Mapping economists' belief spaces using survey data

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Abstract

Most survey research on the beliefs of economists has focused on measuring consensus within the profession. There has been less attention to other aspects of the organization of economists' belief systems. This paper shows using representative survey data for the first time that economists' beliefs on an important subset of policy-relevant beliefs are ideologically aligned, despite moderately high levels of agreement on these issues. The analysis does not support the existence of a second dimension of alignment capturing a Keynesian/anti-Keynesian split on macroeconomic stabilization topics. Going beyond these conventional methods, the paper also reports the results of belief network centrality and correlational class analyses, methods motivated by recent developments in cognitive science and cultural sociology. This analysis suggests that beliefs including those relating to inequality and redistribution, the level of government spending, environmental regulation and the minimum wage play a generative role in economists' belief systems. The results also indicate that the main source of heterogeneity in economists belief systems is between ideologically aligned and less ideologically aligned subgroups. There is limited evidence of qualitatively distinct patterns of construals of relations between beliefs. Finally, although the analysis is tentative, I fail to find evidence supporting the hypothesis of a more ideologically aligned belief system in the 1970s.

Under review

1 Introduction

The structure of belief in the economics profession is a question of scholarly, professional and political relevance. A lively debate in conference presentations, editorials and blogs rages over whether economists' views on such issues as fiscal policy and the size of government are "ideological" (Krugman, 2013; Smith, 2013). Others argue that there is widespread agreement on relevant public policy issues and debate whether consensus is beneficial (Mankiw, 2009; Rodrik, 2014). These debates reverberate in the business press (Wessel, 2011; The Economist, 2022). Surveys of the economics profession play a prominent role in this debate. A long history of survey research on professional economists in the United States reports relatively high levels of professional consensus (Kearl et al., 1979; Fuller and Geide-Stevenson, 2003, 2014), which has risen further in the most recent data (Geide-Stevenson and de la Parra Perez, 2021). Similarly, using an open survey of elite economists conducted by the Institute for Global Markets (IGM), Gordon and Dahl (2013) reported high levels of consensus and failed to find any sign of ideological "polarization." However, using the same data Van Gunten et al. (2016) reported that standard statistical techniques could indeed uncover evidence of ideological alignment. To date, however, there are no similar findings using representative survey data.

Research in this area can profit from engagement with the growing literature on formal analysis of belief systems across political science, cognitive science and the sociology of culture (Converse, 1964; Martin, 2000; Poole, 2005; Goldberg, 2011; Dalege et al., 2016; Boutyline and Vaisey, 2017; Boutyline, 2017; DellaPosta, 2020). In this paper, I investigate the structure of opinion in the economics profession using two waves of a representative survey of American economists conducted in 2000 and 2011, supplemented by data from previous survey waves dating back to 1976. I also examine an alternative survey specifically designed to probe the breadth of "free market" beliefs (Klein and Stern, 2007). The results confirm previous research on ideological alignment (Van Gunten et al., 2016) using a survey representative of American Economic Association members: there is a persistent belief dimension across survey waves ranging from consistent "free market" beliefs to those more consistently favorable to state intervention in the economy. In keeping with prior literature, I refer to this dimension as "ideological" because it captures a thematic division also

present in the broader political arena. I validate this interpretation by showing that the ideological salience of beliefs is highly correlated with the partisan gap on the same issues in a survey of political elites. This analysis also explores the possible existence of a second dimension of this belief space. In particular, it is possible that intra-professional disputes within macroeconomics — the debate between Keynesian and alternative perspectives — are partially independent of ideological divisions. However, I fail to find any evidence to support this hypothesis.

In a second set of analyses, I go beyond classic dimension reduction techniques and implement recently introduced methods for belief network analysis. Cultural sociologists (Boutyline, 2017) and cognitive scientists (Dalege et al., 2016, 2017) have recently converged in conceptualizing belief systems as correlation networks. Boutyline (2017) developed a generative model for the formation of beliefs and introduced a method for identifying the most central beliefs in a belief system. I draw on this approach to identify the core beliefs of economists showing, in this case, that dimension-reduction and belief network approaches yield convergent results. Central beliefs can be seen as those that generatively produce (at the individual level) beliefs that align at the aggregate level. In parallel, drawing on theories of culture and cognition (DiMaggio, 1997), sociologists have argued for relaxing the common (unstated) assumption that all members of a population or community structure share a common belief structure (Goldberg, 2011; Boutyline, 2017). On this view, a community may be made up of subgroups who construe the relationships between beliefs differently. To test for this possibility, I conduct a correlational class analysis. Evidence for qualitatively distinct belief structures is limited; rather, the main source of heterogeneity is between relatively 'aligned' and 'unaligned' belief systems. This analysis suggests that between roughly 40% and 75% of economists organize their belief systems in ideologically consistent ways (at least in the sample of beliefs available in the data used here).

Third, I report some tentative findings regarding trends in ideological alignment over time. A commonly held view is that intra-professional contention has declined over time following a period of paradigmatic conflict in macroeconomics between Keynesianism and its competitors during the 1970s (e.g. Blanchard, 2009). Ideally, one could test this view using the earlier 1976 and 1990 surveys to measure trends in ideological alignment over time. Unfortunately, however, respondent-

level data from the 1976 and 1990 survey waves are no longer available,[1] which severely constrains the conclusions that can be drawn from these surveys. Nevertheless, a substantial amount of information is available: Kearl et al. (1979) and Alston et al. (1992) published marginal distributions of responses from these waves, and the observed correlations among beliefs from later (2000 and 2011) surveys provide a baseline for plausible inter-belief correlations in earlier data. These quantities constrain the range of possible values that may be taken by statistics summarizing alignment. An analysis of simulated data based on the known 1976 and 1990 marginal distributions offers no support for the hypothesis of a declining level of ideological alignment; if anything, beliefs were less ideologically aligned in the 1970s than in more recent data. Based on the available survey data, the best assumption is that the level of alignment within economics has remained roughly constant since the 1970s.

The next section briefly introduces prior survey research on economists' belief systems and then reviews the literature on formal analysis of belief systems. After discussing key information about the data and methodological decisions, I then present the main results before concluding.

2 Quantitative methods in the study of beliefs in the economics profession

Until recently, most quantitative research on professional economists' beliefs was survey-based research focused on measuring consensus. Kearl et al. (1979) inaugurated a tradition of survey research on the American economics profession; researchers have repeated modified versions of this survey roughly every decade since (Alston et al., 1992; Fuller and Geide-Stevenson, 2003, 2014; Geide-Stevenson and de la Parra Perez, 2021). Frey et al. (1984) extended this research agenda to several European countries. Kearl and colleagues were motivated by public perceptions of economics as a fractious and divided field, concluding that "the perceptions of widespread disagreement are simply wrong" (Kearl et al., 1979: 36). Analysis of subsequent iterations of this survey report surprisingly high (Fuller and Geide-Stevenson, 2003) and rising (Fuller and Geide-Stevenson, 2014; Geide-Stevenson and de la Parra Perez, 2021) levels of consensus, while Gordon and Dahl (2013:

635) concluded that the IGM survey shows "a remarkably high level of consensus."

Advocates and critics of the profession tend to interpret evidence of consensus differently. Advocates interpret consensus as evidence of the scientific settlement of key economic questions (Lazear, 2000), while some critics see consensus as evidence of a field ideologically committed to free market orthodoxy. For example, a New York Times journalist has written that "it is possible to speak of economists, particularly in the United States in the second half of the twentieth century, as a homogeneous community. Most American economists —and in particular those who were influential in public policy debates —occupied a narrow portion of the ideological spectrum... differences were matters of degree" (Appelbaum, 2019: 16). This perception appears to be widespread.

A more recent tradition qualifies this emphasis on consensus by pointing to the simultaneous existence of an ideological dimension to economists' beliefs. Among survey-based studies, Van Gunten et al. (2016) found evidence of ideological alignment (in a sense clarified below) in the IGM survey, contrary the the claim of Gordon and Dahl (2013) that variation net of consensus was "idiosyncratic." Researchers have also used text analysis to identify latent ideology in published papers and policy documents (Jelveh et al., 2014; Diaf et al., 2022), while Javdani and Chang (2019) found using an experimental approach that economists' evaluations of statements varied depending on whether the source was presented as ideologically similar or different to respondents. Other research has used data on hiring patterns (Terviö, 2011), citation networks (Goyal et al., 2006), petitions (Beyer and Puehringer, 2022) and social relations (Henriksen and Seabrooke, 2020) to identify related social structures within the profession.

