

ultimately does not deliver folk-economic explanations that are both novel and correct. We argue that (a) most current explanations are evolutionary already; (b) B&P's model is as ad hoc as other theories, and proves too much; and (c) it overrates evolution at the cost of discounting other crucial factors.

We applaud Boyer & Petersen (B&P) on the choice of an immensely important and under-researched topic, and consider their article an important contribution to our understanding of the ways in which evolution might be affecting people's attitudes in the realm of economic issues (although arguments over the precise effects of evolution on the human mind are notoriously hard to settle). We are afraid, however, that their model, despite its overall ingenuity, eventually falls short of providing a novel (more "ultimate") and correct explanation of folk-economic beliefs (FEBs), contra B&P's claim. We see three arguments in favor of such a skeptical verdict.

Not too novel. While the evolution-based narrative supporting the FEB's existence may or may not be true (more on that below), it would not be hard to attach a similar or even identical tale to, for example, Caplan's four biases (Caplan 2007). Had Caplan been more specific in discussing the evolutionary roots of folk economics instead of merely asserting it (p. 178), it would be hard to tell his account apart from B&P's. He did not do so, which is why B&P deserve credit, but for going deeper or being complementary rather than going further. This applies to even simpler FEBs' explanations which B&P do not refer to. For example, all of the folk-economic beliefs that B&P discuss (including their lack of influence on individual-level decision-making) can also be explained by people's tendency to consider the more immediate and salient features of a phenomenon and ignore the ones that are more distant and subtle (Arkes 1991; Houdek 2016; Pennycook & Rand 2017). This is the long-established "seen versus unseen" in economics (Bastiat 1850/1995) or more recent WYSIATI (what-you-see-is-all-there-is) in psychology (Kahneman 2011). This tendency may have its evolutionary origins as indeed both Bastiat (1850/1995, para. 1.5) and Kahneman (2011, p. 90) explicitly suggest, but their failure to be as elaborate as B&P in this regard does not render B&P's account more "ultimate."

Proving too much. Although bias-oriented explanations are admittedly ad hoc, as B&P implicitly hint at in section 2.5, their own model is in the end equally malleable to ad hocery. At first, it appears impressive to see any of the FEBs explained away by a meticulously blended cocktail of intuitions (products of inference systems). But on second thought, these ingredients are so powerful in their combination and so flexible in their interpretation that mixing them in a particular way can explain much more than that, including FEBs that are antithetical to the ones actually held by people, or indeed ones that do not exist. For example, by taking the free-rider detection topped up with the ownership intuition while keeping the coalitional psychology sidelined, one could beautifully prove why laypeople (unlike economists) fanatically oppose trade protectionism or the welfare state (which they of course do not).

Incomplete. B&P portray the whole of folk-economics as ultimately an outcome of evolutionarily determined cognitive processes (they do allow for some cultural input to explain subtle variations between different societies). Although the idea that evolution matters (or, at least, may matter) seems absolutely undisputed, we find B&P's account over-rates the role of evolution at the cost of discounting cultural aspects such as education, values (Caplan 2002; Edwards 2006; Houdek et al. 2016), or media (Ribstein 2012). In reality, non-evolutionary factors may mitigate all of the evolutionary influences so eloquently described by B&P, but they may be deliberately produced by particular interest groups within society. If evolution were all there is, it would be hard to square with observed FEBs incidence that varies with:

1. *Time:* Some FEBs are more widely believed now than they used to be. For example, what McCloskey calls "bourgeois era"

was marked by a recession of the many anti-market biases (or by even positive endorsement of alertness to business opportunity, entrepreneurship, and "innovationism"), to which McCloskey attributes the triggering of industrial revolution and the great enrichment (McCloskey 2006; 2010).

2. *Geographic space:* Populations in different countries succumb to different FEBs to different degrees (see, e.g., O'Rourke et al. 2001; Neher 2011; Davidov et al. 2008, also see opinion surveys such as International Social Survey Programme [ISSP] 2006 or World Values Survey [WVS] 2014). In fact, this is true about opinions of economists as well, which vary in important ways across countries (for an overview, see Stastny 2010, pp. 6–23);

3. *Socioeconomic space:* People of different education levels show different degrees of susceptibility to FEBs (e.g., Caplan & Miller 2010).

