, and perhaps those workers who secure employment under the no-minimum wage regime but would have been priced out of the labor market under the minimum wage regime); and finally redistribute to those 'losers' who would have been better off under the $20 minimum wage rule (probably workers who earn less than this under the no-minimum-wage regime). In this, way the state can create Pareto improvements relative to the counterfactual baseline where the fair legal rule (i.e., $20 minimum wage) is adopted. In order to implement this strategy, however, the state needs to predict how well off each of these parties *would have been* under the $20 minimum wage regime. It needs this information in order to determine who is entitled to receive (and to fund) the transfer payments, as well as the size of the transfer payments required to make each such individual at least as well off as they would have been under the minimum wage law.

[114] *See infra* at section II.A.4.b and Appendix II.

> . . . the lump-sum transfers necessary to accomplish an [optimal welfarist outcome] are scarcely ever feasible. There is no way of obtaining the information about individuals that is required except in a society of individuals who are truthful regardless of selfish considerations.[115]

Specifically, Mirrlees had in mind lump sum transfers based on income earning ability, which we saw earlier are considered first-best in his optimal tax theory.[116] However, the general point carries over with a vengeance to individually tailored transfers of other varieties, such as the compensatory payments employed in KS's method. Without access to the private information needed to determine how well individuals would fare in the relevant counterfactual, these customized transfers cannot be computed.[117] While Mirrlees claimed at the time that this limitation on lump sum transfers was subject to "[w]idespread agreement among economists,"[118] legal scholars involved in the subsequent debate over redistributive mechanisms have, with a couple exceptions,[119][120] largely failed to grapple with this difficulty in implementing KS's method.

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[115] Mirrlees, *supra* note 6, at 1197-98.

[116] *See supra* at section I.A.2.

[117] Note that with Mirrlees's optimal tax theory, the epistemically intractable counterfactual is the economically efficient regime, where an individual is taxed (positively or negatively) on her maximum potential income. By contrast, in those cases concentrated on herein, it is the benchmark (fair) regime, which is to be Pareto-improved upon via KS's method, that frequently cannot be predicted with the required specificity. However, Mirrlees's general point applies in these inverse cases as well. See supra, note 6.

[118] Mirrlees, *supra* note 6, at 1198.

[119] Citing to Mirrlees, Sanchirico does note the problem of private information in stating that "the ascendancy of 'information economics' has bred skepticism about the feasibility of perfectly corrective transfers. Scholars now understand that rearranging the costs and benefits of a legal rule requires information about the rule's impact on each individual. This information is often known only to the individual herself and is thus difficult to obtain, given an individual's natural incentive to overstate her costs and downplay her benefits in order to improve her treatment under the corrective transfer." Sanchirico, *New Efficiency Rationale*, *supra* note 6, at 1006. However, as we saw earlier in section I.B.2.a, in that very same article, Sanchirico develops a model optimal redistribution that is equally, if not more susceptible, to epistemic overreach than KS's.

[120] The most important exception is Ronen Avraham, David Fortus, and Kyle Logue [hereafter, AFL], *Revisiting the Roles of Legal Rules and Tax Rules in Income Redistribution: A Response to Kaplow and Shavell*, 4 IOWA LAW REVIEW 1125 (2004), which develops a narrow version of the sort of epistemic objection articulated above. AFL's first step is to carefully construct a model of an income-dependent tort regime of the sort considered in section I.B.1. They then observe that in responding to this redistributive legal rule, individuals enjoy at least "*two degrees of freedom,"* meaning that they could "adjust both their work effort and their regulated activity" in different amounts. *Id*. at 1152. Furthermore, it is "impossible to know, a priori, the *exact* [*combination*] of work effort and of care level investments" that a particular individual would make, thereby making it impossible to predict the precise outcome of this regime from the armchair. *Id*.

While this complex behavioral response could, in principle, be deduced by obtaining certain private information about individuals, the task becomes informationally intractable if we again make the realistic assumption of heterogeneity—that is, that persons within a given income class differ with respect to other welfare-impacting attributes. The state would then need to "have detailed information about each taxpayer, information such as the individuals' innate accident-proneness, her investments in accident avoidance ('care levels'), the harm she has caused, and so on—information that tax authorities do not usually have." *Id*. at 1153. This information is generally only observed by courts in actual litigation—and even then, on a highly partial and imperfect basis. Consequently, while it might be "possible in theory to construct a tax-and-transfer regime that has a tailored tax function that indeed would leave every individual exactly as well-off as she was under the income-redistributive legal regime," (Logue and Avraham, *supra* note 73, at 192), in practice, KS's strategy is "virtually impossible to implement." Avraham, Fortus, and Logue, *supra*, at 1153.

AFL's analysis is incisive, and if their discussion can be critiqued, it is on the grounds that it fails to go nearly far enough. Taking up this project, I extend to Mirrlees's cautionary observations regarding individualized transfers, and

In the remainder of this Article, I take up the project of building on Mirrlees's insight and developing the epistemic objection articulated above. In so doing, my analysis proceeds in the following stages. In the first stage, I distinguish several types of economic prediction, and show how they function as 'inputs' to the application of various normative criteria employed in the evaluation of law and policy. It is demonstrated that the form of Pareto reasoning relied upon by KS has the most stringent epistemic requirements of the lot. Therefore, *if any* brand of normative economic analysis of law makes predictive demands beyond the ken of economists and policymakers, it will be the sort relied upon by KS. In the second stage, I argue that this epistemic burden cannot in fact be discharged. To support this claim, I begin by citing several authorities, including KS themselves in other work, and then survey a host of obstacles to prediction in economic and social science, which impose fundamental limits on our capacity for foreknowledge. Several potential objections to this critique are anticipated, and in the Article's final section, I draw on these epistemic limits to motivate a pluralist approach to distribution.

This epistemic critique extends Mirrlees's insight[121] in several key directions. Of note, it establishes that the state's lack of access to the private information of individuals is just one of many epistemic roadblocks to individually tailored transfer payments—of all varieties (not just those based on income earning ability). Furthermore, whereas Mirrlees's musings were largely internal to economics, our discussion takes several steps back to examine legal-economic methodology from a higher level perspective. In ascending to this promontory, I identify certain weaknesses suggesting a need for disciplinary reform, as well as epistemological constraints inherent in any enterprise concerned with the types of phenomena that economics investigates. Important connections are also made between positive and normative critiques of the discipline. Given these points of departure, my critique is far broader in its application, as its positive aims are to locate the general *epistemic limits of law-and-economics*; and to draw on these limits to motivate an institutionally *pluralist approach* to distribution policy.

2. A Typology of Economic Predictions

We begin stage one by laying down some conceptual groundwork. As a preliminary definitional matter, to *predict* (*or forecast*) [122] is "to endeavor to provide warranted answers to detailed substantive questions about the world's future developments."[123] Predictions can be either

AFL's narrow version of the epistemic objection, in several directions. As discussed below in the main body, my epistemic critique: (i) demonstrates that the primary evaluative criteria employed in normative law-and-economics are subject to varying gradations of epistemic difficulty, and that KS's argument makes the most stringent predictive demands of any such form of reasoning; (ii) posits a multiplicity of grounds for skepticism about the prospects for precise economic prediction, rather than focusing solely on the problem of private information; (iii) in so doing, locates the general epistemic limits of law-and-economics; which (iv) it then draws upon to motivate an alternate, institutionally pluralist approach to distribution. In addition, while AFL focus on their model of an income-dependent tort regime, and make use of assumptions and techniques common to neoclassical economics, my largely external critique applies to legal rules and policies of all stripes.

[121] As well as AFL's narrow development of the objection, discussed *supra* in the preceding note.

[122] For an excellent primer on philosophical issues involving prediction, see NICHOLAS RESCHER, PREDICTING THE FUTURE: AN INTRODUCTION TO THE THEORY OF FORECASTING (1998).

[123] *Id*. at 37-38. Rescher uses the term "forecast" to mean "a definite prediction concerned with specific concrete events," rather than universal or vague predictions, but I will use these two terms interchangeably.

categorical or conditional: that is, one might predict that a future event E will occur full stop; or predict that E will occur if (and perhaps only if) C does.[124]

Economic (and social scientific) theories might be used to make many types of conditional predictions about the effects of legal rules and government policies. Of greatest interest to policymakers are those involving the impact of laws and policies on the wealth, income, or well-being of individuals comprising the population of concern. Call these, predictions of '*ultimate outcomes*.' As an initial cut, let's distinguish two types of predictions of ultimate outcomes, which vary solely in regards to their specificity:

> *(1) Identifying (or Identity-Sensitive) Distributions*: A distribution of wealth (income, or welfare) that specifies both individual wealth holdings and the identities of the wealth holders.[125] For example, one may predict that if policy *p* is adopted, then Alice will come to hold $5, Bob will hold $10, and Cathy will hold $15.
>
> *(2) Anonymous (or Identity-Insensitive) Distributions*: A distribution of wealth (income, or welfare) that specifies individual wealth holdings, but not the identities of the wealth holders. For example, one may predict that if policy *p* is adopted, then three individuals will come to hold $5, $10, and $15, without conjecturing which individuals will hold which such amounts.

In addition, economists frequently venture '*generic predictions,'* as I'll refer to them, which are either less specific than predictions of identifying and anonymous distributions, or involve subject matter distinct from ultimate outcomes.[126] These include predictions of:

> *(3) Properties of Distributions*: A distribution that possesses certain properties is predicted, but individual wealth holdings, incomes, welfare levels, etc., are not.[127] For example, one may predict that if policy *p* is adopted, then a distribution of wealth with a mean of $100,000 and a standard deviation of $15,000 will arise, without positing individual wealth holdings. Pertinent properties can include statistical properties, as well as how some outcome is ranked by certain individuals relative to other outcomes.

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[124] *Id*. at 41. Note that if C is evitable, and does not in fact transpire, then one can be correct in one's conditional prediction of E, even though E fails to occur. For when one makes a conditional prediction, one is concerned with the truth of a certain counterfactual claim, which may not be susceptible to direct confirmation or refutation when the conditional's antecedent (i.e., C) does not materialize.

[125] This can be regarded as a wealth or well-being vector, to use the terminology of welfare economics. E.g., ADLER, MEASURING SOCIAL WELFARE, *supra* note 11, at 9.

[126] Each of the following types of generic predictions would likely fall under Friedrich Hayek's concept of a "*pattern prediction*." See F.A. Hayek, *Degrees of Explanation*, in STUDIES IN PHILOSOPHY, POLITICS AND ECONOMICS (1967). See also JAMES M. BUCHANAN AND GORDON TULLOCK, THE CALCULUS OF CONSENT: LOGICAL FOUNDATIONS OF CONSTITUTIONAL DEMOCRACY 5 (1962).

[127] That is to say, an identifying or anonymous distribution is not posited.

> *(4) Directional Effects*: An upward or downward movement of some economic factor is predicted, without regard to the magnitude of the increase or decrease.[128] For example, one may predict that if policy *p* is adopted, then the mean income will rise.
>
> *(5) Qualitative Phenomena:* A certain economic "phenomenon, process or entity," such as an equilibrium, is predicted, without regard to its "specific character" or the quantitative details.[129] For example, one may predict that if policy *p* is adopted, then markets will clear. Or that if *p* is implemented, then some legal regime will be transformed into an instance of a game that possesses a Nash equilibrium.

These 'prediction-types' pose varying epistemic demands on economic theories and models. A pertinent epistemic principle here is that, all else equal, more specific and informative predictions will generally be more difficult to come by, and also less secure, than more vague or less definite ones.[130] While the full web of relations among these prediction-types resists straightforward explication, this '*principle of informativeness'* nevertheless implies that correct predictions of identifying distributions will typically be the most challenging.

The demonstration for this claim is intuitive. If an identifying distribution can be forecast, then a fortiori so can an anonymous distribution, since the former contains all the same information as the latter, *and then some*; and may therefore be used to deduce the latter. Similarly, from an identifying distribution,[131] the properties of that very distribution may be ascertained; as can the directional movement of those properties relative to prior states of affairs. Finally, ultimate outcomes will often be more difficult to predict than qualitative phenomena, such as the movement of market forces or existence of equilibria, since the former are typically *downstream effects* of the latter. If an ultimate outcome can be forecast, then generally so can its causes, as knowledge of those causes is normally relied upon to predict that ultimate outcome. Because predictions of identifying distributions are maximally specific statements of ultimate outcomes, they will therefore tend to be more demanding than predictions of qualitative phenomena, as well as the directional movement of economic factors distinct from wealth, income, or welfare.

3. Epistemic Inputs to Evaluative Legal Criteria

Having constructed our typology of economic predictions, and explained why predictions of identifying distributions tend to be the most challenging, I'll now apply these observations to the machinery of normative law-and-economics. In Part I, we encountered a number of criteria frequently used to evaluate the social desirability of legal rules and policies. Among these were: (i) Kaldor-Hicks efficiency; (ii) the closely related criterion of wealth maximization; (iii) social welfare maximization, of which the (iv) utilitarian principle of individual welfare maximization is a special case; and (v) Pareto efficiency. Of note, these standards take different types of information as 'inputs' to their application. As some such inputs concern the future consequences of legal rules and policies, these criteria make distinct demands on the predictive capacity of

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[128] ALEXANDER ROSENBERG, ECONOMICS: MATHEMATICAL POLITICS OR SCIENCE OF DIMINISHING RETURNS? 68 (1992). Following Paul Samuelson, Rosenberg refers to predictions of directional effects as "qualitative predictions," while I use the term "qualitative phenomenon" somewhat differently.

[129] *Id*. at 69. Rosenberg refers to these as "generic predictions," while I use that term a bit more broadly.

[130] RESCHER, *supra* note 122, at 62-63.

[131] As well as, in some instances, an anonymous distribution.

policymakers, and on the economic and social scientific theories on which they rely; and are thus subject to varying gradations of epistemic difficulty. In this section, I will consider each of these evaluative standards in turn, and ascertain which types of prediction are required for its use.[132] We will see that the form of Pareto reasoning relied upon by KS uniquely presupposes an ability to predict identifying distributions. In that regard, it is the most epistemically demanding of all the evaluative criteria to be discussed.

a. Kaldor-Hicks and Wealth Maximization

Begin with Kaldor-Hicks efficiency and its close cousin wealth maximization. To evaluate competing regimes using these criteria, the most that lawmakers need are predictions of the aggregate wealth that would arise from adopting such laws and policies. Frequently, even less will do, as it often suffices to produce rough estimates of the wealth to be generated by candidate policies, which can be compared ordinally. Alternatively, one might offer structural analyses supporting the conclusion that certain regimes will lead to more aggregate wealth than others, whatever their respective totals turn out to be.[133] Because competitive markets tend to maximize wealth in the absence of externalities and other market failures, familiar structural arguments recommend eliminating distortionary regulations and taxes, and taking measures that facilitate the operation of markets. A similar heuristic, employed in legal adjudication, is to adopt a 'market-mimicking' allocation of rights and resources, where actual markets cannot be relied upon to allocate these items ex ante.[134]

In terms of our typology, forecasting aggregate social wealth amounts to a prediction of a *property of a distribution*. Notably, policymakers do not require information about the distribution of individual wealth holdings,[135] nor of the identities of the holders. Nor need policymakers concern themselves with such holdings' effects on individual (or by extension social) welfare. Because there is no need for forecasts of identifying or anonymous distributions, or assessments of interpersonal comparisons of welfare, the Kaldor-Hicks and wealth maximization criteria are

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[132] A similar mode of analysis is employed by Gerald P. O' Driscoll, Jr. and Mario J. Rizzo, who present a taxonomy of the distinct "knowledge requirements" of competing conceptions of economic equilibrium (as compared to different normative criteria of evaluation, as in my analysis). GERALD P. O'DRISCOLL, JR. AND MARIO J. RIZZO, THE ECONOMICS OF TIME AND IGNORANCE 58 (expanded edition 2015).

[133] In our discussion of Pareto reasoning below, I refer to this as the 'indirect method.'

[134] POSNER, ECONOMICS OF JUSTICE, *supra* note 26, at 62. Posner calls this the "hypothetical market" approach.

[135] When it comes to the use of cost-benefit analysis (CBA) in evaluating government projects, this is somewhat of a simplification, which applies when the candidate policies primarily impact monetary holdings. As discussed earlier at section I.A.1, to determine total 'wealth' (on the technical economist's understanding) when in-kind provisions are implicated, policymakers generally need to know (i) different individuals' willingness-to-pay (or willingness-to-accept) for such goods, services, or policies; as well as (ii) how these in-kind provisions are distributed among individuals with different monetary equivalents. Although these exercises impose greater informational demands on policymakers, CBA is still normally less epistemically onerous than social welfare maximization, as well as the form of 'transfer-based' Pareto reasoning employed by KS, for the following reasons. Because willingness-to-pay (and accept) can be elicited from inquiry, or inferred through the observation of revealed preferences, these exercises do not pose the same epistemic conundrums as interpersonal comparisons of welfare, which afflict the SWF method. Furthermore, gathering this information from an appropriately sized sample often permits for extrapolation to broader representative classes. As a consequence, in contrast to KS's Pareto argument, anonymous (rather than identifying) distributions of in-kind costs/benefits can suffice. See infra, at section II.A.3.c.ii. Moreover, the less variation in willingness-to-pay (or accept) among representative classes, the less precision is needed in forecasting these anonymous distributions.

frequently the least epistemically onerous of the evaluative standards under consideration. Unsurprisingly, this operationalizability has historically been one of their major attractions.

b. Social Welfare Maximization

Next consider social welfare maximization. To apply the SWF method, policymakers must determine the distribution of costs and benefits that would arise from adopting the candidate regimes under consideration, and then determine these material effects' impact on individual utilities. Given this distribution of individual utilities, social welfare can then be calculated by applying the applicable formula. The SWF methodology therefore generally requires greater predictive facility on the part of policymakers, as well as an ability to assess interpersonal comparisons of welfare. For these reasons, it's normally more epistemically demanding than Kaldor-Hicks and wealth maximization. Yet the situation is not quite as dire as it may initially appear, for a few reasons.