Engagement between the literatures on consensus and ideology in the economics profession has been limited. Apart from research just mentioned using the IGM survey, there is no research examining the structure of opinion in the economics profession using survey data, other than research focused on consensus. Consensus is an important aspect of belief systems, but it is not the only aspect. Furthermore, while the IGM survey is a valuable dataset, it reflects a small and non-representative sample, and refers only to a recent time period. The small sample size may preclude identification of secondary dimensions — beyond ideology— in the belief space of professional economists. Furthermore, the sample of beliefs represented in the IGM data has unusual properties

and arguably does not capture a representative sample of beliefs. In contrast, while there is no known method for randomly sampling beliefs, the surveys of the AEA membership were designed to collect opinions on an illustrative sample of beliefs. Moreover, because the survey has been repeated, comparative statements about the structure of the belief system over time are possible.

Thus, this paper contributes to prior literature by exploring the structure of the belief systems of professional economists (beyond consensus) using representative survey data for the first time. In addition to this contribution, I go beyond previous research in several ways. First, I validate the interpretation of the ideological dimension of the belief system by comparing professional economists' responses to data on the same set of beliefs among partisan political elites. Second, I evaluate the evidence for a second dimension of this belief system, in particular a dimension related to intra-professional conflicts over Keynesianism. Third, I leverage the repeated nature of the survey in two ways. I analyze both the 2000 and 2011 surveys in order to assess consistency in the belief structures identified over the span of a decade that includes the 2008 financial crisis, which likely affected professional opinion on some beliefs. Furthermore, while data limitations preclude firm statements about longer run changes, I seek to establish constraints on the possible changes in the structure of professional opinion since the 1970s using a data simulation approach.

Finally, I go beyond the reliance on dimension reduction techniques (such as principal components analysis) used in previous research by adopting network-based methods for analyzing belief systems. These approaches are based on formal models of the structure and formation of belief systems. As argued next, these approaches provide theoretical and methodological refinements that should inform research on the structure of belief systems in the economics profession.

2.1 Formal approaches to belief spaces

The formal analysis of belief systems is commonly traced to the work of Converse (1964: 207), who defined a belief system as "a configuration of ideas and attitudes in which some elements are bound together by some form of constraint or functional dependence" (see also Martin, 2002; DellaPosta, 2020; Boutyline and Vaisey, 2017). In this literature, constraint refers to the overall degree of organization of belief systems. More formally, Martin (2002) conceptualizes constraint

as any departure from complete dispersion or randomness in a set of beliefs held in a population, as measured by entropy. In turn, constraint can be decomposed into two distinct components: consensus, which is the degree to which members of a population tend to agree on any particular belief, and alignment (or "tightness"), which is the association between beliefs. Alignment is a form of constraint in which respondents hold *consistent* beliefs. Although consistency can be subjective, operationally alignment can be understood as the extent to which knowledge of an individual's beliefs on one topic permit prediction of their belief on another topic.

Multidimensional spatial models are a common approach to studying alignment in belief systems.[2] In the study of public opinion and party competition (Poole, 2005; Jost et al., 2009), it is common to conceptualize parties and voters as situated on a single ideological spectrum running from left to right. A common way of measuring such latent dimensions is through data-reduction techniques such as principal components (PCA), factor and multiple correspondence analysis. These techniques seek to identify the latent dimension(s) that account for the largest fraction(s) of variance observed in the set of measured beliefs. For example, in a study of the voting population, beliefs related to the left-right division of political competiton typically account for the largest share of variance (i.e. diversity of opinion). In some cases researchers invoke higher-dimensional political attitude spaces, with a "second dimension" of political competition, representing beliefs on social and moral values rather than economic policy issues (Jost et al., 2009). Similarly, field analysis often adopts a two or three-dimensional model (e.g. Lebaron, 2001).

While research to date on economists' beliefs has focused on the ideological dimension, there is reason to hypothesize that the belief space of professional economics may be two dimensional. The ideological dimension gives prominence to beliefs regarding market regulation, fiscal policy and other topics that are substantively similar to broader political cleavages over the role of the state in the economy. In some respects, this dimension may also capture the divide between Keynesian and anti-Keynesian (e.g. monetarist, supply side and New Classical) beliefs. However, it could also be the case that that belief space of professional economists actually consists of two distinct dimensions. That is, the intra-professional conflicts arising from this Keynesian/ anti-Keynesian division may be orthogonal to the ideological dimension, or at least, less strongly

correlated with the latter than often assumed. This conjecture is motivated by the observation that some self-identified New Keynesian economists are politically conservative and tend to advocate free-market policies.[3] It is logically consistent to simultaneously hold Keynesian beliefs regarding the cyclical stabilization of inflation and economic growth (core topics in the Keynesian/anti-Keynesian divide) and "pro-market" beliefs regarding the long-run size of government, social policy, and environmental regulations. Empirically, if many economists combine "Keynesian" beliefs about short-run stabilization with "free market" beliefs more generally, then there may be a second dimension to the economics belief space.[4]

Dimensional approaches to analyzing belief spaces are useful descriptive methods, and I employ them below. This approach produces a meaningful map of the belief space of some community, such as (in this case) the discipline of economics. However, there are important limitations to these approaches.

First, standard dimension-reduction techniques assume that all members of a population organize their beliefs in a similar fashion. For example, these approaches assume that if there is a connection in a community between beliefs about the need for redistributive policies and beliefs about the proper fiscal stance of government, then this connection exists in the minds of all members of this community. This assumption is inherent in the use of measures of association between beliefs (such as correlation) to infer belief structures, and can give rise to what Martin (2000) has termed the 'associationist paradox.' Partitioning a population into subgroups can lead an apparent belief structure to dissolve because correlations that define subgroup membership disappear when the groups are analyzed separately.

Drawing on theories of cognitive schema, sociologists of culture have argued that subgroups in a community may organize their belief systems in substantively different ways; that is, display heterogeneous schematic organization, or construals of the relations between beliefs (Goldberg, 2011; Boutyline and Vaisey, 2017). For example, DiMaggio and Goldberg (2018) show that in one group of respondents beliefs regarding (for example) profit making and environmental protection are positively correlated, while in another group these beliefs are negatively correlated.

A special case of this heterogeneity in the structure of belief system organization pertains to

individuals situated in the center of a latent belief dimension, such as ideology. Conventional interpretations equate such positions with centrism and moderation; however, such interpretations are ambiguous. In dimension-reduction approaches, individuals might appear in the middle of a belief dimension for one of two reasons. First, respondents might have a tendency to choose the middle category on the scales typically used to measure beliefs in social surveys; this middle category is typically assumed to reflect a combination of uncertainty ("don't know") and indifference ("no opinion"). Second, respondents may have relatively *uncorrelated* belief systems. These are two substantively different interpretations of what it means to sit "in the middle" of a latent belief dimension: in the first case, respondents effectively do not hold opinions on the beliefs in question; in the second, respondents may hold quite strong beliefs but their overall belief systems are relatively unstructured or "unaligned." In this case, the belief structure that appears in the community considered as a whole does not exist in the minds of the centrists. Taken alone, dimension reduction approaches cannot distinguish between these cases. Furthermore, unless this question is answered, interpretation of a latent dimension model risks imputing a cognitive structure present only in the minds of *some* respondents to all members of a community.

Motivated by these considerations, the analysis below implements correlational class analysis (Boutyline and Vaisey, 2017) to answer two questions. First, are there subgroups of professional economists who display substantively distinct construals of the relationships between beliefs? Second, are "centrist" economists primarily those whose belief systems are unconstrained, or are centrists more likely to have qualified beliefs? The latter interpretation arises because, as explained below, the middle category in the data used here reports agreement "with provisos."

A second limitation of latent dimension approaches is that such approaches rest on an unrealistic model of the cognitive process generating beliefs. As Dalege et al. (2016) argue, taken as *causal* models, latent variable models assume that individuals start with a position on a latent variable and derive beliefs from this dimension. This implies, for example, that professional economists hold an intrinsic latent position on the free-market/interventionist spectrum, and choose their beliefs on particular issues in accordance with this ideological preference. Needless to say, this is not a model of the cognitive process that most professional economists are likely to find flattering.