Insights of many sciences – not only economics – might run against some evolutionary intuitions, but in economics they seem to survive and stick around much more. For example, over the course of evolution, people's folk-physics minds have had every reason to think the Earth was flat, or their folk-biology minds have had every reason to think the world (including humans) was created by divine design (see, e.g., Evans 2001). Yet, natural scientists were able to convince (almost) all of mankind that the Earth is round and was not created within 6 days. However, it may well be that people do find international trade objectionable for evolutionary reasons – but how is it that this is still a predominant belief despite some 250-plus years of economists' trying to enlighten populations in that regard? We are afraid that B&P's model is of limited assistance here, and is actually outperformed by long-existing models that include cultural factors as interacting with cognitive biases without necessarily worrying much about their precise roots (evolutionary or not).

Why do people think that others should earn this or that?

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Abstract: Some questions, such as when a statistical distribution of incomes becomes too unequal, seem highly attention-grabbing, inferentially productive, and morally vexing. Yet many other questions that are crucial to the functioning of a modern economy seem uninteresting non-issues. An evolutionary–psychological framework to study folk-economic beliefs has the potential to illuminate this puzzle.

We commend Boyer & Petersen (B&P) for outlining an evolutionarily and cognitively informed program for studying folk-economic beliefs. Here we consider recent work documenting the folk-economic belief that the current level of economic inequality is too high. This work suggests that people underestimate the actual degree of wealth inequality, prefer less wealth inequality (Arsenio & Willems 2017; Norton & Ariely 2011; Norton et al. 2014), underestimate the actual income gap between CEOs and unskilled workers, and think this gap should be smaller (Kiatpongsan & Norton 2014; see also Davidai & Gilovich 2015; Kraus & Tan 2015). We offer some reflections on the last of these

claims – that people desire a smaller income gap (Kiatpongsan & Norton 2014; henceforth KN) – although similar arguments apply to the rest of this burgeoning literature.

KN's conclusions are based on their analyses of the Social Inequality IV Questionnaire of the International Social Survey Programme (ISSP, 2009). This is a data-set with survey data from 40 countries which includes participants' open-ended responses to, among others, the questions: "How much do you think *X* earns?" (*estimate* question) and "How much do you think *X* should earn?" (*ideal* question), where *X* is "a chairman of a large national corporation" (*CEO*) or "an unskilled worker in a factory" (*worker*). KN found that in all 40 countries the ratio of *ideal* CEO:worker earnings is significantly lower than the ratio of *estimated* CEO:worker earnings.

To see the significance of this finding, consider how an evolved human mind untrained in economics might estimate the salary of a CEO or indicate the ideal salary for a worker. Over human evolutionary history, our ancestors engaged in many cooperative enterprises (e.g., cooperative hunting) that produced surpluses that were then allocated. From an evolutionary perspective, it seems inevitable that we evolved powerful sentiments about how allocations should be made. It seems plausible that the questions in the ISSP questionnaire activate, to some degree, these evolved systems. There is now a large literature on cooperative game behavior, emotions, and their evolutionary logic (e.g., Frank 1988; Hammerstein 2003; Tooby et al. 2008). One plausible evolved system is a set of sentiments that mobilize compassion for the needy (Goetz 2010; Sznycer et al. 2017), and sharing directed at those who have tried to be productive but have suffered bad luck (Kaplan & Hill 1985a; Petersen et al. 2012). In systems of joint production, this compassion is paired with punitive sentiments toward those who free-ride (Delton et al. 2012; Fehr & Gächter 2000). Ancestrally, these games took place among small groups of people, and although there was a range of highly productive people, it is extremely unlikely that anyone was able to be hundreds of times more productive than the average worker, as some can today.

To judge whether an allocation is fair or ideal or objectionable, it seems likely that the human mind evolved to take as input a number of variables (e.g., the need of the least productive, the amount of group benefit contributed by the highly productive). However, in the ISSP data analyzed by KN, workers and CEOs are presented in decontextualized form, so that all of those parameters are unspecified and must be filled in by the subjects. Since we don't know how subjects filled in these parameters, we don't know how to generalize from these results to an enduring construct of people's actual preferences about the real world.