First, reasonable assumptions about the general shape of individual utility functions can frequently facilitate rough interpersonal comparisons of welfare. Perhaps the most common such presupposition posits the declining marginal utility of wealth. This often permits the estimation of welfare effects of policies that affect distinct income classes differently.

Second, given further plausible assumptions about the formal properties of the SWF,[136] decision makers will be able to maximize *expected* social welfare if they can identify all possible outcomes of the policies under consideration, and assign these outcomes well-formed probabilities.[137] In that case, full-fledged predictions may not be necessary—a comprehensive scenario analysis will do just fine.[138]

Third, and most importantly for our purposes, because the SWF framework is *impartial*—meaning that it does not count the utilities of particular individuals more than others in the social welfare calculus solely in virtue of their identities[139]—it generally does *not* presuppose an ability to predict *identifying* distributions. Rather, its predictive requirements vary as follows. When individual utility functions are likely to be substantially similar, at least with regard to how the effects of candidate policies are translated into well-being, forecasts of *anonymous* distributions of material costs/benefits will allow approximate calculations of social welfare, and comparisons among alternative regimes.

Conversely, where substantial divergence in (sub)utility functions is likely, something short of predictions of identifying distributions should still generally suffice: namely, predictions of *anonymous distributions of utility functions along with costs/benefits*. For instance: "Some individual will have utility function u_1 and wealth holding h_1, some other individual will have utility function u_2 and wealth holding h_2, etc." Compare this to the identifying distribution: "Alice will have utility function u_1 and wealth holding h_1, Betty will have utility function u_2 and wealth holding h_2, etc." By the principle of informativeness, the former information set is surely less onerous than the latter, and can often be generated by statistical extrapolation across representative classes. Yet it still permits policymakers to determine a regime's impact on the anonymous distribution of individual utilities, and with it social welfare.

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136 ADLER, MEASURING SOCIAL WELFARE, *supra* note 11, at 108-12, 130-44.

137 *Id.* at 108.

138 *But see infra* at section II.B.2 for discussion of this method's limitations.

139 *Id.* at 21. It will, however, treat the utilities of individuals differently insofar as those persons differ with respect to their morally pertinent characteristics, such as how well-off they are.

Notwithstanding these workarounds, in the final tally, the SWF method will normally come out as more epistemically demanding than the Kaldor-Hicks and wealth maximization criteria. But because it can make do with anonymous (rather than identifying) distributions, it is still less onerous than the form of reasoning employed by KS, to which we turn below.

c. Two Forms of Pareto Reasoning

To that end, let's now consider Pareto efficiency. It is necessary to distinguish between two forms of Pareto reasoning that make significantly different epistemic demands on policymakers, yet have not been adequately differentiated by legal scholars. I'll refer to these as (i) 'invisible-hand' and (ii) 'transfer-based' Pareto reasoning, and take them in turn.

i. Invisible-Hand Pareto

One who engages in '*invisible-hand' Pareto reasoning* seeks to show that adopting some legal or policy regime R_1 would lead to an outcome where all parties are at least as well off as they would be under an alternative regime R_2, and some parties are better off, *without any transfer payments* among the parties. In these circumstances, the Pareto-superior outcome is a natural byproduct of market or other structural processes. It is not the consequence of compensatory side payments from 'winners' to 'losers,' which are engineered to make the latter as well as off as they would have been under R_2. In principle, either of two methods may be employed to wage an invisible-hand Pareto argument.

When one takes the '*brute force' (or* '*direct'*) *approach*, one simply predicts the identifying distributions that would result from adopting R_1 and R_2, respectively, and compares the two. If everyone in R_1's identifying distribution is at least as well off as everyone in R_2's identifying distribution prior to side payments, and some are better off, then the invisible-hand Pareto argument is complete. This brute force approach is extremely predictively demanding, as it requires forecasts of precise identifying distributions.[140] For this reason, one seldom sees this method actually employed to evaluate social policies whose effects range over large classes of individuals.

More often, no effort is made to forecast precisely how well-off the parties would be under either R_1 or R_2. Rather, when one takes the *'indirect approach*,' one argues that *however well-off* individuals would be under R_1 and R_2, all would be at least as well off under R_1 as under R_2, and some would be better off—once again, even without compensatory transfers. As we saw above, this style of argumentation is also frequently used to establish Kaldor-Hicks efficiency.[141]

A number of indirect strategies are possible. Sometimes, this conclusion can be established by strictly logical argument. To give a simple example: a rule that maintains the current distribution of wealth, whatever that distribution happens to be, will be Pareto-superior to a rule that does the same except for requiring everyone to burn $1.[142] More frequently, structural analyses of competing regimes are involved. As illustrated below, this may involve extrapolating from representative examples or models, and extending their central lessons to some concrete

[140] That said, unlike the SWF method, it does avert the need to make interpersonal comparisons of welfare, and therefore enjoys at least one epistemic advantage vis-à-vis social welfare maximization.

[141] *See supra* at section II.A.3.a.

[142] Assuming no offsetting incentive effects.

institutional context.[143] Alternatively, the analyst may take stock of a motley assortment of economic considerations, which resist systematization into a single theory or model, and build a holistic case for why one regime is very likely to be Pareto-superior to another. Apart from making less stringent demands on the forecasting abilities of policymakers, the indirect approach may also be preferable to a brute force method in virtue of its greater generality. Leaf through the textbooks on the economic analysis of law, and one will find that a good deal of the analysis exhibits an indirect character.[144]

To get a sampling of this fare, consider three classic indirect, invisible-hand Pareto arguments:

(i) Thomas Hobbes's contention that the civil society is uniformly superior to the state of nature, where the absence of criminal law enforcement renders life "nasty, brutish and short."[145]

(ii) Garret Hardin's argument[146] that a system of private property rights is better for all than a regime of no ownership or common ownership, which can give rise to a "tragedy of the commons" for resources that are rivalrous but non-excludable.[147]

(iii) The observation, familiar among contract law scholars, that state enforcement of contracts yields Pareto-improvements by facilitating mutually beneficial exchanges that would otherwise fail to occur.[148]

How are these extremely far reaching empirical conclusions delivered without resort to precise forecasting? Each such argument proceeds in two main steps. In the first, it is shown that some institutional context exhibits the strategic structure of a well-studied *game form*, [149] which can be thought of as a type of model. Next the trick is to show how, in light of that structure, certain interventions would alter incentives in a way that leads the players to adopt strategies yielding a socially preferable outcome, such as a Pareto improvement.[150] Frequently, these interventions result in a salutary transformation of the original game into a distinct game form, where the players' self-interest is channeled in a collectively advantageous direction.[151]

To use this indirect strategy, one does not always need to know the exact wealth changes or cardinal utilities corresponding to the players' payoffs in the game's various possible outcomes. Rather, as Russell Hardin has persuasively argued, knowledge of the players' *ordinal rankings* of these outcomes will often suffice.[152] This explains how it can be possible to predict that a particular intervention will lead to a Pareto improvement, without forecasting the identifying distribution

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143 Three examples of this indirect strategy are considered below.

144 *See e.g. generally* POSNER, ECONOMIC ANALYSIS OF LAW, *supra* note 4. Admittedly, indirect arguments are more commonly applied to establish Kaldor-Hicks efficiency than invisible-hand Pareto efficiency, although there are a notable examples of the latter, such as those arguments considered below.

145 *See* THOMAS HOBBES, LEVIATHAN (1651).

146 Garret Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243 (1968).

147 These are frequently referred to as "common pool resources." ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION (1990).

148 *E.g.,* RUSSELL HARDIN, MORALITY WITHIN THE LIMITS OF REASON, 42-46, 84-86.

149 For an influential application of game theory to model legal institutions, see DOUGLAS G. BAIRD, ROBERT H. GERTNER, AND RANDAL C. PICKER, GAME THEORY AND THE LAW (1994).

150 *E.g.,* HARDIN, *supra* note 148, at 46.

151 *E.g.,* KEN BINMORE, GAME THEORY AND THE SOCIAL CONTRACT: VOL. 1 PLAYING FAIR 118 (1994).

152 HARDIN, *supra* note 148, at 10, ch. 2. As one of its most self-aware practitioners, Hardin employs this strategy to analyze many of the central threads of the common law under the assumption of significant epistemic limitations.

associated with that result. Insofar as the player's ordinal rankings of outcomes are knowable, there may be no need to predict their cardinal payoffs.

In each of our three examples, the key initial observation is that the relevant state-of-nature scenario takes the form of a *prisoner's dilemma*[153]—a game where players' choices of individually rational strategies produce a Pareto suboptimal outcome. The strategic structure of the prisoner's dilemma is captured in the following payoff matrix (with corresponding outcomes from our examples in parentheses)[154]

Table 1: Structure of the Prisoner's Dilemma

	B Defects	B Cooperates
A Defects	3rd best, 3rd best (war of all against all; depletion of the commons; no bilateral exchange for fear of swindling)	1st best, 4th best (one player preys upon another; consumes more than her fair share of the commons; fails to keep her side of a bargain)
A Cooperates	4th best, 1st best (one player preys upon another; consumes more than her fair share of the commons; fails to keep her side of a bargain)	2nd best, 2nd best (peace; preservation of the commons; mutually beneficial exchange)

The dilemma arises from each party's realization that she would do better for herself to defect, regardless of whether the other players defect or cooperate. Because each party is symmetrically situated, all players therefore defect. And when they do so, they all end up with their 3rd most preferred outcome, represented in the upper-left quadrant of our payoff matrix. While the Pareto-superior outcome (cooperate, cooperate) located in the bottom-right quadrant is feasible, individual rationality blocks its attainment.[155]

The way out? Taking our examples in order, Hobbes argued that by delegating certain natural rights of self-defense to the state, individuals can escape the anarchic "war of all against all," where each individual does best to anticipatorily prey on her neighbor, lest she be preyed on herself. In Garret Hardin's case study, establishing a system of private property rights gives each party an incentive to use her own share of some common pool resource within sustainable limits, thereby forestalling its depletion. And in the final example, state enforcement of reciprocal promises guarantees that parties to a contract will follow through with their side of a bargain, or pay appropriate compensation. Knowing this in advance, individuals will then be willing to enter into certain mutually beneficial exchanges, which they otherwise may have avoided for fear of their counterparties failing to live up to their respective obligations.[156]

With these interventions, each player's self-interest is channeled in a mutually beneficial direction, permitting for a Pareto-improvement from the first quadrant of our matrix to the fourth.

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[153] For game theoretical characterizations of: (i) Hobbes's argument, see BINMORE, *supra* note 151, at 118; Garret Hardin's argument, see OSTROM, *supra* note 147, at 3-5; and (iii) the familiar contract law argument, see HARDIN, *supra* note 148, at 42.

[154] *E.g.,* R. DUNCAN LUCE & HOWARD RAIFFA, GAMES AND DECISIONS: INTRODUCTION AND CRITICAL SURVEY 95 (1957).

[155] Some argue in favor of alternate conceptions of rationality on the grounds that they permit individuals to escape the prisoner's dilemma. See DAVID GAUTHIER, MORALS BY AGREEMENT ch.6 (1986).

[156] But for analysis of alternate methods of contract enforcement in the state of nature, see Anthony T. Kronman, *Contract Law in the State of Nature*, 1 J.L. ECON. & ORG. 5 (1985).

As per the general nature of invisible-hand Pareto improvements, this can be achieved without compensatory side payments among the parties. Moreover, for all three indirect, invisible-hand Pareto arguments, we can be fairly confident in these dynamics with the bare knowledge of the players' ordinal rankings of outcomes; foreknowledge of cardinal (identifying or anonymous) distributions is not required. Situated within our typology, we conclude that indirect, invisible-hand Pareto reasoning often only requires predictions of a *property of a distribution:* namely, how individuals *ordinally rank* a certain outcome relative to others, whatever the accompanying cardinal distributions in those outcomes happen to be.

ii. Transfer-Based Pareto

Now consider a second and importantly different form of Pareto reasoning, which is the type employed by KS. When one engages in '*transfer-based' Pareto reasoning,* one seeks to show that, while it would produce winners and losers, the choice of R_1 over R_2 would nevertheless maximize aggregate wealth. And in that case, the winners could make compensatory transfer payments to the losers, leaving the latter at least as well off as they would have been under R_2.

What distinguishes this schema from mere Kaldor-Hicks (or 'potential-Pareto') reasoning is its attention to the details of the transfer payments: for a transfer-based Pareto argument to succeed, it must be established that the payments would *actually occur*—or, at least, that they would be *feasible*. Inter alia, this requires showing that there is an authority capable of forcing the winners to fork over the appropriate portion of their gains to the losers, or other reason to believe that the winners would voluntarily remit these payments;[157] that there is a suitable mechanism for effectuating these transfers; and that the transaction costs of doing so would not exceed the extra wealth produced by opting for R_1 over R_2, thereby upsetting the attempted Pareto improvement.

Furthermore, because appraisal of the transfer payments is a prerequisite to their administration, it is necessary to ascertain *who* is entitled to such compensation, and in precisely *what amounts*. Without answers to these questions, the taxes necessary to fund these transfers could not actually be collected, and the checks could not actually be sent out. It follows that policymakers must be in position to predict precisely how well-off all parties would have been under R_2, as this identifying distribution serves as the baseline, or reference point, for ascertaining whether a Pareto improvement has been achieved.

This result is central to our epistemic critique of KS, and so bears emphasis: *one who offers a transfer-based Pareto argument cannot rely solely on the indirect method, which can sometimes be employed in invisible-hand Pareto reasoning.* We might refer to this as the '*fundamental epistemic principle of Pareto reasoning.*' While the first step of a transfer-based Pareto argument, which establishes R_1 as Kaldor-Hicks efficient relative to R_2, might in principle be established via an indirect strategy, this exercise would ultimately prove inadequate, and therefore extraneous, since the argument's second step (i.e., assessment of the transfer payments) demands a brute force calculation. Namely, to determine which individuals are entitled to receive (as well as finance) compensation, and to tailor these payments to leave no such individual worse off, policymakers must *predict the identifying distribution that would obtain under R_2.* Generally, then, transfer-based Pareto reasoning makes far greater epistemic demands of policymakers than invisible-hand Pareto reasoning.

[157] E.g., strong social norms of reciprocity.

That said, the difficulty of forecasting the identifying distribution that would obtain under R_2 can vary markedly depending on whether R_2 represents an actual or counterfactual baseline. If R_2 is already in effect, one merely needs to take stock of the present state of the world—e.g., by conducting a census, making the appropriate wealth measurements, and so forth—to ascertain the baseline for assessing Pareto improvements. Or, if the goal is to leave everyone at least as well off as they would have been if R_2 were left in place during the period of R_1's operation, one needs to extrapolate into a future where R_2 is sustained for that period of time. Both exercises will normally pose fewer challenges than cases where R_2 is not already in operation. When R_2 represents a *counterfactual baseline*, policymakers must forecast the identifying distribution that would result from adopting some non-actualized legal or policy regime. As a rule of thumb, this will be most difficult when this counterfactual baseline represents a radical departure from the status quo, rather than a slight or moderate divergence.

Before continuing, let's collect some of the main results from this section and the prior section's analysis. As shown in Table 2 below, while invisible-hand Pareto arguments do not always require brute force predictions of identifying distributions, and can sometimes make use of an indirect strategy, transfer-based Pareto arguments do require such predictions in virtue of their second step (i.e., assessing transfer payments). Moreover, the difficulty of these forecasts can vary depending on whether R_2 represents an actual or counterfactual baseline for comparison with R_1.

Table 2: Forms of Pareto Reasoning

	Indirect Method	Brute Force (Direct) Method
Invisible-Hand Pareto	Available	Available
Transfer-Based Pareto	Unavailable	Required
- Actual Baseline		Generally Less Difficult
- Counterfactual Baseline		Generally More Difficult

We have now arrived at the conclusion to the first stage of our epistemic critique. Among the normative criteria frequently employed to evaluate the social desirability of legal rules and policies, transfer-based Pareto arguments (which take a counterfactual baseline) typically make the greatest predictive demands of policymakers. That's because they uniquely require accurate forecasts of the identifying distributions that would obtain from adopting rules or policies that are not presently in operation; and unlike invisible-hand Pareto arguments, can never rely on an indirect strategy. It follows that, *if any* mode of normative economic analysis of law makes unrealistic presumptions about the predictive abilities of lawmakers and social scientists, *then* it will be transfer-based Pareto arguments, like KS's.

4. Can Identifying Distributions be Reliably Predicted?

Transitioning to the second stage of our epistemic critique, we must now evaluate this conditional's antecedent and ask whether predictions of identifying distributions are generally feasible. Unsurprisingly, I argue for a negative answer to this question. As preliminary support for this claim, I will cite several authorities in the next section, before surveying a host of substantive reasons why economic (and social) science are not up to this task in Section II.A.4.b, as supplemented by Appendix II's fuller discussion of these obstacles to prediction.

a. Optimists, Pessimists, and Moderates

To frame our inquiry, begin by considering three broad orientations one may adopt towards the possibility of knowledge of the future, or of counterfactuals.[158] For *optimists*, detailed predictions of a great many matters are possible; while for *pessimists* the dizzying complexity of the world,[159] together with the marked inadequacy of the human mind,[160] render prediction a largely futile endeavor. Between these extreme positions sit the *moderates*, who hold that "while there is much that we can successfully foresee, our powers in this direction, though real, are unavoidably and substantially limited."[161]

Applying this taxonomy to forecasting in the economic, legal, and social realms, I shall understand an optimist to be one who holds that all of those types of prediction enumerated in section II.A.2, including identifying distributions, are reliably feasible; a pessimist to be one who holds that none of them are; and a moderate to be one who holds that some subset of them are, with the critical exclusion of identifying distributions.