One implication is that change induced in one belief (say, by the introduction of new evidence) cannot change other, related beliefs, because the latter beliefs are fully causally determined by the underlying latent variable. This is an implausible model of the cognitive process.

Motivated by these concerns and others, cognitive scientists and cultural sociologists have recently developed network-based generative models for explaining the emergence of belief structures (Dalege et al., 2016; Boutyline and Vaisey, 2017; Hunzaker and Valentino, 2019). In contrast to the inherently aggregate nature of belief dimensions, these models seek to represent the actual cognitive processes occurring within individuals. In these models, each belief is a node in a network, in which network ties represent connections between beliefs. Boutyline (2017) propose a core-periphery model of belief structure in which central beliefs stochastically generate further beliefs, which in turn iteratively generate further beliefs. For example, a conservative political identity might generate a stance on redistributive policies, which might in turn generate a belief about a specific tax program.[5] Empirically, these authors showed that political identity is a uniquely central belief among a set of 46 political beliefs in the context they studied. Other scholars have used related methods to identify clusters of related beliefs (Dalege et al., 2017; DellaPosta, 2020).

Empirically, belief network analyses are calculated from patterns of association between variables, just as are latent dimensions. This connection suggests that, in certain settings, central beliefs will be those with strong weight on latent dimensions, and the existence of a latent dimension at the aggregate level can be seen as a reflection of an underlying cognitive process as described by belief network models at the individual level. I explore this complementarity between dimension reduction and belief network methods below.

2.2 Analytical strategy

In what follows, I employ multiple analytical methods, including conventional dimension reduction techniques (principal components analysis), belief network centrality, and correlational class analysis to analyze the 2000 and 2011 surveys of the AEA membership. First, I begin with dimension reduction to verify the existence of an ideological dimension in these data and to confirm the interpretation of the dimension, taking advantage of a parallel survey of political elites. Second, these

data also permit more careful consideration of the dimensionality of the belief space. Specifically, I ask whether there is evidence of a two-dimensional belief space, in which more narrowly intra-professional disagreements are orthogonal to the main ideological dimension. Third, I conduct a belief network centrality analysis in order to identify the beliefs which play a generative role in producing the broader belief system, and the relationship of core or central beliefs to ideological alignment. Fourth, I use correlational class analysis to test for heterogeneity in the structure of belief systems.

Fifth and finally, historical trends are an important substantive question, though data limitations constrain the inferences that are possible from extant survey data. As noted in the introduction, a common narrative about the economics profession is that the 1970s was a period of paradigmatic professional conflict followed by subsequent convergence (Blinder, 1988; Mankiw, 1990; Heilbroner and Milberg, 1995; Duarte, 2012; Van Gunten, 2015). For example, Blanchard (2009: 208) wrote that in the 1970s the field of macroeconomics "looked like a battlefield. Researchers split in different directions, mostly ignoring each other, or else engaging in bitter fights and controversies. Over time....there has been a broad convergence in vision." Blinder (1988) described the 1970s as a time in which a dominant Keynesian paradigm was rejected in an "intellectual revolution," but that a resurgent Keynesianism since the 1980s has resolved many apparent tensions with monetarist critics. Heilbroner and Milberg (1995: 92) argue that post–1980s New Classical and New Keynesian schools "have more in common than in conflict," implying a reduction in professional polarization since the 1970s. While data from the 1976 and 1990 surveys are not available to the author, precluding a direct examination of trends over time, I use a data simulation approach described below to establish constraints on the likely direction of change.

3 Data and methods

The primary data source used in this paper is the representative survey of American Economic Association members from 2000 (Fuller and Geide-Stevenson, 2003) and 2011 (Fuller and Geide-Stevenson, 2014). The authors sent surveys to random samples of American Economic Association members, achieving response rates of 31% (2011) and 20% (2014).[6] The majority of respondents

are academics (around 60%), with smaller numbers of respondents in business and government employment. Both surveys ask respondents if they agree, agree "with provisos," or disagree with 44 different propositions. These propositions touch on many economic policy issues ranging from the welfare impact of tariffs to whether the US Federal Reserve can reliably target the money supply. Some propositions were added to and others dropped from the 2011 survey, leaving 33 beliefs measured at both time points. In the analyses reported below, I focus on this constant set of beliefs. I also use published values from a parallel survey sampling delegates at the 2000 Democratic and Republican conventions (Fuller and Geide-Stevenson, 2007). These data permit comparison of the partisan gap on economic issues among political elites and the structure of belief in the economics profession.

Quantitative analysis of belief systems is sensitive to the sample of beliefs represented in available data sources. For example, measurement of consensus depends on the sample of beliefs included in the survey instrument. Because there is no known method for randomly sampling beliefs, all measurement of consensus is strictly relative to the dataset used. The same is true of any attempt to quantify the *amount* of ideological alignment (or alignment on other dimensions) and other properties of the belief system. To address this issue, I also analyze a second survey (Klein and Stern, 2007) explicitly designed to test whether American economists have "free market" beliefs as a benchmark for role of ideology in the primary survey data.

As outlined above, I use a variety of different methodological approaches to analyze these data, including principal components analysis (PCA), belief network centrality, and correlational class analysis.[7] PCA is a standard data-reduction technique related to factor analysis, which can be used to infer latent dimensions from a large set of variables. Belief network centrality (Boutyline and Vaisey, 2017) seeks to determine the most "central" beliefs in the sense discussed above. Given a correlation matrix among beliefs, highly correlated beliefs are "closer" to one another than less correlated beliefs. Conversely, less correlated pairs of beliefs are more distant. The length of a path in this network is the sum of these distances. The shortest path between any pair as beliefs is the path with the smallest value.[8] The authors show analytically that the shortest-path betweenness (Freeman, 1978), a measure of the proportion of shortest paths which flow through a given node,

captures the centrality of beliefs in such a network. Roughly speaking, this metric captures the extent to which beliefs fall on paths through the network; a highly central belief is one that is linked to many other beliefs by chains of correlation. For example, in their data, political identity is strongly correlated with many belief items, while correlations among belief items is generally smaller; therefore, more shortest paths 'flow' though this belief.

Correlational class analysis (CCA) is a related approach which partitions respondents into latent classes or groups that share similar response *patterns* but not necessarily similar *responses* Boutyline and Vaisey (2017). This method is an adaptation of relational class analysis (Goldberg, 2011) with greater reliability. The algorithm first calculates correlations between *respondents*, rather than variables (in other words, correlations between rows of the data matrix rather than columns). The resulting correlation matrix represents the similarity of response patterns between respondents. After removing statistically insignificant correlations to reduce noise, the algorithm uses a community detection method to partition the network into discrete subgroups.[9] Intuitively, community detection seeks to detect clusters of respondents who display similar response patterns, that is, who construe the relations between beliefs in similar ways. Interpretation of these results centers on the number and size of groups, as well as the patterns of correlation within the subgroups identified.

Finally, as already noted, respondent-level datasets from the 1976 and 1990 AEA surveys have unfortunately been lost. To leverage the known marginal distributions from these surveys, I use a method for simulating random ordinal data from a specified marginal distribution and correlation matrix (Ferrari and Barbiero, 2012). For ease of exposition, I describe the assumptions of this analysis and the method used in more detail below.

4 Results

4.1 Ideological structuring of the belief space

I first conduct a principal components analysis of both 2000 and 2011 surveys, using the 33 beliefs included in both datasets.[10] Inspection of the scree plot showing the variance explained by addi-

tional dimensions (supplementary figure A1) strongly suggests that the idea space in both years consists of at most two dimensions. The first dimension explains 31% (2000) to 33% (2011) of variance, the second dimension 7–9% of variance, and additional dimensions about 5% or less. Results are highly consistent across the two available survey waves; the correlation between item loadings across the two years is .97. This result suggests that there was little change in the overall structure of the belief system in the decade that passed between the two surveys, despite the substantial shock of the 2008 financial crisis. In this section I focus analysis first on the first dimension, postponing consideration of a possible second dimension to the next section.