Do people weight relevant information when judging what an ideal earning should be? To find out, we asked people questions about four types of earnings: CEO estimate and ideal, and unskilled worker estimate and ideal. We created two between-subjects conditions. In one condition, the CEO was described as causing a company to increase its yearly profits by \$12,000,000. In the other, the CEO caused an increase in profits of \$500,000. The worker questions were the same in both conditions, and the same as in (a) the ISSP (2009) dataset and (b) the KN (Kiatpongsan & Norton 2014) report based on the ISSP (2009) data. There were 99 participants per condition, recruited with Amazon Mechanical Turk. As predicted, and unsurprisingly, subjects thought the CEO earned and should earn more in the \$12,000,000 condition (medians: estimate: \$1,000,000; ideal: \$500,000) than in the \$500,000 condition (medians: estimate: \$300,000; ideal: \$200,000). Also the ideal CEO:worker earnings ratio was higher in the \$12,000,000 condition (median: 14:1) than in the \$500,000 condition (median: 6:1; Mann-Whitney's U s > 3,082, $ps \leq .019$).

So, yes: Information about productivity calibrates people's judgments of ideal earnings, as would be expected in an ancestral world in which one would have to incentivize the participation of the productive. That estimated and ideal earnings scale with productivity shows that any specific expressed political preference is

not fixed, but a function of input parameters. That estimated and ideal earnings don't scale linearly is interesting, where, ancestrally, much higher productivity than normal would have involved not only greater skill but also unreliable luck.

If perceptions of how much others should earn are shaped by these and other relevant factors, then responses about statistical aggregates stripped of specificity (e.g., "a chairman of a large national corporation") may not translate into stable preferences in specific cases in the real world.

The fact that the ISSP survey asks people how much an unskilled worker and a CEO should earn, and that KN found the responses illuminating, raises the question of just what economic questions are interesting to an evolved human mind. Some questions, like how much others earn or should earn, seem highly attention-grabbing, engaging, inferentially productive, and morally vexing. Others, like how a company should handle its accounting or manage its distribution channels, seem uninteresting non-issues, even though in a modern economy they are every bit as critical as CEO or worker compensation. We believe KN's findings are an important if indirect demonstration of how consistent and compelling folk-economic beliefs can be.

We think the framework sketched by B&P can be productively applied to understanding the epidemiology of this folk-economic belief, and of popular discourse on economics in general.

Do the folk actually hold folk-economic beliefs?

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Abstract: Boyer & Petersen (B&P) argue that folk-economic beliefs are widespread – shaped by evolved cognitive systems – and they offer exemplar beliefs to illustrate their thesis. In this commentary, we highlight evidence of substantial variation in one of these exemplars: beliefs about immigration. Contra claims by B&P, we argue that the balance of this evidence suggests the "folk" may actually hold *positive* beliefs about the economic impact of immigration.

A core feature of folk-economic beliefs (FEBs) according to Boyer & Petersen (B&P) is that they are widespread. There is evidence, however, of substantial variation in several of the exemplar FEBs that they draw upon to illustrate their thesis. For instance, beliefs about the economic impact of immigration vary – sometimes dramatically – as a function of educational attainment and political preference in the United States, Europe, and elsewhere. Furthermore, this evidence suggests that *positive* beliefs about the economic impact of immigration may actually be more prevalent than their negative counterparts, contrary to the exemplar beliefs B&P cite (sect. 2.1) as evidence for their thesis: that immigrants "steal jobs" (FEB 2) and abuse the welfare system (FEB 3).

Figure 1 displays the results of a recent representative survey of the attitudes of British adults (British Social Attitudes; BSA 33, NatCen Social Research 2015). The data reveal substantial variation; the proportion of Britons who believe immigration is "bad" or "very bad" for the economy is almost equal to those who believe that it is "good" or "very good." Similarly, the results of the 2014 European Social Survey reports that 40% of Britons believe immigration is good for the economy, whereas 36% believe it is bad (Ford & Lymperopoulou 2017). Inferential