A moderate position regarding the prospects of economic prediction was held by none other than Paul Samuelson, the father of modern mathematical economics. In his seminal work, *Foundations of Economic Analysis*, Samuelson displayed the methodological awareness to acknowledge the epistemic limitations of his discipline. On Samuelson's view, which comes closest to the position endorsed by this Article, economic theory can often be employed to forecast the directional movement of market forces and factors, and to make predictions of qualitative phenomena (for instance, the existence of equilibria), but seldom yields exact quantitative predictions.[162] A fortiori, on this line, predictions of identifying distributions will generally be infeasible, as they are nothing less than maximally specific quantitative forecasts of ultimate outcomes.

A more pessimistic view is advanced by the mathematical statistician, trader, and scholarly essayist Nassim Taleb. In his influential skeptical treatise, *The Black Swan: The Impact of the Highly Improbable*, Taleb describes his own futile efforts at tracking down systematic Popperian confirmation of economics' alleged predictive power:

> I found no paper trumpeting economists' ability to produce reliable predictions. So I reviewed what articles and working papers in economics I could find. They collectively show no convincing evidence that economists as a community have an ability to predict, and, if they have some ability, their predictions are at best just slightly better than random ones—not good enough to help with serious decisions . . . . The most interesting test of how academic methods fare in the real world was run by Spyros Makridakis, who spent part of his career managing competitions between forecasters who practice [the discipline of] econometrics—an approach that combines economic theory with statistical measurements. Simply put, he made people forecast in real life and then he judged their accuracy . . . Makridakis [and his collaborators]

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158 *See* RESCHER, *supra* note 122, at 16-17.

159 *See* F.A. Hayek, *The Use of Knowledge in Society*, 33 AMERICAN ECONOMIC REVIEW 519 (1945). Given his stance on the possibility of "pattern predictions," however, Hayek may ultimately be an epistemic moderate. See Hayek, *supra* note 126.

160 *See* HERBERT SIMON, ADMINISTRATIVE BEHAVIOR (1947/1997) (developing the notion of "bounded rationality").

161 RESCHER, *supra* note 122, at 17.

162 *See* PAUL SAMUELSON, FOUNDATIONS OF ECONOMIC ANALYSIS 19-21, 26-27 (1983 enlarged edition). Samuelson's epistemic moderacy is largely predicated on the fact that the economist seldom possesses the "exact quantitative knowledge" of the state of the system required for precise deduction, and therefore must settle for looser assumptions. *Id*. at 26. For further discussion of Samuelson's view, see ROSENBERG, supra note 128, at 67-70. See also BUCHANAN AND TULLOCK, *supra* note 126, at 5.

> reached the sad conclusion that 'statistically sophisticated or complex methods do not necessarily provide more accurate forecasts than simpler ones.'[163]

Offering a diagnosis for why economics is nevertheless often ascribed significant predictive power, Taleb conjectures that "we focus on the rare occasion when these methods work and almost never on their far more numerous failures"—a striking instance of the '*confirmation bias*,' which has been documented by cognitive psychologists.[164]

Even on a lenient interpretation of KS's thesis, which asserts that redistribution should generally (rather than always) be effected through taxes-and-transfers, one still must take an extremely optimistic stance towards the possibility of foreknowledge for their transfer-based Pareto argument to be successful. Conversely, one need not assume as hardline a skeptical stance as Taleb to accept the crux of this Article's epistemic critique. Rather, *KS's argument will falter even on a moderate view*, which holds that economic theory can frequently predict directional effects, properties of distributions, qualitative phenomena, and perhaps even anonymous distributions—but not identifying distributions.

Given admissions by leading lights of the discipline, such as Samuelson and Mirrlees, the burden of persuasion should fall not on critics of KS's argument to offer positive refutations of their stringent epistemic presuppositions. Rather, it should fall squarely on KS and those who embrace the orthodox view of law-and-economics to mount a courageous defense. Far from discharging this dialectic obligation, however, KS provide little if any substantive defense of the assumption that the consequences of any—or even most—redistributive legal rules and policies can be forecast with precision.[165]

On the contrary, at points KS even appear to adopt a skeptical posture themselves, while failing to note its ramifications for their own argument. One such concession crops up in their reply to Sanchirico's alternate model of optimal redistribution. For context, recall Sanchirico's claim that it will maximize social welfare to make all legal rules at least slightly redistributive whenever individuals with the same incomes differ with respect to other welfare-impacting attributes, such as ability to take care in preventing accidents (the 'heterogeneity assumption').[166] In an effort to rebut this challenge to their tax-only view, KS observe that to implement Sanchirico's proposal, policymakers would—for technical reasons that do not concern us—need to be able to measure the correlation

> between unobservable income-earning ability (as distinct from income actually earned) and the underlying skill of individuals in avoiding accidents (as distinct from whether individuals were careless in particular instances in which accidents occurred). As should be apparent, it will not be easy to design a research program that would provide reliable measures of such a correlation.[167]

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[163] NASSIM NICHOLAS TALEB, THE BLACK SWAN: THE IMPACT OF THE HIGHLY IMPROBABLE 154 (2nd ed. 2010), citing to Makridakis et al., *The Accuracy of Extrapolation (Time Series) Methods: Results of a Forecasting Competition*, 1 JOURNAL OF FORECASTING 111-153 (1982); Makridakis et al., *The M2-Competition: A Real-Time Judgmentally Based Forecasting Study*, 5 INTERNATIONAL JOURNAL OF FORECASTING 29 (1993); Makridakis S. and Hibbon, M. *The M3-Competition: Results, Conclusions and Implications*, 16 INTERNATIONAL JOURNAL OF FORECASTING 451-476 (2000).

[164] TALEB, *supra* note 163, at 154.

[165] For some minor defense, mainly against the charge that irrational behavior will always frustrate economic prediction, see KAPLOW AND SHAVELL, *supra* note 18, at 460-63.

[166] In addition, Sanchirico's conclusion only follows if a distributionally sensitive SWF is adopted.

[167] Kaplow and Shavell, *Should Legal Rules Favor the Poor?*, *supra* note 77, at 833.

Shortly thereafter, KS double down on the infeasibility of these measurements and raise broader worries about empirical legal studies. In their own words:

> . . . . the capacity of legal policy analysts to do empirical research is limited. Given how little empirical work has been done on the most basic features of the legal system, such as on the effect of myriad types of legal rules in controlling the behavior that they address, it would seem to be a mistake to allocate significant effort toward a refined question where the prospects of success appear to be dim.[168]

KS's reservations regarding the measurement of unobservables mirror Mirrlees's admonition that a lack of access to private information will often prevent custom tailored transfers. Yet KS do not trace the implications of this fact, and of the broader limitations of policymakers to discover "the effect of myriad types of legal rules" on behavior, for their own transfer-based Pareto argument. If Sanchirico's analysis, construed as actionable policy proposal rather than mere mathematical model, fails for the epistemic reasons KS articulate, then so does their own argument.

This oversight is compounded by a subsequent recognition of Kaplow's in his impressive and wide-ranging treatise, *The Theory of Taxation and Public Economics*. There, he observes that the "construction of distribution-neutral (offsetting taxes)," which compensate losers for the adoption of efficient policies, "assumes knowledge of the distributive incidence" of the "government expenditures"[169] constituting the baseline for Pareto-improvement. While the specter of our epistemic objection lurks just beneath the surface here, the possibility that such knowledge will frequently not be forthcoming, invoked in KS's own reply to Sanchirico, is not confronted by Kaplow.

b. Obstacles to Prediction in Economic (and Social) Science

It would not be unreasonable to rest our epistemic objection to KS's transfer-based Pareto argument on their own tacit admissions, and on the evident fact that policymakers frequently lack the information required to predict identifying distributions. Nevertheless, to make further progress towards locating the epistemic limits of law-and-economics, I'll now consider ten obstacles to prediction in economic (and social) science, which shed further light on why predictions of identifying distributions are seldom feasible. A more extensive discussion of these matters is reserved for Appendix II to this Article. That fuller analysis, which synthesizes classic and contemporary work on the methodology of economics, has been appended due to its more technical nature.[170] Nevertheless, if a reader finds herself with lingering doubts as to the feasibility of predictions of identifying distributions, or has interest in the foundational issues discussed therein, she might work her way through this more detailed discussion before proceeding on to Part II.B. For the time being, these ten methodological difficulties may be briefly delineated as follows.

(1) Economics rests on a host of *false (or idealized) assumptions*, including (i) the axioms of rational choice theory, which constitute the foundation on which other neoclassical economic theories and models are built; (ii) modelling assumptions used to render highly complex social phenomena cognitively tractable; and (iii) the presupposition that

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168 *Id.* For similar reservations, see also KAPLOW AND SHAVELL, *supra* note 18, at 457-58.

169 KAPLOW, *supra* note 39, at 208.

170 See this Appendix II for references to the claims made below.

econometric phenomena generally conform to a Gaussian (or bell curve) distribution, necessary for the application of many standard statistical techniques.

(2) Economic theories take publicly *unobservable mental states* as inputs: in particular, individual preferences and expectations. While these private mental states can sometimes be elicited or estimated from past behavior, this process of imputation is highly imperfect, and places a ceiling on the precision of economic prediction and explanation. As Mirrlees noted, knowledge of other unobservable characteristics, such as abilities, may also be required.

(3) The domain of economic phenomena is *not causally closed*, and economic outcomes are routinely influenced by non-economic forces. While economics would therefore need to incorporate disciplines with overlapping domains to achieve great predictive power, comprehensive assimilation is highly unrealistic. Accordingly, economic laws are best viewed as statements of imperfect tendencies, rather than universally true generalizations.

(4) Economic theories used to model legal regimes, such as game theory, often permit for *multiple equilibria or optima*. As we've seen, transfer-based Pareto arguments like KS's require unique predictions of the identifying distribution that would have arisen under the pertinent comparison regime. But such predictions will not be possible whenever application of the appropriate economic theories fail to specify a single outcome.

(5) In social choice theory and welfare economics, the consequences of legal rules and policies are normally taken to be known in advance, or anticipated with certain probabilities. But in practice, these probabilities must be derived from evidence, which is costly to acquire. Moreover, economic theory is itself incapable of specifying *how much evidence* it is rational to collect. Because distinct bodies of evidence yield diverging projections and probabilities, unique predictions of identifying distributions will once again be infeasible.

(6) If individuals possess *free will*, and are not always causally necessitated to act precisely as they do, then economic, legal, and social systems will not be deterministic. In that case, unique predictions will be impossible, even in principle. In addition to being philosophically defensible, such freedom captures most people's intuitive conception of their own abilities.

(7) Economic and social scientific theories are *reflexive,* meaning that awareness of the theory or its predictions can itself influence behavior. Such theories must therefore account for their own second-order (third-order, etc.) effects on action, introducing enormous technical challenges. This problem famously led to the downfall of orthodox Keynesian economics.

(8) Many economic theories, such as the theories of the firm and the household, employ production functions, which specify how physical inputs and labor are translated into outputs, given some background state of technological knowledge. To predict the future, these theories therefore must incorporate (or work alongside) a successful theory of technological innovation. But as the philosopher of science Karl Popper argued, predicting *technological novelty* is impossible, even in principle, since it would lead to a collapse of present and future knowledge.

(9) Economic outcomes can be influenced by *black swans*, which are (i) rare outlier events, that (ii) have pervasive impact, yet (iii) are only retrospectively, and not prospectively, intelligible. Because a black swan event is unforeseeable, society cannot take specific precautions against its effects. Such events render economic forecasting a highly imprecise affair, at least across longer time scales.

(10) Economic, legal, and social systems are frequently *chaotic*, meaning that minute variations in their initial conditions, which may fall below our effective measurement threshold, can produce large differences in observable outcome. These systems therefore behave as if they were indeterministic for all practical purposes. Moreover, even where it is possible to make more fine-grained measurements of a system's boundary conditions, this can pose very great costs, which may exceed the gains achieved by adopting efficient legal rules.

It must be emphasized that *any one* of these methodological difficulties could frustrate attempts at precise prediction in the economic and social sciences. Yet in practice, economists and policymakers typically confront a significant number and sometimes even *all* such challenges in crafting laws and policies. Therefore, we have very strong reason to hold that the predictions of identifying distributions required by KS's transfer-based Pareto argument will seldom be feasible, at least for laws and policies with a broad impact. The state will therefore be unable to ascertain the pertinent counterfactual scenario, which serves as the baseline for Pareto improvement, in the full specificity required to craft its individualized transfers payments. With this ultimate conclusion, we draw the second stage of our epistemic critique to a close.

B. Objections, Replies, and Refinements

In this section, I consider several potential responses to my epistemic critique of KS's transfer-based Pareto argument, which I refer to as the: (1) abstract model response, (2) ex ante Pareto response, (3) embarrassment-of-riches response, (4) near-Pareto response, and (5) turnabout-is-fair-play response. In developing rejoinders, my concurrent aim will be to refine and elaborate on several threads of analysis offered above in section II.A.

(1) Abstract Model Response. KS might assert that I have simply misunderstood the nature of their project. What they offer in their seminal 1994 article is not concrete policy guidance, but rather an abstract economic model.[171] And like those economic models referred to above at section II.A.4.b and Appendix II, it helps itself to certain idealizing assumptions that isolate important aspects of the system under investigation. For the same reason KS's analysis assumes away administrative and compliance costs, factors that create offsetting distortions, inter alia, it presupposes zero information/decision costs and perfect forecasting ability on the part of the state. While they come at the cost of predictive power, these simplifications facilitate our economic understanding. That's because accounting for these (or other) complicating variables would obscure KS's central insight: that redistributive legal rules create two layers of behavioral distortions, while redistributive tax schemes only create one. Nor are these idealizing assumptions exceptionable, as neoclassical economics routinely presupposes perfect knowledge on the part of economic actors.

There are a few things to say to this response. As a threshold matter, if what KS offer is solely an abstract model with little bearing on real-world law and policy, then they have not made satisfactory efforts to set the record straight and to correct for grave misunderstandings. Indeed, their framework has widely been viewed as a guide to actual policy reform[172] and has exerted a profound influence on the economic analysis of law, one of the most influential legal

[171] This sort of reply is considered by Rasknolnikov, *supra* note 10, at 1601.
[172] *Id.* at 1601, fn. 74. See also, Liscow, *supra* note 13, at 499, 509-11.

methodologies. Many prominent judges, among them Richard Posner and Frank Easterbrook, routinely draw upon its methods in adjudicating real world disputes. Thus, if the present response were apt, it would prove too much: for it would imply that the modern approach to law-and-economics, with its single-minded focus on legal efficiency, is itself predicated upon a hollow abstraction, and therefore must remain silent on all matters of practical relevance. When applied to the real world, KS's reasoning amounts to an argument from mere KH-efficiency, which has been roundly rejected as an inherently attractive evaluative criterion.

Far from rejecting such misconceptions about the practical implications of their analysis, KS frequently speak as if their argument in fact ought to dictate answers to concrete questions of law and policy.[173] Furthermore, as discussed earlier on, in their exchange with Chris Sanchirico[174] KS hold that his alternate model of optimal redistribution falls prey to certain epistemic pitfalls, not unlike the sort I've highlighted in this Article. This certainly suggests that KS do not regard their debate as occupying wholly theoretical terrain, but rather acknowledge real-world constraints on and ramifications to its resolution.

It is instructive to compare the case at hand to another landmark event in the history of law-and-economics. In his foundational work in the discipline, Ronald Coase demonstrated that, in an idealized world of zero transaction costs, an initial assignment of property rights would never influence the ultimate distribution of assets, since parties would always bargain until all assets found their way to their most productive uses.[175] Notably, Coase undertook this analysis in order to clarify our thinking about the real world, in which transaction costs are ubiquitous. Having derived his eponymous theorem, succinctly stated above, Coase returned his gaze to the reality we inhabit, and found that the pervasiveness of transaction costs explains various phenomena that do not arise in his idealized world—perhaps most notably, the existence of firms.[176] The methodological contrast is clear: while KS undertake the first step (analysis of their idealized environment), they *elide the second* (exploring the implications of the truth or falsity of its assumptions for the real world). Rather, they take their first stage analysis as the final word, and seemingly advocate for its crude translation to the realm of policy.

There is one more thing to say on this matter. As I've already alluded to, a number of the obstacles to prediction discussed in section II.A.4.b and Appendix II seem to apply *in principle*. There is therefore an argument to be made that a retreat to idealization cannot even save KS's argument. Suppose some of these obstacles indeed represent insurmountable hurdles to prediction in any possible world,[177] or given the internally mandated rules of construction for economic models.[178] Then the predictions required by KS to craft their transfer payments will not be possible, even insofar as their model is interpreted as an exercise in logical analysis, unconstrained by the nettlesome practicalities of everyday reality.

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[173] "[A]ny regime with an inefficient legal rule can be replaced by a regime with an efficient legal rule and a modified income tax system designed so that every person is made better off." Kaplow and Shavell, *supra* note 2, at 669. "[R]edistribution through legal rules offers no advantage over redistribution through the tax system and typically is less efficient." *Id*. at 667. "[D]istributive concerns are more effectively addressed directly, through the income tax and transfer system." KAPLOW AND SHAVELL, *supra* note 18, at 460.

[174] *See supra* at section II.A.4.a.

[175] R.H. COASE, *The Problem of Social Cost*, reprinted in THE FIRM, THE MARKET, AND THE LAW 95-157 (1988).

[176] R.H. COASE, *The Nature of the Firm*, reprinted in THE FIRM, THE MARKET, AND THE LAW 33-57 (1988). In so doing, Coase adhered to sound methodological practice, which requires that models be conjoined with 'auxiliary hypotheses,' asserting that real world systems embody their assumptions, before laying claim to predictive power.

[177] As seems to be the case with forecasting intellectual novelty, or the actions of agents with libertarian free will.

[178] As with multiple equilibria, iterated rational choice, and other forms of rational underdetermination.