Table 1 summarizes the substantive content of this dimension. The table reports the twelve beliefs with the ten highest loading on the first dimension across both waves.[11] Loadings capture the weight of each belief in the composition in the underlying principal component. Because a agreement with each belief statement is coded as having a positive value, a positive loading indicates that agreement with a belief item is positively associated with the latent dimension.[12] Beliefs including those regarding the level of government spending, environmental regulation and efficiency, inequality and redistribution, and the effects of the minimum wage and capital gains taxation load strongly on this dimension. These items share a common thematic content relating to the outcomes of unregulated markets and the appropriateness of government intervention in the economy. Higher positive loadings on this dimension indicate agreement with "free market" beliefs, while negative values indicate more interventionist positions. For example, agreement with the statement "the level of government spending relative to GDP in the U.S. should be reduced (disregarding expenditures for stabilization)" loads positively on this dimension. In contrast, agreement with the statement "the distribution of income in the U.S. should be more equal" loads negatively. Beliefs with weights closer to zero on this dimension include items relating to trade, population, exchange rates, globalization and inequality, the Phillips curve, and whether fiscal balance should be achieved cyclically. These beliefs largely lack the market and intervention theme invoked by the first set of beliefs.[13] Thus, this first dimension captures the varying beliefs of economists about the role of government in the economy. The term "ideology" is appropriate because this belief spectrum is substantively related to policy issues at stake in the broader political arena.

[Table 1 about here.]

To illustrate the range of variation of respondents' beliefs, it is instructive to review the belief profiles of respondents occupying the poles of this ideological dimension. Table 2 reports the modal response among the 50 respondents at both low (interventionist) and high (free market) ends of the dimension and the percentage within each group who hold this modal response. The table includes the same twelve beliefs as table 1. As expected (given the selection of respondents at the extremes), there is a polarized response pattern among these respondents. For example, large majorities of respondents at the high, "free market" end of the spectrum agree that US government spending should be reduced, that reducing the power of the US Environmental Protection Agency (EPA) would improve economic efficiency, that the minimum wage increases unemployment, and disagree that with the statement that inequality is too high. Large majorities of respondents at the low, "interventionist" end of the spectrum hold the opposite opinions. These results undermine the claim that economists occupy a "narrow range of the ideological spectrum" and that differences are "a matter of degree" (Appelbaum, 2019: 16): these are substantial variations on the fundamental question of the proper role of government intervention in the economy. A key finding, therefore, is that the range of ideological variation observed in survey data is substantial.

[Table 2 about here.]

As additional step to validate this interpretation, I take advantage of a parallel survey of delegates at the 2000 Republican and Democratic party conventions (Fuller and Geide-Stevenson, 2007). I calculate the ideological weight of items in this survey of party elites as the difference between the proportion of Republicans and Democrats agreeing with each belief, and merge this difference with the item loading from the PCA analysis. The correlation between the Republican-Democrat difference and PCA item loading on the ideological dimension is high: around .8 for both years. Thus, beliefs on which the main American political parties have widely divergent positions tend to load strongly on the ideological dimension among economists, while beliefs on which parties differ less have smaller loadings. Scatterplots of the Republican-Democratic difference and PCA item loading (see supplementary figure A2) show that there is a generally linear relationship

between these two variables; the main outliers are a cluster of fiscal policy beliefs that are more controversial among political elites than economists. This strong correlation between the gap between party elites and the dispersion of beliefs among economists further justifies labelling this dimension "ideological."

Previous analysts of these data have often noted that consensus is highest in microeconomics (Kearl et al., 1979; Fuller and Geide-Stevenson, 2003) and lower in macroeconomics. A question that follows naturally from this observation concerns how questions pertaining to different subfields rank in ideological salience. Table 3 shows the distribution of ideological salience (measured by the absolute value of belief loading on the first dimension) across the subfields of macroeconomics, microeconomics, international economics and distributional issues. Overall, the level of ideological salience among macro, micro and distributional items is similar, with beliefs related to international economics displaying the lowest level of salience. In both years, microeconomic propositions have the *highest* ideological salience, followed closely by distributional issues. International economics questions in the survey concern topics such as trade, exchange rates and global population, which are unlikely to invoke the free market/interventionist divide among economists. While the low of ideological salience of international economics beliefs is expected, the similarity of ideological salience across macro, micro and distributional topics is surprising. There is no evidence that ideological salience is concentrated among distributional and macro topics, as some observers might expect.

[Table 3 about here.]

In principle, it would be helpful to quantify the contribution of this ideological dimension to the overall structure of the belief systems of economists. In other words, we wish to answer the question: "how much of the overall constraint in the belief system of the economics profession is explained by ideology?" The variance explained by the first principal component (i.e. the ideological dimension) is one possible metric. A major caveat, however, is that any such metric is dependent on the set of measured beliefs. Any answer to this question is therefore strictly relative. Analysis of data that includes more ideologically salient beliefs should be expected to find that an ideological dimension explains more variation than data including fewer ideologically salient beliefs. With this

in mind, I conducted a PCA of the survey conducted by Klein and Stern (2007), which deliberately samples beliefs expected to invoke free market or interventionist opinions.[14] Beliefs load on the first dimension in this survey in the expected directions; opposition to public school funding, workplace safety regulations, higher minimum wages, environmental regulations and redistribution having the five highest weights. Three beliefs load negatively: opposition to restrictions on immigration and abortion, and support for military spending. In the American political context, these are beliefs in which respondents occupying the "liberal" (in the US sense, i.e. interventionist on economic issues) would be expected to endorse non-interventionist opinions. The Klein survey thus captures a similar ideological dimension, though on some beliefs a partisan, rather than strictly professional, logic appears to prevail. This first dimension captures 49% of variance.

Bearing in mind the caveats just noted, it is useful to compare the variance explained by the first dimension across different surveys of economists. The 31–33% of variance explained by the first dimension lies between the 10–12% of variance in the comparatively "noisy" IGM survey (Van Gunten et al., 2016) and 49% in the ideologically freighted Klein survey data. The roughly 50% of variance explained in the Klein survey can be taken as an estimate of the upper bound on the amount of variance that ideology might be expected to explain among economists in an ideologically loaded set of beliefs. From this perspective, the roughly one third of variance in the AEA survey is substantial. Interpretation of these values must also bear in mind the fact that the AEA survey contains many beliefs not expected to correlate with a free market-inteventionist ideological dimension.[15] Selecting the ten beliefs with the highest loadings and conducting a PCA of these beliefs explains 58% (2000) to 61% (2011) of variance. Thus, among beliefs known to be ideologically salient, the variance explained is about double that in the full sample. Thus, overall, ideology is a strongly structuring principle of in the sample of beliefs measured in the AEA survey.

4.2 Dimensionality of the belief space

As noted above, one question about the belief space of the economics profession is whether debates that map onto broader ideological divisions are also correlated with intra-professional theoretical debates. One important intra-professional debate is between economists adhering to Keynesianism

and those that advocate and monetarist, "New Classical" and other related approaches. These intra-professional conflicts center on issues of monetary and fiscal policy, inflation and macroeconomic stabilization that may be only indirectly related to the issue of state intervention. At a deeper level, these are debates over the nature of macroeconomic equilibrium (de Vroey, 2016). I identified a set of ten beliefs as those most likely to constitute a distinct "Keynesian/anti-Keynesian" dimension; these include beliefs about the Phillips curve, the causes of inflation, the natural rate of unemployment, whether GDP is self-correcting, and the long-run effects of demand shocks on GDP.[16] Among these ten beliefs, only three (the Federal Reserve's mandate, monetary versus fiscal stabilization, and the effects of fiscal stimulus) appear in the top ten most ideologically salient beliefs. It is also striking that beliefs about the Phillips curve — a key dimension of intra-professional contention in the 1970s, and still a relatively low-consensus belief — loads strongly on the second dimension in 2000 (though not in 2011). Thus, on first glance the possibility of a second Keynesian/ anti-Keynesian dimension seems plausible.

However, on closer examination evidence of a second dimension corresponding to a Keynesian-anti-Keynesian divide is weak to non-existent. To test for a second dimension, I examined the loadings of the ten selected beliefs on the second principal component both in the original PCA reported above, and following an oblique rotation of these components.[17] The ranking of beliefs by absolute item loading on the second principal component is shown in table 3; results from the oblique rotation are substantively similar and included in supplementary table A1. In neither case do the ten selected beliefs systematically load strongly on a second dimension. Following oblique rotation, only 3 of the selected beliefs fall in the set of beliefs with the ten highest loadings in 2000 (four in 2011), and many beliefs have low loadings. Examination of scatterplots of item loadings (see supplementary figures A3 and A4) fail to suggest any consistent interpretation of the second dimension.[18]

[Table 4 about here.]

