



Diminished-dimensional political economy

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ABSTRACT

Economists base policy advice on models of responses by a variety of economic entities to policy adoptions. There is compelling evidence that these entities do not optimize as mainstream economics assumes. Rather, they limit decision-making to solving problems of much smaller dimensionality. We consider how political economy goes awry when ignoring diminished dimensionality, and some research avenues opened up by this realization.

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1. Introduction

Political economy refers herein to that broad swath of economic knowledge and scholarship in which public-sector economic actions or decisions are considered, or the impact of an economic or social policy is analyzed. Mainstream political economy relies on the optimization tools of neoclassical economics to characterize both the behavior of households and firms in response to policies, and the optimal choices of public-sector decisions and policies.

Mainstream political economy thus posits that firms and households maximize an objective function that takes as arguments perhaps thousands of relevant variables such as net demands or supplies of vectors of commodities, subject to constraints that may lie in even larger vector spaces. There is compelling evidence (confer Harstad and Selten, 2013) that human decisionmaking does not solve such large-dimensional problems.¹

Whether the behavior can be considered consistent with first-order conditions or not, it is clear that the dimensionality of human decisionmaking is of a far smaller order than neoclassical economics assumes. This evident conclusion points to fallacious reasoning in mainstream political economy. When households and firms behave via a series of decisions that come from dealing (either optimally within its scope, or via some pattern of aspiration formation and adaptation) with fewer variables in any decision, political economy must be re-thought to take this into account.

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¹ In Harstad and Selten (2013), we proposed that optimization models do not accord with human behavior, and bounded-rationality models are needed (despite the added difficulties in competing intellectually). Here we focus on the dimensional size of problems solved behaviorally, and allow for modeling that might or might not treat the smaller problems faced as if being optimized.

Focusing on dimensionality, the current essay indicates, in broad scope and with but preliminary import, the sorts of changes needed. It also lays down a welcome mat to a broad range of research topics, most of them challenging.

2. Evidence

It is true that problems like

$$\max_x U(x_1, x_2, \dots, x_{1000}) \quad \text{s.t.} \quad p_1x_1 + p_2x_2 + \dots + p_{1000}x_{1000} = Y$$

can be represented as

$$\max_{x_1, x_2} V(x_1, x_2) + W(x_3, x_4, \dots, x_{1000}) \quad \text{s.t.} \quad p_1x_1 + p_2x_2 + Z(x_3, x_4, \dots, x_{1000}, p_3, p_4, \dots, p_{1000}) = Y.$$

However, such a formulation implies that, for each pair (x_1, x_2) , the remaining variables are set at their optimal values given prices and income. It maintains the presumption that a change in any price p_j leads to re-optimizing (x_1, x_2) , including possibly changing $Y-Z$. This is not the behavior we see. (Indeed, once the realistic assumption is made that many of the variables in classical optimizations are binary or integer-valued, such problems are NP-complete, that is, not computationally manageable).

2.1. Households

Households tend to segregate purchase decisions into categories, with any optimization only coming within categories. Income and other sources of purchasing power are segregated as to categorical purpose. While neoclassical models suggest that any price or income change or new option or altered perceived quality of a commodity calls for a complete re-optimization, shifting of funds across categories occurs far less frequently.

Several researchers (see, for example, [Collins et al. \(2009\)](#), and references there) have found that households have multiple budget constraints for multiple categories of spending, and often physically segregate segments of cash holdings according to the intended purpose.² Only in rare and extreme occurrences (such as unexpected employment or unemployment or major medical expenses) are funds moved from one segment to another, or used for a different purpose than their physical placement had indicated. [Dupas and Robinson \(2013\)](#) find that funds set aside by Kenyans for emergency medical expenses are not tapped for preventive medical purposes. [Villa et al. \(2010\)](#) discover that the income elasticity of demand for nutrition in East Africa can be essentially zero for some sources of purchasing power, yet near one for other sources.³

Virtually any economic policy will see different responses from households behaving in this way than from *homini economicus*. Many a change in some tax or subsidy program may find responsiveness only in a small-dimensional subset of a household's behaviors.

2.2. Firms

[Selten et al. \(2012\)](#) find that financially incentivized human subjects in an informationally-realistic dynamic-monopoly laboratory setting select a small number of goals, each less encompassing than the expected discounted sum of profits, and pay attention in a single time period to but one of the selected goals, temporarily ignoring others. [Arad and Rubinstein \(2012\)](#) observe a vast number of subjects in a complex, symmetric game that is essentially a multi-market duopoly. All subjects are observed to edit the strategy space into a few dimensions, and then consider these dimensions seriatim. The thinking is completely antithetic to the best-response calculations that would lead to a mixed-strategy equilibrium.

Abundant evidence accords with this conclusion that firms solve problems whose dimensionality is diminished relative to the neoclassical model. The divisions of nearly all corporations work to parcel, if not outright partition, the dimensions of profit maximization across such divisions as production, distribution, marketing, finance, product development. The agendas for meetings of top executives may be logistics, or lobbying, or potential mergers, or assembly-line streamlining, or advertising, etc. Every meeting focuses on a small-dimensional subset of the profit objective, with the remaining dimensions temporarily unattended.

2.3. Legislative bodies

There are, of course, significant differences among the ways various legislative bodies operate, even between nations in the European Union, let alone across continents and ideologies. Yet these differences do not come close to economists'

² Patterns such as some in a purse, more in a kitchen cupboard, emergency funds under a mattress, savings for a particular purpose in a tin can buried in the back yard, are common across cultures and continents.

³ An extensive psychological literature posits that individuals substitute more-easily-solved problems for more difficult ones, often unconsciously (cf. [Kahneman and Frederick, 2002](#)). We are unaware of papers in that literature which [a] give an explicit dimensional structure to the substitution, or [b] assist to structure an econometric analysis.

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