(2) Ex Ante Pareto Response. As a second reply, KS might concede arguendo that it is not always possible to forecast precise identifying distributions. Nevertheless, policymakers are at least able to identify alternate scenarios that could have played out from adopting a certain regime, and assigning these scenarios well-formed probabilities. And in that case, the state will be positioned to determine the *expected* impact of such rules/policies on individuals comprising the population of concern. It could then redistribute the gains reaped from adopting wealth maximizing laws to ensure that everyone receives at least their expected wealth levels under the fair regime.[179] Contrary to my contention, the pertinent baseline for Pareto improvement is not the ex post consequences of this counterfactual regime, but rather its *ex ante expectation*. And since it is not beyond the ken of social scientists and policy makers to determine these expectations, my epistemic critique fails for reason of having attacked a strawman: KS's argument need not presuppose such strong predictive abilities on the part of policymakers. While this response raises some very important issues, it is subject to normative, analytic, and epistemic shortcomings.

Let me begin on the normative front. Since the great welfare economist John Harsanyi's 1955 demonstration, it's been known that ex ante Pareto principles are only axiomatically consistent with use of a utilitarian social welfare function (SWF),[180] and cannot be paired with distributionally sensitive SWFs, such as Rawlsian, prioritarian, or egalitarians SWFs.[181] Given this technical result, resort to an ex ante Pareto approach would significantly limit the scope of the KS's analysis. As things stand, they claim to establish that redistribution should always be effected through the tax-and-transfer system. And in subsequent work, Kaplow asserts that his public finance framework does not generally depend on the adoption of any particular SWF.[182] However, if one embraced ex ante Pareto principles in an effort to resist my epistemic critique, KS's argument could then only be employed in the context of utilitarian SWF analysis. This, of course, is unlikely to perturb thoroughgoing utilitarians, and may even be touted as a virtue of their theory.[183] However, for scholars and policymakers sympathetic to distributionally sensitive theories of justice, and practitioners of positive economics who wish to remain agnostic on these normative issues, this will constitute a serious limitation on KS's analysis.

There's also an analytic difficulty with the ex ante Pareto approach: it will not always be possible to confer a person their ex ante expectation ex post. This will be the case whenever adopting efficient laws or policies results in the deaths of certain individuals who otherwise would have survived under the counterfactual fair regime, or leaves individuals with injuries or disabilities that cannot be compensated monetarily.[184] After all, the dead man has little use for his judgment to the tune of the statistical value of a human life. Nor will the severely brain damaged squeeze much enjoyment out of the blankest of checks. Oftentimes in dealing with laws that affect the very composition of the population in question,[185] the only way to ensure that an individual receives her expectation from fair rules and policies will be to adopt that fair regime the first place.

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179 ADLER, MEASURING SOCIAL WELFARE, *supra* note 11, at 228. See also, Revez, *supra* note 102, at 1514-16.

180 John Harsanyi, *Cardinal Welfare, Individualistic Ethics, and Interpersonal Comparisons of Utility,* 63 J. POLITICAL ECON. 309-21 (1955), reprinted in his ESSAYS ON ETHICS, SOCIAL BEHAVIOR AND SCIENTIFIC EXPLANATION (1976).

181 ADLER, MEASURING SOCIAL WELFARE, *supra* note 11, at 138, 140.

182 KAPLOW, *supra* note 39, at 50.

183 ADLER, MEASURING SOCIAL WELFARE, *supra* note 11, at 140.

184 Revez, *supra* note 102, at 1514-17.

185 PARFIT, *supra* note 41, offers the seminal philosophical analysis of such issues.

Turning finally to epistemic considerations, there is reason to doubt that economists and policymakers are always even capable of determining expected impact. Because the laws of economics are generally not probabilistic in character,[186] it is unclear how these expectations are derived. Perhaps they emerge from employing a number of alternative economic theories, to which we assign varying degrees of confidence;[187] or an assortment of unverified boundary conditions, weighted in much the same way. Because these probabilities are nowhere to be found in economic laws themselves, however, the ex ante Paretian owes us some explanation of how they are determined.

I suspect she will be hard pressed to answer this question in concrete fashion, and that this difficulty points to still deeper epistemic pitfall with the ex ante approach. Within economic theory, the distinction has long been recognized between decisions under (*Knightian*) '*risk*,' in which all possible outcomes of an action can be enumerated and assigned discrete probabilities; and those under (*Knightian*) *'uncertainty*,' in which all possible outcomes are foreseeable but cannot be assigned probabilities.[188] Notably, expected value calculations are only possible for decisions under risk; not for decisions under uncertainty. For the latter, decision theorists have proposed alternative solution concepts, such as the '*maxi-min*' *strategy*, which directs one to take those actions that maximize one's payoff in the worst-case scenario.[189] Yet even maxi-min (and related)[190] approaches will be unavailable if one cannot foresee every possible outcome of a given action or intervention—circumstances we might refer to as "*radical uncertainty*."[191]

The biggest problem for the ex ante Pareto response is that many policy decisions taken to be under risk are plausibly under uncertainty—and often of the radical variety. Taleb refers to the source of this confusion as the *ludic fallacy*: the inappropriate use of the casino game paradigm to model real world choices.[192] As he explains, "in the casino you know the [well-defined] rules" of the game, and therefore "can calculate the odds."[193] But the "casino is the only human venture . . . where the probabilities are known, Gaussian, and almost computable."[194] By comparison, in "real life, you do not know the odds; you need to discover them," but "the sources of uncertainty are not defined."[195] Because of unknown sources of uncertainty, "computable risks are largely absent."[196] For the most part, decisions under risk are "laboratory contraptions," while "fuzziness is the very nature of uncertainty" away from the blackjack table.[197]

We might refer to this predicament as *second-order uncertainty*, which arises whenever it is itself unclear whether one faces a decision under risk or (radical) uncertainty. If Taleb's diagnosis

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186 *See* DANIEL M. HAUSMAN, THE INEXACT AND SEPARATE SCIENCE OF ECONOMICS 129 (1992).

187 JON ELSTER, SOLOMONIC JUDGEMENTS: STUDIES IN THE LIMITATIONS OF RATIONALITY 12 (1989).

188 FRANK KNIGHT, RISK, UNCERTAINTY, AND PROFIT (1921). Sometimes, the term "ignorance" is used to refer to Knightian uncertainty, while "uncertainty" is employed as a broader term to include both risk and ignorance, so understood.

189 *E.g.,* MARTIN PETERSON, AN INTRODUCTION TO DECISION THEORY 43 (2009); CASS R. SUNSTEIN, WORST-CASE SCENARIOS 147 (2007).

190 For a survey of such approaches, see PETERSON, *supra* note 189, at 40-63.

191 O'DRISCOLL, JR AND RIZZO, *supra* note 132, at 31-32, 70. See also, SUNSTEIN, *supra* note 189, at 147. A method of quantifying radical uncertainty in terms of "potential surprise" is developed by G.L.S. SHACKLE, DECISION, ORDER, & TIME IN HUMAN AFFAIRS (2nd ed. 1969).

192 TALEB, *supra* note 163, at 127.

193 *Id.*

194 *Id.*

195 *Id.*

196 *Id.* at 128.

197 *Id.*

is correct,[198] and this haze constitutes the ordinary backdrop to human decision-making, then even expected values will not often be computable. While I suspect that Taleb's skeptical stance is closer to the truth than many would be willing to admit, even a weaker version would suffice to rebut the ex ante Pareto response, which relies on the assumption that policymakers always (or at least generally) face decisions under risk, rather than (radical) uncertainty. If even a significant number of policy decisions are under (radical) uncertainty, which seems quite likely, then this reply will falter. At the very least, if KS wished to fall back on the ex ante Pareto response, the onus would then fall on them to offer a positive defense for its critical yet implausible epistemic presupposition.

(3) Embarrassment-of-Riches Response. Consider another challenge to my claim that transfer-based Pareto arguments like KS's require predictions of identifying distributions. If the guaranteed efficiency gains of adopting wealth-maximizing legal rules and policies are sufficiently great, then it may be possible to redistribute to ensure that each individual is at least as well-off as she would have been ex post under the fair regime, even without knowing precisely how well-off she would have been. In some instances, all policymakers need to know is the range of possible wealth holdings under each regime.

To illustrate, consider a simple example where it is known that under the efficient regime (ER), individual A would end up with $2 or $3, and B would end up with between $6 and $10; and that under the comparison regime (CR), A would end up with between $1 and $3, and individual B would end up with either $3 or $4. In table form:

	Individual A	Individual B
Efficient Regime (ER):	$2-3	$6-10
Comparison Regime (CR):	$1-3	$3-4

Now imagine that as the cookie happens to crumble, A and B end up under ER with their lowest possible amounts of $2 and $6, respectively. Moreover, suppose that had CR been adopted, A and B each would have enjoyed their highest possible amounts of $3 and $4, respectively. Again, as a table:

	Individual A	Individual B
Efficient Regime (ER)	$2	$6
Comparison Regime (CR)	$3	$4

Even though the worst case scenario arises under ER, and the best case scenario would have arisen under CR, the total efficiency gains from adopting ER are still great enough to redistribute to achieve a Pareto improvement relative to CR. In particular, $1 could be taxed away from B and transferred to A, so that B ends up with $5 (= $6 - $1 tax), and A ends up with $3 (= $2 + $1

[198] For support, see Appendix II's discussion of Taleb's "black swan theory".

transfer). A is then as well-off as she actually would have been under CR ($3 vs $3), and B is still better off then she would have been under CR ($5 vs $4). Once more, in table form:

	Individual A	Individual B
Efficient Regime (ER) with transfer payments:	$3 (= $2 plus $1)	$5 (= $6 minus $1)
Comparison Regime (CR)	$3	$4

Because a Pareto improvement is possible when ER's worst case scenario arises and CR's best case scenario would have arisen, it follows a fortiori that Pareto improvements also could have been achieved had any other values within ER and CR's range of possibilities been realized. Since the *minimum (or assured) social efficiency gains* are sufficiently great, policymakers are in position to know that Pareto improvements can be achieved by adopting ER, even if they do not know the precise values that would be realized under ER and CR. Whenever this is the case, we might say that ER yields an '*embarrassment of riches'* .

This response represents an important refinement to the analysis offered above at section II.A.1. Nevertheless, it cannot save KS's argument, for at least two reasons. First, as noted above, policymakers sometimes face decisions under radical uncertainty, where the full range of possible outcomes from choosing a certain policy cannot be identified.[199] Second, and probably more importantly, the assured social efficiency gains from adopting wealth maximizing rules will not often be great enough to pull off this trick. This reply therefore fails to establish KS's thesis that non-tax rules and policies should always (or even generally) be chosen for their efficiency. As a positive matter, the greater the uncertainty and range of possible outcomes from adopting ER and CR, the larger the minimum social efficiency gains must be in order to ensure Pareto improvements by choosing ER. This range can vary dramatically from context to context, and from the armchair one suspects that this strategy will only be viable in a rather small subset of cases. Thus, while a welcome refinement and modest qualification to our earlier analysis, the embarrassment-of-riches response should not fundamentally alter the implications of the epistemic objection.

(4) Near-Pareto Response. KS may complain that I have held their argument to an overly stringent standard of success. In practice, strict Pareto improvements are hardly ever feasible: most policies create at least a handful of losers. Accordingly, I ought to grant KS some leeway. Even if it is beyond the ken of social scientists and policymakers to forecast precise identifying distributions, and they are therefore unable to generate '*strict-Pareto*' *improvements*, perhaps our forecasting

[199] A variation on the embarrassment-of-riches response, suggested to me by Jeesoo Nam, holds that if the increase in social wealth from adopting efficient legal rules is sufficiently great, then Pareto improvements could perhaps be achieved by redistributing pursuant to a prioritarian, egalitarian, or other purely forward-looking distributionally sensitive rubric, which does not make targeted compensatory transfers to distributive losers. To establish the feasibility of this strategy, however, legal economists would need to demonstrate that massive (rather than modest or even moderate) efficiency gains vis-à-vis well-constructed redistributive legal rules are the norm, which they have not. Furthermore, even if this were the case, if it could not be *known*—e.g., for any number of the methodological reasons I discuss in Appendix II—*this in itself* would suffice for my objection to KS's Pareto argument, which, after all, is epistemically predicated. Indeed, if one is an epistemic moderate who holds that only directional effects and qualitative phenomena are normally predictable, then it is unlikely that the magnitude of these efficiency gains could be confidently quantified.

techniques permit for reasonable approximations. And in that case, KS's method could be used to generate '*near-Pareto*' *improvements*—the most that could reasonably be asked for.[200]

To evaluate this reply, we need to know how close is 'close enough'. That is: how many losers are too many, and when are their losses too great? Because KS present their argument in strict-Pareto terms, we are not given answers to these threshold questions.

To make headway then, we might consider the philosophical rationale for embracing the Pareto criterion as a normative standard of evaluation. Two primary justifications have been offered in the literature. The consequentialist rationale is that Pareto improvements assure increases in total individual utility without the need to assess interpersonal comparisons of welfare.[201] And the contractarian rationale is that because Pareto improvements harm none and help some, they would be unanimously consented to by rational parties.[202]

Of note, neither justification is assured for near-Pareto improvements, which need not increase total utility, nor guarantee unanimous consent. If a few individuals suffer very great losses from the choice of some institutional arrangement, or many individuals suffer minor losses, or the losers are considerably worse off than others to begin with, then their welfare losses may exceed others' gains.[203] Similarly, losers can never be presumed to consent to the choice of an arrangement that harms them.

It follows that if KS wish to assert the near-Pareto response, the burden lies with them to answer the two interrelated questions: (a) how close to a true Pareto improvement is 'close enough,' and (b) what is this relaxed Pareto criterion's own normative justification? While it may be true that only an approximate version of the Pareto standard can realistically be satisfied, these two issues must be resolved before one can determine the import of this fact for KS's argument.

Furthermore, in addition to answering these two questions, KS would need to establish the feasibility of predictions accurate enough to create near-Pareto improvements falling within the range of normative acceptability. In so doing, they face the following *dilemma*: the more lax a near-Pareto standard (i.e., the more 'losers' that are permitted), the more likely its predictive inputs are to be epistemically feasible, but the less likely that standard is to be normatively justified. As the barriers to forecasting laid out in section II.A.4.b and Appendix II are formidable, and the predictive track record in economics commensurately modest, it seems unlikely that KS would be able to discharge this burden for any version of the near-Pareto criterion strict enough to pass the test of normative acceptability. If we adopt a moderate view of the predictive capacity of economic and social science, then even such (appropriately specified) near-Pareto improvements will not often be epistemically feasible.

(5) Turnabout-is-Fair-Play Response. Finally, KS may point out that if we cannot predict the consequences of non-tax rules and policies with the precision required to craft custom transfer payments, then how could we hope to rely upon these very same rules and policies as distributive instruments? To the extent that my epistemic critique succeeds in undermining their transfer-based Pareto argument, it equally undercuts the view they aim to attack. To add fuel to the fire, it might be claimed that the distributive consequences of taxation are frequently easier to forecast than the consequences of non-tax rules and policies. If taxation enjoys this comparative epistemic advantage, then we may ultimately be led to the very same tax-only view of redistribution for

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200 For this distinction, see Posner, *Wealth Maximization in Tort Law, supra* note 30, at 105.

201 COLEMAN, *supra* note 30, at 100.

202 *Id.* at 101.

203 In the third scenario, that is because of the declining marginal utility of wealth.

which KS argue. In refuting their argument, I have inadvertently staked out an alternate route to their conclusion. And this may be a price they are willing to pay.

This response is the most critical, as it concerns the positive institutional implications of my epistemic critique of KS, which so far has assumed a largely negative character. It is to these issues that I devote the final section of this Article.

C. Distribution for Epistemic Moderates: Towards a Positive Theory

How should distribution policy be pursued in the face of the epistemic limits of law-and-economics? Unsurprisingly, one's answer to this question will turn on what one believes those limits to be. Roughly put in terms of our earlier taxonomy, it will depend on whether one is an (i) optimist, (ii) pessimist, or (iii) moderate about the prospects for prediction in the realm of human affairs.[204]

For optimists, the sky is the limit. Given recourse to KS's method, there are no epistemic constraints on the extent of redistribution, nor any conflict between the pursuit of equity and efficiency. The two can always be reconciled by choosing non-tax rules/policies to maximize wealth, then making offsetting transfers to create Pareto improvements. I've devoted a fair amount of ink to undermining the optimist view on which KS's transfer-based Pareto argument is predicated, and which is represented by the neoclassical economic tradition more broadly. The falsity of its epistemic presuppositions means that the orthodox, tax-only view of redistribution lacks firm foundations, and that we furthermore must own up to the conflict between equity and efficiency. Fairness poses costs, which cannot be dispensed with the wave of a wand or the snap of one's fingers.

For pessimists, by contrast, almost all efforts at redistribution are a fool's errand, whether through the use of taxes, legal rules, or other government policies. Because we have but the foggiest idea as to the ultimate consequences of our interventions, we can only hope to make a hash of it, and to produce collectively worse results than if prudence had ruled the day. For the most part, policymakers should thus concentrate on laying down and sustaining those select institutions that produce invisible-hand Pareto improvements, which require minimal capacity to foresee.[205] The central elements of the common law represent the most important such institutions;[206] and taxation that is levied on a 'benefits theory,'[207] and exclusively utilized to fund public goods, is likely another. This is roughly the position of many consequentialist libertarians and classical liberals,[208] who adhere to minimal state philosophies on partlyepistemic grounds.[209]

And what if we are epistemic moderates? Recall that on the moderate view advanced by this Article, economic and social scientific theories can seldom be wielded to conjure correct predictions of identifying distributions. However, they can at least be used to forecast the

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[204] *See supra* section II.A.4.a.

[205] *See supra* at section II.A.3.c.i.

[206] Libertarians often emphasize that these institutions have arisen through an evolutionary historical process lacking intentional design.