This result is perhaps surprising for those observers, such as Krugman (2009), who see the economics profession (or at least the subfield of macroeconomics) as divided into competing "freshwater" and "saltwater" camps. These labels originate in the intra-professional conflicts of the 1970s,

which focused on debates about monetary and fiscal policy, inflation and the Phillips curve and (at a deeper level) the nature of macroeconomic equilibrium (Hall, 1976; Gordon, 1989). However, the relevant set of beliefs neither appear to be particularly central on the ideological dimension, nor appear to constitute a second independent dimension of the economics belief space. While employment with universities associated with the "freshwater" and "saltwater" labels predicts position in ideological space (Van Gunten et al., 2016) and is associated with hiring patterns (Terviö, 2011) and informal recognition (Henriksen et al., 2022), there is no easily identifiable signal of these intra-professional debates within these survey data.

4.3 Belief networks

I now move from latent dimension approaches to belief networks. As explained above, belief network centrality analysis identifies "core" beliefs, understood as those that play a generative role in producing the belief system. To aid interpretation of this analysis, it is helpful to first visualize the correlation among beliefs as a network, as shown in figure 1 . Line width and shade are both scaled to the strength of (squared) correlation, and values below .2 are removed for visual clarity. Node size is scaled to belief centrality and isolated beliefs (i.e. beliefs with no value above .2) are omitted. The layout algorithm places a set of beliefs including those regarding inequality and redistribution, government spending, regulation and the minimum wage at the center of a large cluster of beliefs. These beliefs also receive the highest centrality scores, as demonstrated below. Thus, this set of beliefs — which notably overlaps with those loading most heavily on the first principal component — form the core of the belief system of the economics profession. This core of beliefs is surrounded by a periphery consisting of derivative beliefs, such as those about capital controls, welfare reform and (in 2000) the gender pay gap. It is also worth highlighting that about 1/3 of beliefs are omitted from the network because they are not strongly correlated with any other belief. These beliefs — which include such topics as exchange rates, global population, and trade — appear incidental to the belief system as a structure of aligned opinion. This may be because there is relatively high consensus on these beliefs and thus relatively little variance that may correlate with core beliefs.

[Figure 1 about here.]

The network visualizations also shed additional light on the status of beliefs related to intra-professional debates, such as those beliefs related to the possible Keynesian/anti-Keynesian divide discussed above. The pattern is most clear in the 2011 data. Alongside the cluster of ideologically central beliefs, the belief system of 2011 respondents appears to include a secondary cluster of beliefs related to macroeconomic equilibrium.[19] This cluster includes beliefs regarding whether GDP is self correcting, whether the economy tends towards a natural rate of unemployment, whether aggregate demand shocks have long run effects, and (less obviously) the monetary causes of inflation. All four of these beliefs are among those identified above as most likely to pertain to a Keynesian/anti-Keynesian split. While there is little evidence that these beliefs constitute a second dimension of the belief structure, there is modest evidence that beliefs on these issues do cluster together, while not correlating highly with the beliefs making up the ideological dimension. However, there is less evidence of this belief cluster in the 2000 data. Future analysis of the most recent AEA survey data may be able to show whether a consistent secondary belief cluster has emerged.

To confirm these visual impressions, figure 2 reports centrality estimates for the measured beliefs along with bootstrap 95% confidence intervals. Confidence intervals report values relative to the most central belief in each survey (absolute values are reported for the point estimate). I focus interpretation on beliefs with a confidence interval excluding zero. This analysis confirms the visual impression that across both waves, the most central beliefs include those already identified as ideologically salient: in particular beliefs about inequality and redistribution, the level of government spending, the minimum wage, and environmental regulation and efficiency. In addition, beliefs about the Federal Reserve's inflation mandate appear central in 2000 (but not 2011) while beliefs about fiscal stimulus achieved a higher centrality in 2011. Beliefs regarding whether GDP is self-correcting are also relatively ideologically salient and central (though the estimate only excludes zero in a 90% confidence interval, not 95%, in 2000.

[Figure 2 about here.]

Because this method is novel, comparison to previous published results using this approach may help contextualize the findings. Boutyline and Vaisey (2017) examined 46 salient beliefs in the US political context (for example, abortion, foreign aid, immigration and welfare spending) as well

as self-reported ideological identity on a liberal-conservative spectrum. Their main finding is that ideological identity is the uniquely central belief in this belief network. The betweenness centrality value (.35) is substantially higher than the most central beliefs identified here, while the range of centralities of other beliefs is generally lower than the centralities found here. This is partially due to dependency of centrality estimates among beliefs: other items are necessarily less central *because* this belief is more central. An important observation is that the AEA survey — and arguably the economics profession itself — lacks an identity variable that might occupy such a uniquely central location within this belief space. In the absence of such a measured identity, it is not surprising that this analysis does not return a single most central belief, but rather a cluster of central beliefs surrounded by a periphery of non-central or derivative beliefs.

These results suggest that beliefs identified as ideologically salient in the principal components analysis reported above play a generative role in shaping economists belief systems. In this sense, the results of the two approaches are complementary. Both approaches assign similar relative weight to each belief, but belief centrality analysis is less linear, selecting a few highly central beliefs as the core of the belief system and down-weighting other beliefs, while conventional PCA assigns more uniformly distributed loadings. In this sense we may conceptualize the most central beliefs as the core of the belief system, which (in the context of a one-dimensional belief system) generatively produces alignment along the ideological dimension.

4.4 Heterogeneity of belief structures

So far, this analysis treats all respondents as occupying different locations within the same belief space. However, as noted above, recent methodological innovations have devised methods for identifying heterogeneous belief structures within a population. To address this possibility, I implement the correlational class analysis (CCA) procedure introduced by Boutyline (2017). As described above, this procedure partitions the sample into latent classes of respondents who share similar understandings of relations between beliefs. Results show three latent classes in 2000 data and two in 2011. Patterns of correlation within these latent classes are illustrated in figures 3 and 4. I begin with interpretation of the 2011 data for ease of exposition.

[Figure 3 about here.]

[Figure 4 about here.]

The basic distinction identified in this analysis is between groups of respondents with relatively highly aligned (i.e. highly correlated) belief systems and those with less aligned belief systems. This pattern is particularly marked in the 2011 data. Around 38% of respondents belong to a group (labeled group 2) exhibiting high levels of correlation between beliefs. Within this group, the mean (absolute) correlation between beliefs is nearly .4, with nearly one third of belief pairs showing correlations above .5. The remaining 62% of respondents show much lower levels of correlation between beliefs. The average correlation in this low-constraint group is .12, with very few correlations above .5. Most correlations above .4 within the low-correlation group correspond to beliefs with a tight logical linkage. For example, the highest overall correlation (.51) is between the belief that US inequality is too high and the belief that redistribution is a legitimate role for government.[20] Based on comparison of the ideology scores from the PCA analysis above to these latent classes (see supplementary figure A6), group 1 disproportionately includes respondents located in the center of the ideology distribution (with a slight lean towards interventionism), while group 2 includes respondents located at the extremes. Thus, the CCA discriminates ideologically 'aligned' responses at the extremes of the distribution from relatively ideologically 'unaligned' responses in the center.

As noted, CCA analysis of the 2000 data returns a more complicated pattern of three groups. Inspection of the ideological location (again reported in supplementary figure A6) shows that group 1 respondents overwhelmingly have ideology scores above zero (relatively free market views), while group 3 respondents overwhelmingly have scores below zero (relatively interventionist views). In other words, group 1 consists of respondents holding centrist-to-free market views, while group 3 consists of respondents holding centrist-to-interventionist views. Patterns of correlation within each group vary. For example, within the "free market" group, beliefs about the monetary causes of inflation are highly correlated with views on the minimum wage, while these views are largely unrelated in groups 2 and 3. The main source of variation is between respondents who hold strictly "free market" views on both beliefs and those whose free market beliefs are qualified (i.e. they agree with provisos) on one dimension. Conversely, for example, within the "interventionist" group

consistency between the belief that inequality is too high and that redistribution is legitimate is very high, while these variables are only moderately correlated in the other two groups. Similarly, beliefs about the Phillips curve are correlated with endorsement of the natural rate of unemployment, which is not the case for the other two groups.