[207] For a recent defense, see Charles Delmotte, *Predistribution Against Rent-Seeking: The Benefit Principle's Alternative to Redistributive Taxation*, 39 SOCIAL PHILOSOPHY AND POLICY (2022).

[208] *See* Hayek, *supra* note 159; RICHARD EPSTEIN, SIMPLE RULES FOR A COMPLEX WORLD (1995). The appropriate characterization of Hayek is a bit tricky, as he does recognize that "pattern predictions" are frequently feasible. See Hayek, *supra* note 126. If an epistemic moderate, he should own up to the viability of the pluralist approach developed in this Article.

[209] Hayek somewhat more so than Epstein.

directional movement of economic variables, coarse-grained properties of distributions, and other qualitative phenomena (e.g., existence of equilibria).[210] As elsewhere in life and law, moderation courts complexity. The problem of distributive fairness in the face of significant but not paralyzing epistemic limitations is one of the deepest faced in legal theory. As such, I must reserve a fuller positive account to future work, and for now will be content to sketch just a few main threads.

As a threshold matter, the turn-about-is-fair-play response can only claim total victory against pessimists; not against moderates. Insofar as policymakers are able to forecast the directional effects of policies on distributions of wealth or welfare, non-tax rules and policies can and should be employed as blunt tools to such ends. Given these limitations, however, an institutionally *pluralist approach*, which employs many slightly redistributive legal rules and policies in tandem, will generally be the most sensible.[211] Why is that?

The basic *argument from epistemic moderacy* runs as follows. Because we are not optimists, and cannot confidently rely on any single rule or policy to bring about a specific outcome, we would do best to diversify our efforts and tweak a large number of legal and policy 'dials' in the anticipatorily desired direction. Our expectations regarding any particular instrument may be upset. Nevertheless, if predictions of directional impact, at least, are frequently feasible—as they are for non-pessimists—then in the aggregate and over the long run, variability and errors from individual measures are likely to offset each other. By proceeding in this way, we increase the odds of achieving the approximate anticipated effects of our interventions, and can expect to make significant strides in the desired distributive direction.

While the pluralist approach, as effectuated through this *diversification strategy*, is epistemically tractable, can it be trumped? Recall the second claim of the turn-about-is-fair-play response: *if* taxation enjoys relative epistemic advantage vis-à-vis non-tax rules and policies, then we may be led back a tax-centric view of redistribution anyway, regardless of the success of KS's Pareto argument. Does it?

The answer to this question appears to be yes, at least to some extent. Since the tax-and-transfer system only distorts labor-leisure tradeoffs, while redistributive legal rules and policies distort labor-leisure tradeoffs, as well as activity in their particular domain of governance, it may be easier to predict a tax rule's ultimate distributive consequences. After all, we need only account for one broad type of behavioral response, not two. So viewed through the lens of epistemology, rather than economic efficiency, KS's double distortion reasoning can be reinterpreted to lend support to a tax-centric approach—all without having to invoke those Pareto-improving transfer payments whose feasibility I have denied.

While this would be a highly significant conclusion in its own right, however, the tax-only view does not follow from these considerations. Although there's something to be said for this '*epistemic double distortion argument*,' we must be careful not to overstate its implications. As we gleaned from our earlier discussion,[212] the optimal tax problem is extremely complex, as it involves a host of interlocking incentive and signaling effects, which produce the singularly characterized 'labor-leisure distortion.' While certain trends emerge from conducting a range of simulations, the model's prescriptions can still be significantly affected by altering any of its multitudinous parameters. When messier real world complications are introduced, such as those

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[210] And if one is slightly more bullish, rough anonymous distributions may also be in play.

[211] As discussed above, similar proposals are presented by Sanchirico, *supra* note 13, and Liscow, *supra* note 13, although they offer different justifications than the epistemic grounds advanced in this Article. Furthermore, I've argued above that their own arguments are indecisive.

[212] *See supra* at section I.A.2.

involving tax administration, appraisal, compliance, avoidance and evasion efforts (of varying degrees of legality), one will be hard pressed to assert that the consequences of tax rules can be forecast with precision. Indeed, attempts to do so will run up against any number of those obstacles to prediction surveyed in section II.A.4.b and Appendix II. Therefore, the tax system's *relative* epistemic advantage over non-tax rules and policies may not translate into a particularly large *absolute* one, which can be taken full practical advantage of by lawmakers.

Furthermore, there is reason to believe that sole reliance on the tax system for distributive objectives would progressively erode its relative advantage. If it is to be successful in this regard, tax law must serve as a model of the economy.[213] Greater distributive precision will therefore breed greater legal complexity, as the tax regime tracks economic transactions and structures with increasing detail. But because tax planning is often a function of this very complexity—with a more labyrinthine code typically presenting more elaborate planning opportunities—predicting a tax regime's behavioral consequences will grow more difficult as it strives to become an ever more comprehensive distributive instrument. Accordingly, there are very likely '*diminishing epistemic returns*' to its use.

By comparison, when responsibility for distributive objectives is spread out more diffusely among an array of rules and policies, each such instrument will require less distributive precision, and therefore a less complex construction. That is because it is these rules' aggregate effect that concerns us, after accounting for the offsetting variability of individual rules. Because simpler rules generally produce less complex behavioral responses, the consequences of each such rule/policy may paradoxically be easier to forecast.

The upshot is that the tax-and-transfer system's relative epistemic advantage vis-à-vis the legal system should be not significant enough, in absolute and practical terms, to justify *exclusive use* for distributive objectives, although this advantage plausibly warrants assigning the tax system a *greater share* of this responsibility. While it may work somewhat better than other distributive techniques some portion of the time, it is no silver bullet. Drawing this section's threads together, the *optimal approach to redistribution for epistemic moderates* will therefore involve an institutional division of labor, whereby:

(1) the tax-and-transfer system bears a significant share of the responsibility for achieving distributive objectives; but is

(2) supported by many non-tax rules and policies, whose 'dials' are turned slightly in the anticipatorily desired distributive direction.

Like a prudent investor who allocates a greater share of her portfolio to higher expected return investments, but guards against volatility and risk by diversifying across a broad range of assets, so too the state should make greater use of the tax-and-transfer system for advancing distributive objectives than other methods, but protect against error, uncertainty, unanticipated behavioral responses, and tax avoidance/evasion efforts, by employing a broad array of other equity-promoting instruments as well.

To reiterate, the core epistemic justification for this '*prudent investor' framework*—one member of a broader family of pluralist views—is that we can be more confident in the rough

[213] *See* Edward D. Kleinbard, *Stateless Income and its Remedies*, in GLOBAL TAX FAIRNESS, ed. Thomas Pogge and Krishen Mehta 129, 132 (2016).

effect of a large number of tax and non-tax instruments working together, than in the precise outcome produced by any particular measure in lone operation. The more diversified our efforts, the more our confidence should grow in this regard. While this Article takes no stance on how much redistribution is normatively justified, this approach implies that the greater the amount deemed to be socially desirable, the more (anticipatorily) redistributive legal rules and policies that ought to be recruited, holding fixed the estimated quantum of redistribution achieved through tax-and-transfers.

While this rough division of labor should constitute our starting point, and the exactness of our efforts must never be overestimated, these approximate shares of distributive responsibility can be further calibrated to reflect further institutional considerations. As explained below in the appended discussion of the contracting-around and haphazardness arguments,[214] the practical efficacy of tax versus non-tax distributive instruments can vary with respect to a number of contextual factors, which should be kept in mind in making these assignments.

In some circumstances, independent epistemic considerations will also lend auxiliary support for a rule-based approach. In particular, it has been shown that legal rules sometimes do a superior job of observing non-income, welfare-based inequalities and redistributing with respect to them, often indirectly through the use of selection filters or other invisible-hand mechanisms.[215] Similarly, legal rules, as enforced through the courts, often can take better take stock of context-specific and historical factors potentially pertinent to fair treatment, to which the tax system is ineluctably blind.[216] On the pluralist approach endorsed by this Article, policymakers may adventitiously harness such informational advantages of legal rules for added epistemic edge.

This framework, and the epistemic moderacy from which it derives, carry a number of more specific doctrinal and policy implications, both negative and positive in character. I conclude this Article by considering both varieties.

Take first the negative implications. As we saw earlier, Alex Raskolnikov has recently documented an array of federal policies adopted on efficiency grounds over the last several decades, which appear to have resulted in sizable losses to certain classes as measured against the antecedent status quo.[217] This putative lack of indemnification, which is plausibly explained by the epistemic infeasibility of KS's method, implies that these policies ought to be revaluated. In particular, their apparent adverse distributive consequences[218] must be weighed against any

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[214] See Appendix I.

[215] Logue and Avraham, *supra* note 73. Where this is the case, Logue and Avaraham advocate for the use of legal rules to redistribute in lieu of the tax-and-transfer approach. Their central example involves a non-discrimination provision that forbids insurers from denying insurance coverage on the basis of genetically determined pre-existing health conditions. This rule circumvents the challenge of directly quantifying lifetime health costs posed by such illnesses, and other detrimental effects they have on individual welfare, and indirectly compensates unlucky individuals for these amounts. *Id*. at 208, 213-14.

[216] *See* CHARLES FRIED, RIGHT AND WRONG 135-36 (1978); Richard S. Markovits, *Why Kaplow and Shavell's "Double Distortion Argument" Articles are Wrong*, 13 GEO. MASON L. REV. 511, 535-40 (2005).

[217] *See supra* at section I.B.2.c. As the reader may recall, his case studies include trade liberalization; increased immigration; certain environmental regulations; deregulation leading to a rise in product, capital and labor market concentration; and laws weakening employment protections and labor unions.

[218] As measured against the prior status quo. As per my epistemic critique, determining the counterfactual fair benchmark with precision may not be feasible. However, if these policies' outcomes are deemed unfair relative to the antecedent status quo, it would follow a fortiori that they're also unfair relative to a fairer counterfactual benchmark.

observed efficiency gains in deciding whether ongoing implementation is justified, or whether their repeal is in order.[219]

Turning to the positive implications, pluralism dictates that an assortment of fair rules be recruited as cogs in a legal scheme offering distributive support to the tax-and-transfer system. Which rules? While economic analysis of law has long focused on legal efficiency, fairness-based analysis is not wholly without precedent, and over the years legal scholars have identified a number of rules that could credibly play a redistributive role. Among these are the contractual unconscionability doctrine; usury laws, warranties of quality, minimum wage laws, and other forms of contractual regulation;[220] antipoverty measures in property law, such as housing codes, subsidies, and rent control;[221] product liability rules in tort law;[222] situational use of strict liability over negligence;[223] anti-discrimination requirements in civil rights law; labor laws granting employees the right to form unions, and requiring employers to negotiate with them in good faith;[224] prohibitions on the denial of health insurance coverage due to genetically determined illness;[225] and damages for tortiously causing pain-and-suffering.[226] While this list is surely far from exhaustive,[227] it illustrates the range of legal tools that lawmakers have recourse to in pursuing distributive objectives through institutional diversification. In addition to these specific doctrinal devices, there are also more general mechanisms for incorporating distributive considerations into legal design, two of which merit consideration.

First, recall KS's own example of a redistributive tort regime, which ties damages owed for tortious injury to the tortfeasor's income.[228] If one finds this particular example off-putting—perhaps, because it is felt to violate some non-distributive fairness norm—there are other legal contexts where linking damages or penalties to income (or wealth) is intuitively far more palatable. A couple of examples that come to mind are income-dependent penalties for tax evasion, certain other fines,[229] and punitive damages for egregious conduct, broadly construed.

Second, contra the modern economic approach, distributionally sensitive evaluative criteria might be employed to evaluate government projects and expenditures falling outside the ambit of the tax-and-transfer system. These may include a modified form of cost-benefit analysis, which assigns extra weight to the preferences of worse-off individuals,[230] as well as distributionally sensitive social welfare functions.[231] Of course, use of these criteria is subject to the epistemic

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[219] Raskolnikov comes to a similar conclusion, though based upon the political (rather than epistemic) infeasibility of KS's method.

[220] Anthony T. Kronman, *Contract Law and Distributive Justice*, 89 YALE. L.J. 472, 473, 505, 507, (1980).

[221] Bruce A. Ackerman*, Regulating Slum Housing Markets on Behalf of the Poor: Of Housing Codes, Housing Subsidies and Income Redistribution Policy*, 80 YALE L.J. 1093 (1971).

[222] Koichi Hamada, *Liability Rules and Income Distribution in Product Liability*, 66 AM. ECON. REV. 228 (1976).

[223] While in theory appropriately designed strict liability and negligence regimes will be equally efficient (e.g., POLINSKY, *supra* note 4, at 46), in practice certain empirical factors can give either the edge. Where they diverge in their efficiency, strict liability can have more desirable distributive consequences in certain contexts, such as where injuries are due to inherently dangerous industrial activities engaged in by businesses owned by wealthy stockholders.

[224] Sanchirico, *New Efficiency Rationale*, *supra* note 6, at 1047.

[225] Logue and Avraham, *supra* note 73, at 208, 213-14.

[226] *Id.* at 227-28; Liscow, *supra* note 13, at 544.

[227] A number of further examples are offered by Liscow, *supra* note 13, at 542-48.

[228] *See supra* at section I.B.1.

[229] *Id.* at 540.

[230] *See* ADLER AND POSNER, *supra* note 25.

[231] *See* ADLER, MEASURING SOCIAL WELFARE, *supra* note 11.

limitations delineated in this Article,[232] which should be kept clearly in view. Nevertheless, the fact of these limitations does not mean that such criteria cannot be sensibly employed within a pluralist framework, which acknowledges and accounts for the imprecision of individual instruments in its overall diversification strategy.

By recruiting a host of redistributive non-tax rules and policies, the pluralist method poses the efficiency costs identified by KS's double distortion reasoning. However, we've seen that because custom compensatory transfers are not epistemically feasible, equity-efficiency tradeoffs are inevitable. Given a moderate view of our predictive abilities, the pursuit of fairness epistemically requires that we spread our efforts across a range of legal and policy measures, and that potential efficiency costs be balanced against the improved prospects for equity. If we are fortuitous in our adjustments, we may reap the offsetting efficiency gains identified by Sanchirico[233]—although this would be a bonus, rather than a core justification of this method. Rather, the pluralist approach's primary warrant derives from the fact that it offers us the most realistic chance of achieving rough distributive justice in light of the epistemic limits of law-and-economics.

Appendix I: Additional Arguments for the Modern Economic Approach

This Appendix briefly considers two arguments that, prior to the rise of KS's Pareto argument, were offered as primary support of the modern economic approach's favored division of labor between the tax and legal systems.

The first argument is that redistributive legal rules can often be contracted around in a way that blunts their intended distributive impact.[234] For example, suppose some pro-tenant rule—say, an implied warranty of habitability—were adopted in an effort to redistribute from wealthier landlords to their tenants. Landlords might then increase rent to reflect the additional costs borne from complying with this new rule. And in that case, there will be no net transfers to tenants.

While it captures an important insight, this '*contracting-around*' *argument* overlooks a number of situational features that can prevent one from contracting around these legal burdens. For instance, offsetting adjustments will be easiest when the parties stand in a contractual or market relationship to each other, and far more difficult (if not impossible) when they are strangers.[235] Consequently, tort law can often be a more effective distributive instrument than contract law. In addition, the contracting-around reasoning largely pertains to "changes in law that attempt to directly address the outcome of bargain," rather than to those that modify the underlying rights of the parties in a way that alters their respective bargaining capabilities and leverage.[236] As proof of concept, consider labor laws granting workers the right to form unions, and requiring employers to bargain with them in good faith.[237] Finally, in our initial example, the landlord's ability to pass off the costs of the implied warranty of habitability to her tenants depends on the *relative elasticities* of supply and demand for housing.[238] Generally, the more elastic the demand for some

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232 *See supra* at section II.A.3.
233 *See supra* at section I.B.2.a.
234 *E.g.,* POLSINKY, *supra* note 4, at 159.
235 Harold Demsetz, *Wealth Distribution and the Ownership of Rights*, 1 J. LEGAL STUD. 223, 227-28 (1972).
236 Sanchirico *New Efficiency Rationale*, *supra* note 6, at 1047.
237 *Id.*
238 Logue and Avaraham, *supra* note 73, at 179, citing to Ackerman, *supra* note 221, at 1105-08. But for some complexities, see Richard Craswell, *Passing on the Costs of Legal Rules: Efficiency and Distribution in Buyer-Seller Relationships*, 43 STANFORD L. REV. 361 (1991).

commodity, and the less elastic its supply, the more difficult it will be for a seller to pass along such costs to buyers.

In relation to this last factor, the contracting-around argument ignores a critical parallel between the tax and legal systems, which further narrows the gap in their respective efficacies qua redistributive instruments. Namely, it falsely presupposes that the party who nominally pays a tax will always bear its full *economic incidence*.[239] The classic counterexample is the *corporate tax*,[240] whose incidence is typically borne, at least to some extent, by a firm's customers and employees. As with the costs of redistributive legal rules, a firm's ability to pass this tax along by raising its prices or reducing its wages depends upon the relative elasticities of the supply and demand for its products, and for its employees' labor. We see then that the ability to offset costs imposed by redistributive rules and taxes turn on qualitatively similar economic factors. Consequently, no conclusion can be drawn from the armchair as to which will constitute the superior distributive modality in a particular context. That is a matter for empirical investigation.

Consider now the second traditional argument for the modern economic approach's preferred division of labor: that legal rules constitute a more haphazard method of redistribution than taxation.[241] While the tax-and-transfer system can redistribute wealth to (and from) all individuals falling within certain target income classes, legal rules are frequently both over- and under-inclusive.[242] Illustrating via our earlier example, even if landlords are generally better off than tenants, this is surely far from an exceptionless generalization. In a subset of cases, a pro-tenant rule will therefore have the perverse effect of redistributing from a worse-off landlord to a better-off tenant. Moreover, there will be still other individuals that the state would like to transfer resources to (or from) who are neither landlords nor tenants—e.g., homeowners.

While this '*haphazardness' argument*' also gets at a grain of truth, it both underestimates the potential comprehensiveness of legal rules and policies, and overestimates the precision of the tax system qua redistributive instrument. Taking these blind spots in turn, the argument only considers rules piecemeal, rather than a system in which many redistributive rules and policies are used in tandem. When the net is cast wide, the over- and under-inclusiveness problems are dramatically mitigated:[243] the former because the distributive 'errors' produced by particular rules tend to cancel out in the mix, and the latter because all individuals are likely affected by some subset of the rules in the system. Under-inclusiveness of specific rules is further assuaged by the availability of insurance,[244] which converts costs imposed ex post on some subset of a class (e.g., drivers who negligently cause traffic accidents) into premiums distributed over the entire class ex ante (e.g., all drivers).

Conversely, various features of the tax system detract from its alleged comprehensiveness and precision. For instance, annual income can be influenced by a host of unpredictable and downright stochastic events,[245] such as unanticipated layoffs, lucky promotions, windfalls, casualty losses, random walks in the stock market, and so forth. Furthermore, all actual income tax systems employ a *realization requirement,* which provides that a sale or other disposition of an asset must occur

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239 Tomer Blumkin and Yoram Margoliath, *On the Limits of Redistributive Taxation: Establishing a Case for Equity-Informed Legal Rules,* 25 VA. TAX REV. 1, 5 (2005).

240 *E.g.,* JOEL SLEMROD AND JON BAKIJA, TAXING OURSELVES: A CITIZEN'S GUIDE TO THE DEBATE OVER TAXES, 116-19 (2017 5th ed.).

241 *E.g.,* POLSINKY, *supra* note 4, at 162-63.

242 *See id*; Logue and Avaraham, *supra* note 73, at 182, 185.

243 *See* Sanchirico *New Efficiency Rationale*, *supra* note 6, at 1052.

244 *Id.*

245 *Id*. at 1053.

before appreciation in its value is included in taxable income.[246] This rule, largely motivated by administrative considerations, departs from the theoretically proper measure of Haigs-Simons income, which defines income as the value of all consumption plus accretions to wealth (including unrealized asset appreciation) over a given time period. As a consequence, real world tax systems present significant opportunities for the elective realization and taxation of income, to say nothing of legion other tax avoidance strategies.[247]

A further important weakness of the tax-and-transfer system is its blindness to non-income factors relevant to fair distribution. Developing this insight, Kyle Logue and Ronen Avraham have argued that legal rules sometimes do a better job of observing non-income, welfare-based inequalities, and redistributing with respect to them.[248] Similarly, legal rules can often better address context specific or historical factors pertinent to fair treatment from deontological moral perspectives,[249] which do not evaluate the rightness and wrongness of acts solely on the basis of their consequences, or on 'end-state' principles.

Taken together, these responses to the contracting-around and haphazardness arguments add up to a wide array of circumstances where legal rules are no worse off qua redistributive instruments than the tax-and-transfer system. Indeed, when many such rules and policies are recruited, they can collectively be both more difficult to contract around[250] and equally (if not more) comprehensive[251] than an income tax. These conclusions provide auxiliary support for the pluralist institutional approach to distribution advanced in this Article.

Appendix II: Obstacles to Prediction in Economic (and Social) Science

This Appendix supplements Section II.A.4.b's brief discussion and considers at greater length ten obstacles to prediction in the realm of human action, which contribute to economic (and social) science's predictive limitations. Our analysis supports this Article's contention that identifying distributions, of the sort required by KS's transfer-based Pareto argument, cannot be reliably forecast.

While several of these epistemic barriers (or variations thereof) afflict the social sciences generally, I mostly concentrate on economics, for the reasons given below.[252] Some of these difficulties (most notably, the first) are plausibly attributable to methodological missteps on the part of economic science; while others reflect limitations inherent to the discipline, or to the domain of phenomena with which it is concerned. The distinction is important. By identifying unforced errors, we can aim to improve the predictive and explanatory power of economics over

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246 I.R.C. Section 1001(a)-(c), 1031.

247 *See* Logue and Avraham, *supra* note 73, at 183.

248 *See generally id*.

249 *See* FRIED, *supra* note 216, at 135-36; Markovits, *supra* note 216, at 535-40.

250 *See* Kronman, *supra* note 220, at 505-06.

251 *See* Sanchirico, *New Efficiency Rationale*, *supra* note 6, at 1052.

252 Of primary importance, economics is the only social science that *even purports* to yield quantitative predictions of the exactitude required for KS's transfer-based Pareto argument. If it were shown to be unsuccessful in this regard, then my epistemic objection would thus be complete for all practical purposes. Furthermore, because KS primarily invoke economic analysis in their own work, it is dialectically appropriate to devote my limited space to engaging with my interlocutors' own discipline. Finally, many of the issues discussed herein have been analyzed in greatest depth in the literature on the methodology of economics. Although this work has an enormous bearing on the economic analysis of law, it has largely been ignored in legal scholarship. In bringing its themes to bear on my epistemic critique, my aim is to introduce these matters to the broader audience of legal economists and scholars.

time. Conversely, prudence demands acknowledgement of inbuilt limitations, as failure to come to terms with these bounds can result in a wayward approach to matters of the utmost social importance: e.g., the use of theoretical devices with far ranging policy implications, whose practical employment cannot be justified. I claim that KS's Pareto argument is one such device, as are other instances of transfer-based Pareto reasoning applied to policies with broad, population-wide impact.

1. False Assumptions

We begin with the most frequent criticism of economics: that it is fraught with unrealistic assumptions.[253] As discussed earlier on,[254] neoclassical economics takes *rational choice theory (RCT)* as its underlying psychological account of human behavior. According to RCT, individuals are rational maximizers of their own expected utility, which amounts to holding and acting on preferences that satisfy certain formal constraints, including completeness,[255] transitivity,[256] continuity,[257] and independence.[258]

RCT has a number of virtues. As John von Neuman and Oscar Morgenstern famously proved, whenever an agent's preferences satisfy these axioms, their choices can be represented by a well-defined utility function, which assigns discrete utilities to sure-thing outcomes, as well as to probabilistic lotteries.[259] In addition to this theoretical elegance, RCT can make a strong claim to offering a plausible normative account of rationality. Indeed, one strong argument for this thesis is that agents whose preferences fail to satisfy RTC's axioms can sometimes be exploited through the construction of a 'Dutch book,' which guarantees the individual will lose money on a series of consensual transactions.[260]

The quandary that RCT presents for economic theory, when viewed as a scientific (rather than normative) enterprise, which is in the business of explaining and predicting real-world phenomena, is that RTC's axioms are *false*.[261] In practice, not all alternatives be comparable;[262] and a good many seem incommensurable, even in principle. Real world decision makers also routinely offend

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253 It "assumes the can opener."

254 *See supra* at section I.B.2.b.

255 An agent A's preferences are *complete* if all options can be compared. Or, more formally, "for all options x and y, either A prefers x to y, or A prefers y to x, or A is indifferent between x and y." HAUSMAN, *supra* note 186, at 14.

256 Agent A's preferences are *transitive* if it is always the case that, if A prefers x to y, and A prefers y to z, then A prefers x to z; and if A is indifferent between x and y, and is indifferent between y and z, then A is indifferent between x and z. *Id*.

257 *See* PETERSON, *supra* note 189, at 100.

258 Agent A's preferences satisfy the *independence* axiom if the following is true: A prefers x to y if and only if it is the case that A prefers Lottery 1, in which A wins x with a certain probability p and z otherwise, to Lottery 2, in which A wins y with that same probability p and z otherwise. *Id*. at 99.

259 JOHN VON NEUMAN AND OSCAR MORGENSTERN, THE THEORY OF GAMES AND ECONOMIC BEHAVIOR 617-32 (1944). For discussion, see PETERSON, *supra* note 189, at 98.

260 This is also referred to as the 'money pump argument'. Its classic statement is Frank Ramsey, *Truth and Probability* (1926). But for some resistance, see JULIAN REISS, PHILOSOPHY OF ECONOMICS: A CONTEMPORARY INTRODUCTION, 38-39 (2013).

261 Additional failures of rational choice, including those involving weakness-of-will, unconscious beliefs/desires, and cognitive dissonance, are discussed by ELSTER, *supra* note 187, at 17-26.

262 Suppose, for instance, that you were given the choice between driving a backhoe through Tunkhannock or a payloader through Nuangola—which would you prefer? See HAUSMAN, *supra* note 186, at 15.

transitivity,[263] and there are several documented instances of the independence axiom's violation.[264] And that's all *before* accounting for the bulk of those biases and heuristics fastidiously catalogued by psychologists, many of which represent further deviations from RCT's expected utility principle.[265]

A house is only as strong as its foundations. If RCT does not accurately depict the microeconomic realm of individual choice with which it is putatively concerned, then it should come as little surprise that neoclassical economics is subject to significant predictive limitations. For RCT constitutes the scaffolding upon which all of other such theories are built. Given the falsity of its assumptions, we should not be startled to discover that economic prediction is subject to a rather low ceiling with respect to its precision and accuracy.

Over the years, a number of distinguished economists—not least among them Milton Friedman,[266] Armen Alchain,[267] and Gary Becker[268]—have offered qualified defenses of these rationality assumptions. Yet none is (or has generally been regarded as) wholly satisfactory.[269] Probably the most reasonable and commonsensical rejoinder, proffered by Richard Posner among others, is that because people are largely rational much of the time, RCT constitutes an imperfect yet acceptable approximation of empirical reality.[270] Cognitive psychologists in the business of documenting systematic departures from rationality may quibble with this rather sanguine assessment. But even granting Posner's claim arguendo, we would still have reason to doubt that neoclassical economics could produce those maximally specific predictions of identifying distributions required by transfer-based Pareto arguments like KS's. Given merely approximate inputs, the *very best* one could hope for are similar approximations in output—and even this assumes a naive parametricity in the translation of errors by the machinery of economic theories.[271]

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[263] Failures of transitivity have been experimentally documented by the phenomenon of 'preference reversals.' REISS, *supra* note 260, at 41-42, 185-86. There is also an abundance of commonplace evidence: e.g., preferring coffee to tea at breakfast, tea to decaf at lunch, and then decaf to coffee at dinner. Furthermore, if commodities are gerrymandered, bundled, and timestamped to always avoid these apparent violations, then the transitivity axiom will become impossible to falsify. ROSENBERG, *supra* note 128, at 121.

[264] Two confirmed violations are referred to as the Alias and Ellsberg paradoxes. See REISS, *supra* note 260, at 46-49; PETERSON, *supra* note 189, at 78-83.

[265] For an overview ZAMIR AND TEICHMAN, *supra* note 80, at ch. 2. One of the most well-known is Daniel Khaneman and Amos Tversky's *prospect theory*, which holds that people "perceive outcomes as gains and losses, rather than as final states of wealth or welfare." Moreover, "gains and losses are defined in relation to some reference point." *Id*. at 42.

[266] MILTON FRIEDMAN, *The Methodology of Positive Economics*, reprinted in ESSAYS IN POSITIVE ECONOMICS (1953) (defending an instrumentalist methodology for economics, according to which the sole purpose of scientific theorizing is the prediction of future observations, and not correct description or explanation of the world's character; and contending that economics has been predictively successful within its "intended domain" of macroeconomic and market-level phenomena).

[267] Armen Alchain, *Uncertainty, Evolution and Economic Theory*, 58 J. POLITICAL ECON. 211-21 (1950) (arguing that markets function as Darwinian filter mechanisms, which select for firms who behave as if they were rational; and that RTC can therefore be used to model market behavior).

[268] GARY BECKER, *Irrational Behavior and Economic Theory*, reprinted in THE ECONOMIC APPROACH TO HUMAN BEHAVIOR (1976) (arguing that competitive markets will often behave as if their participants are rational as a result of certain structural constraints, even if individual decisions are random).

[269] For compelling responses to Friedman, see ROSENBERG, *supra* note 128, at 61; and to Alchain, see *id*. at 188-191. Becker's mathematical argument, even if successful on its own terms, provides little if any justification for the use of RTC in contexts that do not involve classically competitive markets, such as many legal arenas.

[270] *See* POSNER, ECONOMIC ANALYSIS OF LAW, *supra* note 4, at 4, 17-23.

[271] Of course, to improve their predictive power, economic theories might employ more realistic empirical premises. With the development of behavioral economics and the integration of economics with empirical psychology, a certain

Nor are economics' false presuppositions confined to RCT, which (as mentioned) constitutes the foundation for more elaborate edifices. In the construction of economic models, a host of further idealizing assumptions[272] are routinely employed. In practice, these idealizations may be required to simplify inordinately complex systems, which would otherwise prove cognitively intractable. For this reason, they often prove useful, or even necessary, for cultivating economic insight. As the economist Hal Varian and philosopher Allan Gibbard argue in an influential article, economic models frequently "seek to give an impression of some aspect of economic reality not by describing it directly, but rather by emphasizing—even to the point of distorting—certain selected aspects of the economic situation,"[273] which would otherwise resist perceptibility in the surrounding haze of complexity.[274]

But while such "caricatures"[275] can facilitate understanding, they pose a fateful tradeoff when it comes to prediction. In order to make empirical claims about the world, models must ultimately be conjoined with auxiliary hypotheses asserting that reality sufficiently mirrors the model's assumptions,[276] or 'interpretations' assigning physical extensions to the abstract elements comprising the model's formal structure.[277] Because it is frequently difficult or impossible to do so for cognitively illuminating models of highly complex phenomena, Gibbard and Varian ultimately arrive at the moderate view, not far from Paul Samuelson's, that economics must largely be content to offer explanations and predictions of the "central tendency" of economic behavior.[278]

Striking a somewhat harsher tone, the frequent lack of realism in economic models is decried by the Nobel Laureate Wassily Leontief, who observes that

> It precisely the empirical validity of these assumptions on which the usefulness of the entire exercise depends. What is needed, in most cases, is a[n] . . . assessment and verification of [the model's] assumptions in terms of observed facts. Here mathematics cannot help, and because of this the interest and enthusiasm of the model builder suddenly begins to flag.[279]

Levelling this criticism at the subdiscipline of econometrics, which reflects the marriage of statistical methods with economic theory, Leontief continues that

> . . . the validity of [econometricians'] statistical tools depends . . . on the acceptance of certain convenient assumptions pertaining to stochastic properties of the phenomena which the particular models are intended

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amount of progress has been in made in this regard. Yet behavioral economics faces its own set of predictive obstacles. In particular, because individuals are irrational in different ways and to different degrees, and because decisions are highly context-dependent, it is unclear how it might generate precise quantitative predictions of the sort ostensibly provided by neoclassical economics, and required by transfer-based Pareto arguments. See ZAMIR AND TEICHMAN, *supra* note 80, at 149-50.

272 For a useful taxonomy of such idealizations, see REISS, *supra* note 260, at 124.

273 Alan Gibbard and Hal Varian, *Economic Models*, 75 J. PHILOS. 664, 665 (1978).

274 *See id.* at 673.

275 *Id.*

276 *Id.* at 670. For similar views, see HAUSMANN, *supra* note 186, at 72-78; Robert Sudgen, *Credible Worlds, Capacities and Mechanisms*, ERKENNTNIS 3, 18 (2009); see also Robert Sudgen, *Credible Worlds: The Status of Theoretical Models in Economics*, J. ECON. METHODOL. 1 (2000).

277 ROSENBERG, *supra* note 128, at 81.

278 Gibbard and Varian, *supra* note 274, at 670.

279 Wassily Leontief, *Theoretical Assumptions and Nonobserved Facts*, in ESSAYS IN ECONOMICS 274 (1985). This passage is quoted and discussed by ROSENBERG, *supra* note 128, at 63.

> to explain, assumptions that can be seldom verified. In no other field of empirical enquiry has so massive and sophisticated a statistical machinery been used with such indifferent results.[280]

This sort of complaint represents a central theme of the work of Nassim Taleb, who castigates econometrics for its ubiquitous yet frequently unfounded assumption that empirical phenomena conform to a Gaussian (or bell curve) distribution. The motivation for this a priori presupposition, Taleb surmises, is that bell curves permit for the application of powerful statistical techniques, which can be used to deduce theorems and deliver exact quantitative conclusions.[281] Yet such precision is ultimately illusory, as there is little principled basis for the undergirding Gaussian assumption, which arguably is subject to a vicious circularity.[282] Here, as elsewhere in economic theory, mathematical power and beauty have unfortunately been conflated with empirical truth.[283]

2. *Mental Unobservables*

Let's now consider epistemic obstacles that are not avoidable errors in economic methodology, but rather constitute impediments inherent to the domain of phenomena with which economic (and social) science is concerned. Discussion of these hurdles will occupy us for the remainder of this Appendix II, beginning with the problem of mental unobservables.

It has often been observed that utility theory represents one formalization of '*folk-psychology*,'[284] that commonsensical mode of explanation which explicates human actions by "identifying the beliefs and desires that lead to them."[285] Because beliefs, desires, and other mental states are not publicly observable, however, folk-psychology and its refinements face methodological complexities not encountered in the natural sciences. For the most part, the phenomena studied by physics, chemistry, biology, etc., are perceptible from a host of third-person perspectives, allowing for widespread verification of empirical data and experimental results. By contrast, because individuals enjoy privileged access to their own mental states, the empirical inputs to economic and other folk-psychological theories are often elusive and unverifiable.

Perhaps in tacit recognition of this quandary, neoclassical economics frequently attempts to circumvent the problem of unobservable beliefs and expectations by presuming perfect information on the part of agents. And it seeks to mitigate the unobservability of desires and preferences by making certain assumptions about the formal properties of utility functions: e.g., that agents always prefer more commodities to fewer ('consumerism'), and that increased consumption of a given commodity yields diminishing marginal gains in utility.[286]

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[280] Leontief, *supra* note 279, at 274-75; ROSENBERG, *supra* note 128, at 64.