Correlations within groups one and three for the 2000 data are generally weaker than for the "high consistency" group in 2011. However, this is an instance of the "associationist paradox" (Martin, 2000): the reference group matters. By treating these two subsets of respondents separately, correlations resulting from different response patterns *between* groups disappear. Re-pooling groups 1 and 3 (shown in the bottom-right panel of figure 4) reveals that, when respondents located in these latent classes are grouped together, a high-correlation pattern re-emerges. The group structure of the 2000 survey can thus be regarded as nested: there is a basic division between low correlation (group 2) and high correlation (groups 1 and 3) classes, as well as some further distinction between how the beliefs of relatively free market and relatively interventionist respondents distinguish themselves from the center.

As argued above, the meaning of "center" is ambiguous in latent dimension approaches; centrists may be individuals with *qualified* beliefs (i.e. who tend to answer "with provisos" in these data), or they may be individuals with relatively *uncorrelated* belief systems. As just seen, CCA analysis of AEA survey data reveal that the center consists of respondents who have uncorrelated belief systems, compared to those at the extremes. Nevertheless, it is also the case that centrist respondents are more likely to hold qualified beliefs: there are small but statistically significant differences in the frequency of "with provisos" responses across the groups identified by CCA. For example, in the 2011 data the high alignment group of respondents responds "with provisos" to 26% of questions on average, while the lower alignment group responds with provisos to 30% of questions. Thus, while analytically distinct, holding unqualified beliefs and holding aligned beliefs are empirically related in this case. Nonetheless, given the relatively small differences in the average rate of "with provisos" responses across CCA groups, but substantial differences in the average pairwise correlation between groups, it is clear that low alignment is a substantial component of "centrism" in the economics profession.

Thus, the main distinction in the organization of belief systems is between low and high consistency respondents. One useful summary of this result is the percentage of respondents holding "high consistency" views organized in ideologically consistent ways. This varies between 38% in 2011 (group 2) and 75% (groups 1 and 3) in 2000, though these values should be taken as indicative. The key point is that 'centrist' respondents are not simply those predisposed to chose a "middle" option on a questionnaire (in this case, agree "with provisos"); they are respondents with relatively uncorrelated belief systems. There is substantial heterogeneity in the strength of ideological disposition across respondents, and in the 2011 survey only a minority of respondents exhibit an ideologically consistent pattern of beliefs. This is an important qualification of the PCA results reported above: one should not mistake the existence of an ideological pattern among respondents as a whole for evidence of ideological thinking among all respondents. Rather, the key finding is variation in the extent of ideological disposition.

4.5 Long run dynamics of alignment

One conjecture about the dynamics of belief in the economics profession is that the degree of ideological alignment has changed over time. Specifically, as suggested above, there is reason to hypothesize that ideological alignment peaked during the intra-professional conflicts of the 1970s, and has gradually declined since. Unfortunately, this hypothesis cannot be directly tested because the 1976 and 1990 microdata no longer exist. Nevertheless, it may be possible to draw some inferences about change over time, conditional on assumptions. Given that the marginal distributions of variables in these earlier waves are known from previous publications (Kearl et al., 1979; Alston et al., 1992) and that the intra-belief correlation from later years provides a baseline assumption for the structure of correlation between beliefs, it is possible to reconstruct plausible datasets from the missing years. In this final analysis, I simulate 1976 and 1990 data 1000 times based on the observed marginal distributions in these waves and the observed pattern of inter-item correlations in 2000 and 2011. I then conduct a principal components analysis of each simulated dataset and used the variance explained by the first component as a comparative measure of ideological alignment. 14 variables included in the 1976 survey also appear in the 2000 and 2011 surveys, and 22 variables in

the 1990 survey appear in these later surveys. These values constrain the possible values taken by alignment statistics calculated from these simulated data. The algorithm used for data simulation (Ferrari and Barbiero, 2012) updates the initial correlation matrix (i.e. the observed 2000/2011 correlations) for consistency with the specified marginal distributions, generally resulting in correlations that are somewhat larger in absolute value than the observed correlations.[21] I also simulate 2000 and 2011 data based on the marginal distributions and correlation structure from these years for comparison. Simulations of the 2000 and 2011 data reflect the range of alignment values that are consistent with both the marginal distributions and correlation structures in these fully observed datasets; a strict test of change over time is whether 95% intervals overlap.

Before discussing the results, it is important to note that there have been fairly substantial shifts in marginal distributions over time, including on beliefs with high salience on the ideology dimension. Supplementary figure A7 tracks responses for all items for which responses are available for three or four time periods.[22] For example, the percentage of respondents fully agreeing that the minimum wage increases unemployment for young and unskilled workers has declined from 68% in 1976 to 39% in 2011. Similarly, unqualified agreement with the belief in the efficacy of fiscal stimulus declined from 65% to 40% in 2000 before rebounding in 2011. Beliefs regarding regulatory inefficiency also saw a substantial change, though this may be attributable to a substantial change in the question wording.[23] Given these changes in marginal distributions, there is scope for substantial changes in the level of alignment as well.

Figure 5 reports the results of the simulated data analysis. The main finding from this analysis is that, contrary to the hypothesis of declining alignment over time, in simulated 1976 data the amount of variation explained by the ideological dimension is *smaller* rather than larger than in 2000/2011, and in simulated 1990 data the amount of variation is virtually identical. The figures show the distribution of variance explained by the first principal component in 1000 iterations of simulation procedure above, as well as the variance explained in the observed 2000 and 2011 data. In each panel, the horizontal line represents the variance explained by the first principal component in the observed data, the red-shaded distribution represents the variance explained by the first dimension in simulated historical data, and the blue-shaded distribution represents for

comparison the variance explained in simulated 2000/2011 data. In all cases, the distributions overlap substantially.

[Figure 5 about here.]

The largest difference observed is in simulated 1976 data based on the 2011 correlation structure; this is expected as this is the largest gap in time. Among this set of 14 variables, the first dimension explains about 38% of variance (a somewhat higher proportion than in the full sample of 33 beliefs reported above). Simulation of the 2011 data induces a range of explained variance between about 36% and 41%. The simulated 1976 data explains on average a lower proportion of variance (about 36%) and the 95% interval (35%, 38%) excludes the observed value for 2011. However, as the range of variation in both simulations shows, we can have little statistical confidence that the amount of variance explained in 1976 data is in fact lower than in 2011. What this does establish, however, is that the pattern most consistent with these data is that the first dimension explained a similar or lesser, but not greater amount of variance in 1976 as compared with 2011. Stated in more substantive terms, this evidence suggests that the economics profession was similarly (or slightly less) ideologically aligned in the 1970s compared to more recent years, contrary to the hypothesis outlined above. Similar conclusions follow from the simulation of 1976 data based on the 2000 correlation structure. The variance explained in simulated 1990 data is slightly higher than in the PCA based on observed 2011 correlations, but the difference is very small and statistically uncertain.

While acknowledging that this analysis is necessarily dependent on assumptions, the key implication is that there is little evidence that opinion in the economics profession was more polarized in the 1970s than it is in more recent data. This is surprising relative to the commonly held view that professional conflict in the mid–1970s was likely to be associated with a strong alignment of views across beliefs. There are two main ways one could hypothesize that the economics profession was more ideologically polarized in the 1970s (or 1990) compared to the 2000s despite the analysis presented here: either the sample of beliefs available in the 1976 and 2000/2011 surveys is inadequate to capture the debates prevailing in the 1970s, or beliefs must have been substantially more correlated than in more recent data. Regarding the first point, this hypothesis requires specifying

the particular beliefs that would induce more alignment in earlier data. The results of all analyses presented here suggest that adding a small number of additional beliefs to the dataset is unlikely to change this result substantially. Regarding the second, exploratory attempts to test correlation structures in which the inter-belief correlation was systematically higher in the 1970s compared with more recent data failed because it is often impossible to construct such a correlation matrix which is both consistent with the observed marginal distributions, in which all correlations are mutually consistent. These considerations suggest that evidence of stronger alignment in the past is unlikely to surface.

5 Conclusion

This paper has examined the structure of beliefs in the economics profession using representative surveys of the American Economics Association membership. This research confirms previous findings that a substantial degree of ideological alignment co-exists with relatively high degrees of agreement in the economics field. Beyond this, I fail to find evidence of a consistent dimension of alignment representing a Keynesian/anti-Keynesian divide within the field. New methods based on belief network models are largely consistent; a belief network centrality analysis suggests that beliefs regarding inequality and redistribution, the level of government spending, and regulation and economic efficiency are at the core of a generative cognitive process producing the belief system. The analysis also suggests that between 40% and 75% of respondents have ideologically consistent views. Finally, the limited available data suggests that the level of ideological alignment has been largely unchanged since the 1970s.