[281] TALEB, *supra* note 163, at 282. Indeed, Taleb notes that a number of mainstream economic theories that have been awarded Nobel Prizes expressly depend on the Gaussian assumption, including Modern Portfolio Theory and the Black-Scholes option pricing model. *Id*. at 277-79.

[282] Taleb observes that to discover whether a probability distribution is Gaussian, one needs data. How much data to build confidence? The answer will itself depend on whether the distribution is bell shaped, or takes on a more exotic character. In the face of this regress, which resembles the venerable philosophical problem of induction, most economists and statisticians simply default to a Gaussian assumption. *Id*. at 269.

[283] See Paul Krugman, *How did economists get it so wrong?,* NY TIMES MAGAZINE, Sept 2, 2009, at http://www.nytimes.com/2009/09/06/magazine/06Economic-t.html?pagewanted=all.

[284] Though not the *only* possible one. HAUSMAN, *supra* note 186, at 322. Herbert Simon's reformulation of decision theory, which regards individuals as "*satisficers*" rather than utility maximizers, plausibly constitutes a competing formalization. See SIMON, *supra* note 160.

[285] ALEXANDER ROSENBERG, PHILOSOPHY OF SOCIAL SCIENCE 37 (2016 5th ed.).

[286] See e.g., HAUSMAN, *supra* note 186, at 30.

Yet neither strategy represents a wholly adequate solution to the epistemological imbroglio posed by mental unobservables. Perfect information is a theoretical fiction, a radical idealization with little basis in empirical reality. Rather than confront the problem of hidden beliefs head on, neoclassical economics often opts to simply bury its head in the sand. And while assumptions of consumerism and diminishing marginal utility are both reasonable (if not universally true)[287] and helpful, they are not sufficient for the task at hand. For in addition to the general shape of utility functions, the content of individual preference (e.g., the relative strength of a person's tastes for different commodities) is often required to explain and predict her choices and actions. Although preferences may be elicited or estimated from empirical data, neither method is a silver bullet, since individuals typically harbor preferences over a vastly larger range of states of affairs than they have chosen among in the past, and which can influence their future behavior.[288]

The unobservability of mental states thus imposes considerable limits on the scope and precision of folk-psychological explanations/predictions of human behavior. Indeed, some philosophers have contended that, even in principle, there could be never be exact folk-psychological laws connecting mental states to external behavior. One such view was articulated by Donald Davidson, who argued that the process of imputing beliefs and desires to an individual on the basis of her verbal reports, physical conduct, and the surrounding circumstances is necessarily a contextual, holistic, and therefore imprecise affair.[289] Frequently, the set of mental states imputed to a particular individual is *underdetermined* by the observable data, which may be consistent with a range of (not-so) subtly different beliefs and desires. Alexander Rosenberg, one of the most prominent philosophical critics of economics, offers similar observations:

> The number of specific beliefs and desires that bring about any particular action is very large. The difficulty of identifying them exactly is great. Accordingly, our explanations of particular actions cannot help being sketchy and lacking in detail. Additionally they will be subject to considerable doubt, since it is so difficult to nail down much of what a person actually believed and wanted on a given occasion. Our predictions will be no stronger than our explanations.[290]

In light of these difficulties, some economists have sought to purge mental unobservables from their discipline's theoretical commitments by taking a thoroughly behaviorist approach, which identifies individual preferences with actual choices.[291] Yet while this '*revealed preference' theory* (RPT)[292] has largely become the orthodoxy,[293] it is not ultimately defensible. One reason is that RPT rules out the bare conceptual possibility of ever: (i) choosing against one's preferences, such

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[287] For counterexamples to diminishing marginal utility, see Harry Frankfurt, *Equality as Moral Ideal*, 98 ETHICS 21 (1987)

[288] Or indeed, may ever be in a position to choose among. REISS, *supra* note 260, at 34.

[289] See DONALD DAVIDSON, *Mental Events*, in ESSAYS ON ACTIONS AND EVENTS 207-27 (1980). The philosopher Willard Van Orman Quine advanced a similar 'indeterminacy of translation' thesis in his landmark WORD AND OBJECT (1960). Due to this indeterminacy, Quine held there isn't even a fact of the matter about the propositional content of verbal reports.

[290] ROSENBERG, PHILOSOPHY OF SOCIAL SCIENCE, *supra* note 285, at 50. Rosenberg develops a number of other arguments for the impossibility of precise psycho-physical laws, which rely on further points of disanalogy between mental states and the objects studied by the natural sciences.

[291] REISS, *supra* note 260, at 33; HAUSMAN, *supra* note 186, at 156.

[292] *See* Paul Samuelson, *A Note on the Pure Theory of Consumer's Behavior*, 5 ECONOMICA 61-71 (1938); Paul Samuelson, *Problems of Methodology*, 53 AMERICAN ECONOMIC REVIEW PAPERS AND PROCEEDINGS 232-36 (1953).

[293] REISS, *supra* note 260, at 33.

as when one makes a mistake or is subject to weakness of will;[294] as well as of (ii) changing one's preferences.[295] Furthermore, RPT abandons the critical scientific objective of explaining human action by reference to mental states, instead taking choices as brute facts that resist further explication.[296] Finally, even if one were to bite these bullets, RPT would still prove unsuccessful in purging economics of its reliance on mental states, and is therefore a failure on its own terms. As Rosenberg argues for the reasons sketched below, [297] economic theory must inevitably posit *either* mental preferences or expectations; and in so doing, it opens itself up to the problems posed by mental unobservables.

3. Lack of Closure

In his classic essay, "On the Definition of Political Economy and the Method of Investigation Proper to It," John Stewart Mill characterized economics as the "science which traces the laws of such of the phenomena of society as arise from the combined operations of mankind for the production of wealth, in so far as those phenomena are not modified by the pursuit of any other object."[298] Consistent with this substantive definition, which signifies the discipline by reference to the phenomena it studies (rather than by its method or formal properties),[299] economic theory has largely concerned itself with such wealth-oriented processes such as production, distribution, contracting, exchange, and consumption.[300]

Yet this substantive focus should not obscure the fact that the domain of economic phenomena is *not closed* unto itself; and that the wealth of individuals and societies is heavily influenced by non-economic forces, which represent causal factors exogenous to economic theory. As the philosopher Nicholas Rescher observes, it is frequently the case that "the workings of an economy are at the mercy of developments extraneous to economics itself . . . which from the angle of strictly economic considerations represent the intrusion of a deus ex machina."[301] Such intrusive factors (several of which are presently topical) include "wars, riots, assassinations, epidemics, natural disasters," to say nothing of garden variety politics.[302] The influence of these exogeneities has not been lost on economists. On the contrary, Taleb complains with characteristic acerbity that "[w]hen an economist fails to predict . . . . he often invokes the issue of earthquakes or revolutions, claiming that he is not into geodesics, atmospheric sciences, or political science."[303] That is, the

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[294] *Id*. at 35; Amartya Sen, *Rational Fools: A Critique of the Behavioral Foundations of Economic Theory*, 6 PHILOSOPHY AND PUBLIC AFFAIRS 317 (1977).

[295] HAUSMAN, *supra* note 186, at 22.

[296] *Id*. at 157.

[297] To reduce an agent's preferences to her actual choices, one needs to know something about that individual's beliefs and expectations. Thus the choice of Lottery-1 over Lottery-2 only tells us something about the chooser's utility function if we know the probabilities that she subjectively attaches to the components of each lottery. In parallel fashion, to reduce expectations to behavior, we need to know the agent's preferences. Accordingly, folk-psychological (and by extension rational choice) explanations always involve three variables (preferences, expectations, and behavior), two of which we require knowledge of to infer or theoretically reduce the third. ROSENBERG, *supra* note 128, at 126-28.

[298] In DANIEL M. HAUSMAN (ED.), THE PHILOSOPHY OF ECONOMICS: AN ANTHOLOGY 43 (2008 3rd ed.).

[299] *See* HAUSMAN, *supra* note 186, at 3.

[300] *Id*.

[301] RESCHER, *supra* note 122, at 197-98.

[302] *Id*. at 197-98.

[303] TALEB, *supra* note 163, at 155.

economist often cites these exogenous factors as excuses, "instead of incorporating these fields into his studies, and accepting that his field does not exist in isolation."[304]

These observations suggest a stark dilemma. On the one hand, if economics is taken to constitute an autonomous science, distinct from the likes of politics, military strategy, epidemiology, geology, etc., it cannot aspire to predictive precision, accuracy, and comprehensiveness, even within its own intended domain of application. Because the economic sphere is not causally closed, economics would need to incorporate all intersecting disciplines to achieve these epistemic ambitions. But on the other hand, complete assimilation is surely a quixotic endeavor. While piecemeal progress may be possible, and select interdisciplinary resources can be called forth on specific occasions, is it really plausible to suppose that comprehensive integration is practicable, especially for cognitively bound beings such as ourselves?[305]

Probably the most promising way of navigating this fork is advanced by the philosopher of science Daniel Hausman, who holds that economics is a "separate but inexact science."[306] It is *separate*, in that it is primarily concerned with causal factors not studied by other scientific disciplines, and which frequently (though do not always) predominate in the economic arena. Yet it is *inexact*, since it ignores causal factors that do often influence wealth-related phenomena, sometimes even when viewed from a bird's eye perspective.[307] Developing Mill's classical view,[308] Hausman argues on such grounds that economic laws are statements of causal tendencies, rather than of universally true generalizations. More precisely, economic laws should be regarded as '*ceteris paribus laws,*' which specify how things would be if certain conditions were met,[309] or whose pronouncements are conditional upon the absence of disturbing factors.[310]

To achieve improvements in predictive power, these ceteris paribus clauses must ultimately be cashed out with a list of specific disturbing causes.[311] However, due to the complexity of the world, and inversely proportionate limitations on the human mind,[312] the factors comprising this vast conjunction cannot be enumerated with anything approaching completeness. The ineliminable vagueness of these ceteris paribus clauses means that economic laws will be forever shackled by predictive limitations.[313] On the basis of such considerations, Hausman ultimately ends up in the camp of the epistemic moderates, along with economists like Samuelson and Varian, and philosophers such as Gibbard and Rescher.

4. Underdetermination and Multiple Equilibria

We have seen that transfer-based Pareto arguments like KS's presuppose an ability to predict the identifying distribution that would have arisen under some alternate legal or policy regime. But

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304 *Id*.

305 In FAIRNESS VERSUS WELFARE, KS appear to embrace the second prong of the dilemma, but without addressing its realistic prospects for success. KAPLOW AND SHAVELL, *supra* note 18, at 462.

306 *See generally* HAUSMAN, *supra* note 186.

307 *Id.* at 95.

308 Mill's views on the methodology of economics are set forth in greatest detail in his A SYSTEM OF LOGIC: RATIOCINATIVE AND INDUCTIVE (1843).

309 HAUSMAN, *supra* note 186, at 129.

310 *Id*. at 133.

311 *Id*. at 133-36.

312 *See* HAYEK, *supra* note 159, SIMON, *supra* note 160.

313 *See* HAUSMAN, *supra* note 186, at 145, 150; ROSENBERG, *supra* note 128, at 113.

such predictions will not be possible whenever application of the appropriate economic or social theories fail to specify a *unique* outcome. One reason this may occur is the theory permits for *multiple equilibria or optima*.[314] This issues arises in several subfields of economics, including general equilibrium theory,[315] which describes how markets in particular commodities integrate to form a unified economy; as well as game theory,[316] which generalizes rational choice theory to situations where individual outcomes depend, at least in part, upon the actions of other players. As a host of legal situations can be modeled as scenarios of this latter variety,[317] game theory has exerted a larger influence on law-and-economics than equilibrium theory; and for that reason, I'll concentrate on some (very elementary) issues that arise therein.

Historically, the central solution concept in game theory has been the *Nash equilibrium*, a stable situation in which none of a game's players can improve her outcome by changing strategies in light of the strategies adopted by the other players. Casual perusal of any game theory textbook[318] reveals that many (and perhaps even most) games possess multiple Nash equilibria.[319] These include pure coordination games,[320] the Stag-Hunt, [321] and the Battle of the Sexes,[322] among some of the most fundamental forms. Because many legal situations are best modeled as such

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314 ELSTER, *supra* note 187, at 7-17.

315 HAUSMAN, *supra* note 186, at 101. For detailed discussion, see KENNETH ARROW AND FRANK HAHN, GENERAL COMPETITIVE ANALYSIS, at *chapters* 9-13 (1971).

316 ELSTER, *supra* note 187, at 9; REISS, *supra* note 260, at 67.

317 *See generally* BAIRD, GERTNER, AND PICKER, *supra* note 149.

318 *E.g.,* KEN BINMORE, PLAYING FOR REAL (2007).

319 REISS, *supra* note 260, at 57.

320 In pure coordination games, each player receives a higher payoff when she adopts the same strategy as other players. In many cases, no strategy is intrinsically superior to others. A classic example is deciding which side of the road to drive on. Everyone prefers to drive on the right if all others do, and similarly for the left. If all players choose 'Right,' then it will be in each player's best interests to remain driving on the right; and if all players choose 'Left,' then it will be in each player's best interests to remain driving on the left. Each arrangement is therefore a Nash equilibrium. Moreover, given the symmetric nature of the payoffs, neither equilibrium is Pareto superior to the other; or even provides any particular player a better outcome. For detailed analysis of coordination conventions, see DAVID LEWIS, CONVENTION (1969).

321 REISS, *supra* note 260, at 58-59. The structure of the Stag Hunt is captured in the following pay-off matrix:

	Strategy A	Strategy B
Strategy A	(3,3)	(0,2)
Strategy B	(2,0)	(1,1)

Both (A,A) and (B,B) are Nash equilibria, as neither player can improve her outcome by deviating from these arrangements. However, unlike in coordination games, one such equilibrium (A,A) is Pareto superior to the other (B,B).

322 REISS, *supra* note 260, at 68-69. The structure of the Battle of the Sexes is captured in the following pay-off matrix:

	Strategy A	Strategy B
Strategy A	(4,2)	(0,0)
Strategy B	(0,0)	(2,4)

As in the Stag Hunt, (A,A) and (B,B) are Nash equilibria. However, neither is Pareto superior to the other, as Player 1 receives a higher pay-off in the former while Player 2 does better in the latter. This difference in individual pay-offs distinguishes the Battle of the Sexes from a pure coordination game.

game types,[323] the unique predictions required by KS's transfer-based Pareto argument will frequently be infeasible.

Multiple equilibria are one instance of 'rational underdetermination,' where a single conception of rationality sanctions multiple, mutually exclusive courses of action.[324] In an effort to avert this indeterminacy, some game theorists have proposed refinements to the Nash equilibrium. To consider one notable example, Thomas Schelling argued that in certain coordination games, agents' expectations will be focused towards arrangements that, although not intrinsically superior to the others, possesses greater psychological salience. Schelling referred to these equilibria as 'focal points'.[325] Unfortunately, because salience is highly subjective and context dependent,[326] the theory of focal points has resisted formalization,[327] and with it broad predictive application. Although numerous more technical refinements[328] to the Nash equilibrium have been proposed to serve as unique solutions for other games, no such refinement enjoys decisive arguments in its favor.[329]

Attempts to eliminate rational underdetermination thus give way to a second problem of 'analysis overdetermination': distinct yet seemingly reasonable conceptions of rationality, as embodied in different solution concepts, prescribe incompatible courses of action.[330] Indeed, this second form of indeterminacy plagues not just the Nash equilibrium's refinements, but the general solution concept itself. A recurrent criticism of game theory—at least when construed as normative account of strategic rationality—is that, in adopting the Nash equilibrium as its core solution concept, the discipline prescribes collectively inferior results in Prisoner's Dilemma games, which are ubiquitous in the social realm. These critics urge that any purported conception of rationality that recommends such absurd results is in need of revision, and offer seemingly reasonable alternative accounts in its place.[331] Taking a step back, game theory is ultimately in the business of considering how strategic situations are to be analyzed, conditional upon the acceptance of certain solution concepts. But it does not possess the resources needed to conclusively adjudicate among alternative solution concepts, which reflect different substantive conceptions of rationality. Such questions are ultimately a matter of philosophical, rather than pure scientific or mathematical, concern.

In light of the twin problems of rational underdetermination and analysis overdetermination,[332] the field of game theory—so frequently employed to model legal regimes[333]—is often incapable

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323 *See* BAIRD, GERTNER, AND PICKER, *supra* note 149, at 35-46.

324 *See* ELSTER, *supra* note 187, at 7-17.

325 THOMAS SHELLING, THE STRATEGY OF CONFLICT (1960).

326 Factors that can contribute to salience include uniqueness, symmetry, simplicity, precedent, conventional priority, and evident fairness. *Id*. at 57.

327 REISS, *supra* note 260, at 68.

328 These include Pareto dominant, risk dominant, subgame perfect, sequential, and trembling hands Nash equilibria. See REISS, *supra* note 260, at 67-73; Don Ross, *Game Theory*, in Edward N. Zalta (ed.), THE STANFORD ENCYCLOPEDIA OF PHILOSOPHY (Fall 2021 Edition), sections 2.5 - 2.8 URL = <https://plato.stanford.edu/archives/fall2021/entries/game-theory/>.

329 *See* REISS, *supra* note 260, at 67-73.

330 *See* RESCHER, *supra* note 122, at 225-28.

331 *See e.g.,* GAUTHIER, *supra* note 155, at ch. 6.

332 Of note, even if there were knock-down arguments in favor of certain solution concepts, for game theory to enjoy empirical predictive and explanatory power, it would still need to be established that real world agents act in accordance with the conception of rationality embodied therein.

333 BAIRD, GERTNER, AND PICKER, *supra* note 149.

of generating the unique predictions required by transfer-based Pareto arguments, like KS's, as well as singular normative prescriptions.