These results matter because the economics discipline has a level of public exposure that gives it the opportunity to shape public opinion and political orthodoxy (Hirschman and Berman, 2014), as well as institutionalized channels of direct policy influence through central banks, high level executive advisory committees such as the Council of Economic Advisers in the US and international organizations like the International Monetary Fund. As noted in the introduction, survey research on professional consensus has featured prominently in the mainstream business press. Hopefully, journalists and others reporting on prominent surveys and publications regarding

consensus in economics will include discussion of ideological alignment as well.

The findings of this paper do not imply that economists are uniformly ideological. Rather, the analysis reveals variation in ideological salience across beliefs and in ideological disposition across respondents. Consumers of economic expertise — politicians, policy-makers, journalists and the voting public — can make use of this variation as they evaluate the policy advice of economists. A policymaker seeking advice on the probable effects of a minimum wage increase, for example, might want to take into account the evidence that opinion on the causal effects of minimum wage on unemployment are often correlated with ideology. Similarly, policymakers seeking an "honest broker" (Pielke, 2007) — frank advice on the likely causal effects of policies — might deliberately choose policy advisers whose beliefs display a low level of ideological disposition (that is, are relatively uncorrelated). In other instances, such as in constructing a general outline of economic policy, politicians might prefer an adviser whose ideological alignments coincide with their own. One (admittedly somewhat fanciful) possibility is that consumers of policy advice could ask prospective economic advisors to complete the AEA survey questionnaire, add these responses to the available data for comparison, and reproduce some or all of the analyses reported here in order to contextualize the adviser's views. Seen this way, the analyses reported here constitute a kind of meta-expertise (Collins and Evans, 2007) which provides a hopefully useful context for interpreting the advice of economic policy advisers.

Notes

[1]Personal communication with Doris Geide-Stevenson.

[2]An alternative approach is to model pairwise correlations; see (Baldassarri and Gelman, 2008).

[3]For example, Greg Mankiw and John Taylor are both prominently associated with the "New Keynesian" movement and active in the US Republican party.

[4]Consider the difference between the belief that the minimum wage increases unemployment among low wage worker, and belief in the Phillips curve. Both are emipirical, rather than normative beliefs. But the former belief resonates more strongly with ideological dispositions towards the "free market" than the latter. Nonetheless, the Phillips curve was central to intra-professional conflicts over Keynesianism. The beliefs that figured prominently in these conflicts vary in the extent to which the resonate with the ideological dimension, but the point is that — in pirinciple — these may could consitute separate dimensions. Whether or not this is the case is an empirical question.

[5]This formulation shares some features with the latent variable model, insofar as an underlying belief generates observed Beliefs. HOWEVER...

[6]While these response rates are somewhat low relative to major population-wide surveys, these remain the only survey data that attempted to randomly sample the AEA membership. Non-academic economists appear to be slightly over-represented compared to the AEA membership. Unfortunately, absent an external source of information

on the AEA membership that could be matched to attributes of survey respondents, there is no way to assess the implications of non-response.

[7]Because these methods require complete data, I retain only respondents who maintained a 60% response rate across belief items (which reduces the sample size by five cases for 2000 and three cases for 2011) and impute the modal response for the remaining missing data. The highest rate of nonresponse for any single item is 6%. Because responses take the form of a reduced, three-category Likert-like scale i.e. agree/agree with provisos/disagree) I use polychoric correlations where appropriate in all analyses.

[8]To be precise, these measures are calculated on 1/r squared, where r is the correlation matrix.

[9]I conduct this procedure using the functions implemented in the R package 'corclass' (Boutyline, 2020), modified to accommodate polychoric correlations.

[10]Alternative factoring methods including principal factor and maximum likelihood approaches yield nearly identical results.

[11]That is, there are twelve total beliefs because of change in which beliefs rank in the top ten across the two surveys.

[12]For ease of interpretation, responses are coded so that "agree" equals 1, "disagree" equals –1, and "agree with provisos" equals zero.

[13]Some of these beliefs might appear to have ideological content, but are either less ideologically freighted among economists than among the general public (e.g. trade), or questions are worded in a way that avoids invoking ideology.

[14]The authors explicitly designed this survey to measure whether economists have "free market" beliefs from a libertarian perspective.

[15]For example, questions on pollution and some aspects of trade do not have obvious ideological salience.

[16]I do not assume that these items relate to a Keynesian/anti-Keynesian dimension, but rather ask empirically whether there is any evidence of a coherent belief structure among the set of available items that seem most likely to capture such a dimension.

[17]Because the interfactor correlation following oblique rotation is moderate (around .33), the stronger assumption of an orthogonal rotation is not justified.

[18]It is also worth noting that a second dimension explains only 7–9% of variance across the two years.

[19]In addition to the visual appearance of clustering, community detection using the walktrap algorithm identifies the two-cluster division shown in figure 3. On clusters in belief networks, see della Posta (2020) and Dalege et. al.

[20]While one may in principle believe that inequality is too high but that redistribution is not a legitimate role for government, these beliefs are logically linked a way that, for example, beliefs about the efficiency effects of environmental regulation and the employment effects of the minimum wage are not.

[21]Another assumption of this exercise is that differences in sampling criteria are not relevant. Different survey waves have used different sampling criteria, and Fuller and Geide-Stevenson (2003) removed a stratum of evolutionary economists from the 1990 survey.

[22]Interpretation of these changes should bear in mind that the 1976 survey relied on a stratified sampling design.

[23]The 1979 question asks whether eliminating the Interstate Commerce Commission and (now defucnt) Civil Aeronautics Board would improve economic efficiency; since 1990 the survey refers to the Environmental Protection Agency. Changes thus may reflect different opinions about the particular agencies and regulatory spheres in question, rather than regulation and efficiency in general. Indeed, these beliefs are sufficiently different that pooling them for analysis must be treated with caution. Pooling is justified here because I am most interested in the correlation of these beliefs with other items, but this is still a source of uncertainty in the analysis.

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Table 1: Highest loading beliefs from PCA analysis

Capsule	Proposition	2000 rank	2011 rank	2000 weight	2011 weight
US spending	The level of government spending relative to GDP in the U.S. should be reduced (disregarding expenditures for stabilization).	1	3	0.83	0.79
Regulatory inefficiency	Reducing the regulatory power of the Environmental Protection Agency (EPA) would improve the efficiency of the U.S. economy.	2	1	0.76	0.83
Minimum wage	A minimum wage increases unemployment among young and unskilled workers	3	7	0.76	0.74
Inequality too high	The distribution of income in the U.S. should be more equal.	4	2	-0.75	-0.82
Capital gains	Reducing the tax rate on income from capital gains would encourage investment and promote economic growth.	5	4	0.74	0.76
Redistribution	Redistribution of income is a legitimate role for the U.S. Government.	6	5	-0.73	-0.76
Tax incentive	Lower marginal income tax rates increase the time spent at work and reduce time at leisure.	7	9	0.72	0.69
Welfare reform	Welfare reforms which place time limits on public assistance have increased the general well-being of society.	8	12	0.69	0.67
Fed inflation	The Federal Reserve should focus on a low rate of inflation rather than other goals such as employment, economic growth, or asset bubbles.	9	8	0.69	0.71
Monetary or fiscal	Management of the business cycle should be left to the Federal Reserve; activist fiscal policies should be avoided.	10	13	0.69	0.66
Fiscal stimulus	Fiscal policy (e.g. tax cut and/or expenditure increase) has a significant stimulative impact on a less than fully employed economy.	16	10	-0.55	-0.68
Inequality effects	The distribution of income and wealth has little, if any, impact on economic stability and growth.	20	6	0.49	0.75

Table 2: Modal response among high and low scoring respondents

	2000				2011			
Capsule	Low	(%)	High	(%)	Low	(%)	High	(%)
US spending	Disagree	96	Agree	94	Disagree	94	Agree	98
Regulatory inefficiency	Disagree	94	Agree	66	Disagree	100	Agree	90
Minimum wage	Disagree	74	Agree	94	Disagree	84	Agree	100
Inequality too high	Agree	84	Disagree	80	Agree	94	Disagree	92
Capital gains	Disagree	76	Agree	78	Disagree	94	Agree	84
Redistribution	Agree	94	Disagree	74	Agree	96	Disagree	86
Tax incentive	Disagree	86	Agree	68	Disagree	92	Agree	80
Welfare reform	Disagree	62	Agree	78	Disagree	80	Agree	86
Fed inflation	Disagree	76	Agree	92	Disagree	96	Agree	78
Monetary or fiscal	Disagree	64	Agree	90	Disagree	92	Agree	52
Fiscal stimulus	Agree	68	Disagree	44	Agree	88	Disagree	80
Inequality effects	Disagree	78	Agree	42	Disagree	100	Agree	50

Note: Table shows the modal response among the 50 respondents at the lowest (interventionist) and highest (free market) ends of the ideological spectrum (total N = 100). Percentages indicate the percentage of respondents among these 50 who give the modal response.