5. Costliness of Evidence

In decision theory, social choice theory, and welfare economics, the outcomes of actions are generally either taken to be known in advance, in which case the (social) decisionmaker faces a 'decision under certainty'; or anticipated with certain (conditional) probabilities, in which case the she faces a 'decision under risk.'[334] Moreover, knowledge of these outcomes or their probabilities is normally regarded as exogenous to the social decision problem itself.[335]

Yet in practice, this knowledge does not fall like manna from heaven. Rather, the sorts of probabilities employed in practical reasoning are almost always derived from some body of evidence,[336] which can be costly to acquire.[337] To ascertain the potential outcomes and probabilities employed in this calculus, (social) decision-makers must frequently expend time and resources (i) gathering information about the state of the system upon which they seek to intervene, (ii) inferring its pertinent laws and regularities, and (iii) applying these laws to its boundary conditions, in light of their own anticipated interventions.

These costs give rise to a second-order problem of *how much* evidence to gather before forming the beliefs that guide one's first-order decision. As the philosopher-social theorist Jon Elster explains:

> Every decision to act can be seen as accompanied by a *shadow decision*—the decision about when to stop collecting information. The rationality of the former decision depends on that of the latter, on which it is founded. It is not possible, however, to give general optimality criteria for the gathering of information.[338]

Indeed, any attempt to do so will generate a vicious regress. Standard economic reasoning suggests that a rational agent should "collect information up to the point where expected marginal value of more evidence equals marginal cost of collecting it."[339] But to ascertain these marginal costs and benefits, the agent must rely on prior beliefs, including about the information gathering process itself. And how does she come to *those* beliefs? Clearly, on the basis of further evidence—thereby reproducing the very same sort of quandary one step removed in the decision tree. Although it is "usually possible to point to some information that it would be irrational not to collect" on coarse intuitive grounds, "and some information that it is obviously pointless to collect," this "rough constraint"[340] still leaves open a wide range of reasonable conduct in the process of evidence gathering.

This iterated rational choice problem thus yields another instance of underdetermination. Since our best accounts of rationality do not dictate exactly how much evidence to collect, different social decision makers could reasonably gather different quantities. But as distinct bodies of evidence will produce diverging predictions of the outcomes of policies, or of their respective

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334 E.g., ADLER, MEASURING SOCIAL WELFARE, *supra* note 11, at 108.
335 *See id.*
336 *See* TIMOTHY WILLIAMSON, KNOWLEDGE AND ITS LIMITS, ch. 9-10 (2000).
337 ELSTER, *supra* note 187, at 15.
338 Jon Elster, *Introduction*, in JON ELSTER (ed.) 14 RATIONAL CHOICE (1986).
339 *Id.*
340 *Id.*

probabilities,[341] we have located yet another ineliminable source of indeterminacy in the predictive enterprise. Once again, without *unique* forecasts of identifying distributions, policymakers will be unable to craft the compensatory payments required by KS's transfer-based Pareto argument.

Even setting aside this indeterminacy, the costliness of evidence poses an arguably more basic problem for KS's argument. KS claim that the social efficiency gains from adopting wealth-maximizing legal rules and policies can always be redistributed through the tax system to make losers better off. However, actual Pareto improvements will not be feasible whenever the transaction costs of these transfers exceed such social efficiency gains. These costs plausibly include, inter alia, the actual costs of administering the tax laws, compliance costs, as well as any "political action costs" of using taxation, rather than alternative legal modalities, to achieve distributive objectives.[342]

A further type of transaction cost are the costs incurring in predicting the outcomes of candidate legal or policy regimes. As Ronald Coase observes in his seminal treatment, transaction costs include a host of "information" and "decision costs."[343] While not hitherto appreciated, '*prediction costs*'[344] should certainly fall within these categories. Moreover, there is reason to suspect that in many cases, such as those involving chaotic economic systems,[345] these prediction costs could (vastly) exceed the social gains reaped from adopting efficient rules/policies. Whenever this is so, KS's transfer-based Pareto argument will fall flat.

6. Free Will

A potentially principled obstacle to prediction in the realm of human affairs is *free will*,[346] when understood in the traditional 'libertarian' sense as freedom from determination by prior events and the laws of nature.[347] Libertarians hold that it is at least sometimes the case that agents could have acted differently than they actually do. Thus, if one were to rewind history's clock and replay past events many times over, the scene would not always unfold in precisely the same manner.

It is clear that such freedom is incompatible with strict folk-psychological laws, including microeconomic laws, which deterministically specify how an individual will behave based upon her mental states and the surrounding circumstances. Nevertheless, as the philosopher Nicholas Rescher observes, free will would not necessarily preclude prediction at the social or macro-economic scale. As in the case of thermodynamics and statistical mechanics in physics, indeterministic behavior among individual particles (or persons) can "cancel out in the . . . aggregate, or get lost in a statistical fog," so that "we can obtain perfectly stable, large-scale aggregate effects."[348] The problem for KS is that their transfer-based Pareto argument generally requires more fine-grained predictions at the level of individual outcomes. To craft the custom transfer payments that would produce Pareto improvements relative a regime of fair legal rules, one needs to know how well off each individual would have been under this (often counterfactual)

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341 This further undermines the 'ex ante Pareto response' discussed *infra* at section II.B.2.
342 Fennell and McAdams, *supra* note 101.
343 R.H. COASE, THE FIRM, THE MARKET, AND THE LAW 6 (1988).
344 Such as those stemming from (i), (ii), (iii) on the prior page.
345 See the final section (10) of this Appendix II.
346 *E.g.,* TALEB, *supra* note 163, at 183-84; O'DRISCOLL, JR AND RIZZO, *supra* note 132, at 69.
347 Libertarianism is frequently contrasted with 'compatibilism,' the view that free will (or at least moral responsibility) is compatible with causal determinism.
348 RESCHER, *supra* note 122, at 147.

baseline. However, the exercise of free will has the potential to foil predictions of these identifying distributions.

Although libertarianism is not an uncontroversial philosophical position, it enjoys prominent historical[349] and contemporary[350] defenders. Perhaps more importantly, it also seems to capture people's intuitive conception of their own freedom. As prominent commentators such as John Rawls and Cass Sunstein have argued, major political and legal institutions should be capable of achieving "overlapping consensus"[351] or "incompletely theorized agreement"[352] among individuals who adhere to distinct but reasonable philosophical perspectives. The fact that KS's argument, which has exerted a major impact on legal scholarship, expressly depends upon the falsity of this commonsensical (and so far unrefuted) philosophical view must count as at least a modest strike against it.

7. Reflexivity

A very important difference between the natural and social sciences is that latter are '*reflexive.*' That is, because beliefs and expectations influence human behavior, "awareness of or belief in social theories may [itself] change people's behavior,"[353] often with significant implications for the predictive enterprise. For once Betty becomes aware that Alice the social scientist has foretold that Betty will act in a certain way, Betty may alter her behavior to either conform to or deviate from Alice's forecast. These second-order effects can result in self-fulfilling or self-refuting prophecies. For instance, a prediction that the stock market will crash may encourage a rash sell-off, which produces just such a precipitous decline; while a prognostication that the symphony concert will sell out may discourage enough people from acquiring tickets that the concert ends up with ample seating.[354]

At first glance, the issues posed by reflexiveness may appear to implicate free will. When Betty learns of Alice's prediction that Betty will opt for X, Betty may exercise her self-perceived freedom and choose Y in an effort to frustrate Alice's presumptuous prognostication. However, this conclusion would be rash, as Betty's choice of Y may not always depend upon her actually possessing libertarian freedom. Indeed, Betty may be fully determined to choose Y upon learning of Alice's prediction.

The independence of these two issues suggests that reflexivity is sometimes a surmountable challenge to prediction. Given (approximate) determinism at the level of individuals, social scientific theories can, in principle, be formulated to take account of their own effects on human behavior,[355] giving rise to an iterative process of refinement that may admit to a limit. Suffice it so say, however, that incorporating these second-order (and third-order, fourth-order, etc.) effects often represents an enormous technical challenge, which places practical limits on the reliability

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[349] IMMANUEL KANT, CRITIQUE OF PURE REASON (1787); Thomas Reid, *Essays on the Active Powers of Man* (1788).

[350] Roderick Chisholm, *Human Freedom and the Self*, in Gary Watson (ed.) FREE WILL (1982); TIMOTHY O'CONNOR, PERSON AND CAUSES (2000); ROBERT KANE, THE SIGNIFICANCE OF FREE WILL (1996); PETER VAN INWAGEN, AN ESSAY ON FREE WILL (1983).

[351] JOHN RAWLS, POLITICAL LIBERALISM (1993).

[352] CASS SUNSTEIN, LEGAL REASONING AND POLITICAL CONFLICT (2018 2nd ed.).

[353] HAUSMAN, *supra* note 186, at 321. Indeed, the mere awareness by an individual or group that it is being studied can lead to changes in its behavior.

[354] For similar examples, see RESCHER, *supra* note 122, at 51.

[355] *Id.* at 51.

and precision of social scientific prediction. Moreover, there is no guarantee that even an iteratively rarified theory will yield asymptotic behavior in all cases.

The issue is far from academic. To consider one historically important case study, the perils of reflexivity were largely to blame for the startling demise of orthodox *Keynesian economics*,[356] perhaps the most influential macroeconomic theory of the twentieth century. While the details of this sordid affair would take us rather far afield, its lessons are readily summarized. Once people learned that the government was setting monetary and fiscal policy on the basis of Keynesian theory, sophisticated actors adjusted their economic behavior to capitalize upon this knowledge. These second-order effects led to significant adverse macroeconomic consequences (e.g., 'stagflation') which disconfirmed Keynesianism—at least as a generally, rather than merely locally, applicable theory.

These second-order responses were not foreseeable by the lights of the original theory, which presumed that agents hold '*adaptive expectations*' of the future based exclusively upon their knowledge of the past.[357] Perhaps adventitiously, the downfall of orthodox Keynesianism eventuated in the development of the '*rational expectations*' approach, which posits that some agents make use of *all* available information, including knowledge of economic and social scientific theories; and that these sophisticated actors are sufficiently numerous to exert tangible influence on the economy.[358] As a consequence, certain variables in Keynesian theory taken to be exogenous turn out to be endogenous. In accounting for this reflexivity, the rational expectations approach plausibly represents a theoretical advancement over its predecessor.[359] At the same time, however, it introduces inordinate modelling complexities, which inevitably rear their heads in attempts at practical application.

8. Technological Novelty

Above, in section (4) of this Appendix, I discussed the implications of the economic domain's lack of closure. One causal factor that exerts a particularly profound influence on economic outcomes is technology. In comparison to many of the disturbing factors alluded to in that prior section, however, the impact of technology is acknowledged at various places within economic theory. For instance, in the theories of the firm and of the household, production functions, which govern the translation of physical inputs and labor into outputs, presume a given state of technological knowledge.[360] But while thereby reflected in the equations of microeconomics, the technological state of play is still an exogeneous variable, which influences but is not itself influenced by economic outcomes. That means that if economics aspires to great predictive power, it must incorporate (or work closely alongside) an established theory of technological development.

The problem for the epistemic optimists is that there is compelling reason to believe that technological innovation—construed in the broadest sense to include all varieties of intellectual novelty and knowledge production—is inherently unforeseeable, at least to some degree. In one of his lesser appreciated masterworks,[361] the philosopher of science Karl Popper argued that if we

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356 JOHN MAYNARD KEYNES, THE GENERAL THEORY OF EMPLOYMENT, INTEREST AND MONEY (1936).
357 ROSENBERG, *supra* note 128, at 76-77.
358 *Id.*
359 *See* Robert E. Lucas Jr. and Thomas J. Sargent, *After Keynesian Macroeconomics*, 3(2) FEDERAL RESERVE BANK OF MINNEAPOLIS QUARTERLY REVIEW 1 (1979).
360 *E.g.,* HAL VARIAN, INTERMEDIATE MICROECONOMICS (2005 7th ed).
361 KARL POPPER, THE POVERTY OF HISTORICISM (1957).

wish to predict the world at some future time, then we need to know the technological state of affairs that will then prevail, since technology exerts all manner of influence on society at large. That would mean, however, that we would need to *be able to ascertain the technologies and knowledge of tomorrow, today*. But manifestly, we cannot: otherwise these epistemic byproducts of human ingenuity *would already exist*. Indeed, an ability to predict tomorrow's technologies would amount to a collapse of present and future knowledge, and would seem to imply the existence of 'free lunches' in which knowledge is created ab initio, or at least without incurring the full costs of its development. Intellectual novelty therefore seems to pose strictly logical limits on the scope of prediction within the realm of human affairs, especially over longer timeframes.

9. Black Swans

The discovery of technology that exerts a pervasive impact on society is but one instance of what Nassim Nicholas Taleb has dubbed a '*black swan*' event. According to Taleb's influential theory,[362] black swans are (i) rare outlier events, which (ii) have extreme impact, yet (iii) are retrospectively, but not prospectively, predictable[363]—that is, only 'retrodictable.' Because "nothing in the past can convincingly point to its possibility," a black swan "lies outside the realm of regular expectations,"[364] and is therefore related to the venerable problem of induction: the problem of deriving universally true generalizations from a finite set of observational data.[365] Despite resisting ex ante prediction, black swans are nevertheless rationalized ex post, and woven it into an overarching narrative that creates the illusion of prospective intelligibility. Our propensity to do so, says Taleb, is explained by the hindsight bias,[366] documented by cognitive psychologists, and the connate "narrative fallacy."[367]

The black swan's features are related, as such an event's pervasive impact is often *attributable to the fact that it is not foreseeable*.[368] Because unanticipated, society is unable to take specific precautions to parry its blow, or channel its reverberations into salutary directions. Black swans most frequently occur in domains where "one single observation can disproportionately impact the aggregate, or total,"[369] rather than in those where "no single instance will significantly change the aggregate" or average, given a large enough sample.[370] Because globalization increases interconnections among nations, industries, and associative schema, many realms of the latter sort have recently been transformed into the former, increasing systemic risk and the potential for black swans to run havoc.[371]

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362 *See* generally, TALEB, *supra* note 163.

363 *Id.* at xxii. The theory is further developed in NASSIM NICOLAS TALEB, ANTIFRAGILE (2012), and some aspects are formalized in NASSIM NICHOLAS TALEB, THE STATISTICAL CONSEQUENCE OF FAT TAILS: REAL WORLD PREASYMPTOTICS, EPISTEMOLOGY AND APPLICATIONS (2020).

364 TALEB, *supra* note 163, at xxii.

365 I*d*. at 40.

366 *See* Baruch Fischoff, *For Those Condemned to the Study the Past, Heuristics and Biases in Hindsight*, in DANIEL KAHNEMAN, PAUL SLOVIC, AND AMOS TVERSKY (eds.), JUDGEMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES 335-51 (1982).

367 TALEB, *supra* note 163, at 63.

368 *Id.* at xxiii-xxiv.

369 *Id.* at 33. Taleb refers to such arenas as "Extremistan."

370 *Id*. at 32. He refers to these as "Mediocristan."

371 *See id.* at 225.

Taleb contends that black swan theory account for a great many aspects of our world, "from the success of ideas and religions, to the dynamics of historical events, to elements of our personal lives."[372] In the face of numerous compelling examples, [373] which complement Taleb's arm chair reasoning, this claim enjoys a good deal of plausibility. The argument thus seeks to deliver a startlingly strong conclusion: since black swans are not foreseeable yet exert pervasive impact, our inability to predict substantially *all* events threatens our ability to predict *in general*,[374] at least across significant time scales.

10. Chaos

In certain structural aspects, the problem of chaos resembles the threat posed by black swans to the predictive enterprise. According to black swan theory, low probability *future events*, which resist *forecasting*, exert wide ranging impact on economic and social systems. In parallel fashion, the mathematical field of *chaos theory* has established that minute variations in *initial conditions*, which resist contemporaneous *measurement,* can result in very large changes in output for systems that exhibit nonlinear dynamics.

This latter phenomenon crisply illustrates the distinction between causal determinism, on the one hand, and epistemic tractability, on the other. A system is deterministic if (and only if) its state at some time, together with the relevant laws of nature, entail the system's state at all future times. From our perspective, however, systems satisfying this criterion can still act *as if* they were indeterministic, in so far as "observationally indistinguishable initial conditions . . . eventuate in different results, irrespective of how sophisticated we make our observations."[375] In other words, whenever small variations in initial conditions that fall below our threshold of discrimination, as determined by prevailing technology, are amplified into observable differences in outcome, a system may be regarded as indeterministic for all practical intents and purposes.

Chaos is a common feature of systems that involve the complex interaction of a large number of causal factors, or which are subject to the influence of many intervening (or disturbing) forces.[376] As our earlier discussion of lack of closure might suggest, many economic and social systems have proven to be chaotic for precisely these reasons, and exhibit marked sensitivity to changes in any of their multitudinous parameters.[377] Unsurprisingly, the resulting volatility and instability exhibited by these systems constitute steep obstacles to prediction.

Furthermore, even where it's possible in principle to make more fine-grained measurements of a system's boundary conditions, and to thereby reduce uncertainty attributable to chaos, it may be incredibly costly to do so. When this is the case, the problems of chaos and the costliness of evidence converge. Indeed, increasing the effective threshold of discrimination can even require the development of novel technologies or scientific theories, in addition to gathering vast sums of empirical data. It seems plausible that, in some contexts, there will even be increasing marginal costs to achieving a given quantum of improvement in measurement resolution. Whenever these

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372 *Id.* at xxii.

373 *Id*. A few of Taleb's examples are the historical ascendancy of Christianity, spread of Islam, outbreak of World War I, rise of the Internet and personal computer, and the September 2001 terrorist attacks.

374 *See id.* at xxiv.

375 RESCHER, *supra* note 122, at 144-45.

376 *Id*. at 197.

377 *Id*.

costs are substantial, as they often are, they can quickly eat away at the efficiency gains that motivate a transfer-based Pareto argument, like KS's.