Table 3: Ideological salience of beliefs by subfield

Subfield	Mean	Median	Standard Deviation
2000 survey			
Distribution	0.51	0.59	0.28
International	0.40	0.41	0.19
Macro	0.50	0.55	0.23
Micro	0.65	0.69	0.11
2011 survey			
Distribution	0.63	0.71	0.20
International	0.35	0.37	0.20
Macro	0.55	0.58	0.19
Micro	0.64	0.67	0.20

Table 4: Loadings of possible Keynesian-anti Keynesian beliefs on second dimension

Caption	Proposition	2000 rank	2011 rank
Fed inflation	The Federal Reserve should focus on a low rate of inflation rather than other goals such as employment, economic growth, or asset bubbles.	27	28
Monetary or fiscal	Management of the business cycle should be left to the Federal Reserve; activist fiscal policies should be avoided.	29	29
GDP self correcting	An economy that operates below potential GDP has a self correcting mechanism that will eventually return it to potential GDP.	19	12
Quantity theory	Inflation is caused primarily by too much growth in the money supply?	13	8
Fiscal stimulus	Fiscal policy (e.g. tax cut and/or expenditure increase) has a significant stimulative impact on a less than fully employed economy.	6	9
Aggregate demand	Changes in aggregate demand affect real GDP in the short run but not in the long run.	8	6
Fed money growth	The Federal Reserve has the capacity to achieve a constant rate of growth in the money supply if it so desired.	14	14
Natural rate	There is a natural rate of unemployment to which the economy tends in the long run	9	5
Fiscal policy growth	Appropriately designed fiscal policy can increase the long-run rate of capital formation and economic growth.	5	16
Phillips curve	In the short run, a reduction in unemployment causes the rate of inflation to increase.	1	11

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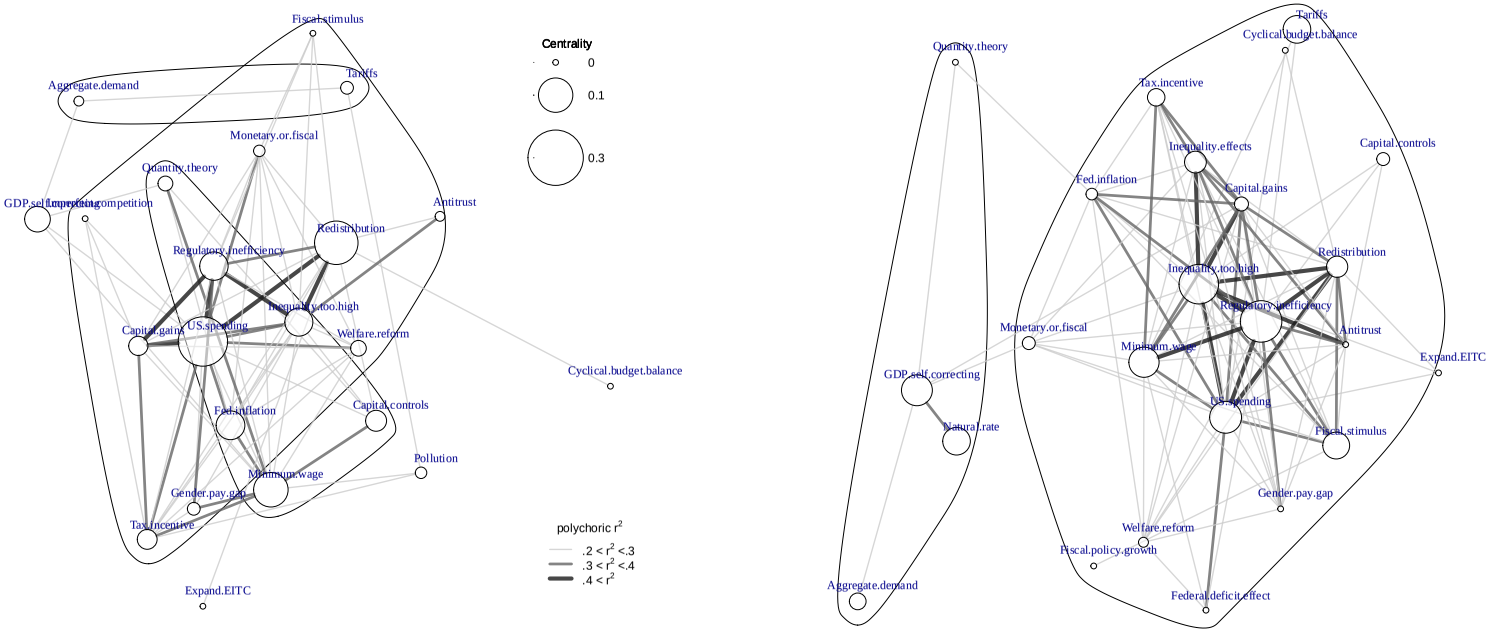
Figure 1: Belief networks in AEA survey (new plots, side by side)

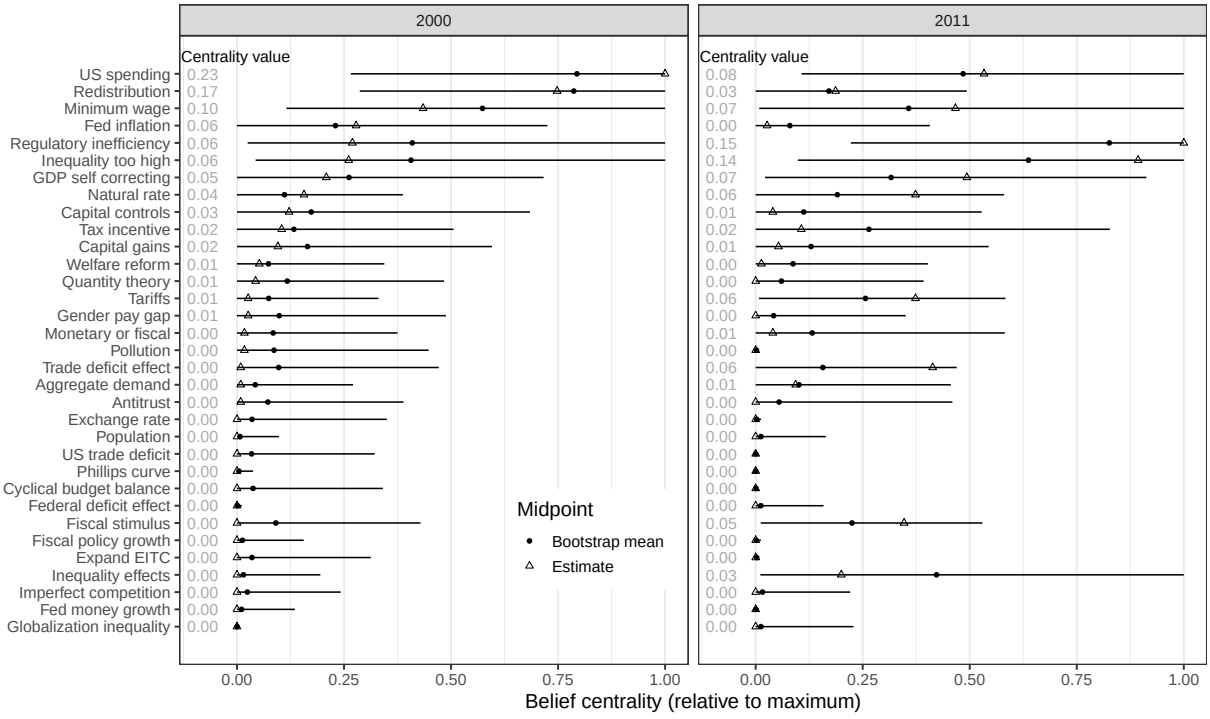


(a) 2000

(b) 2011

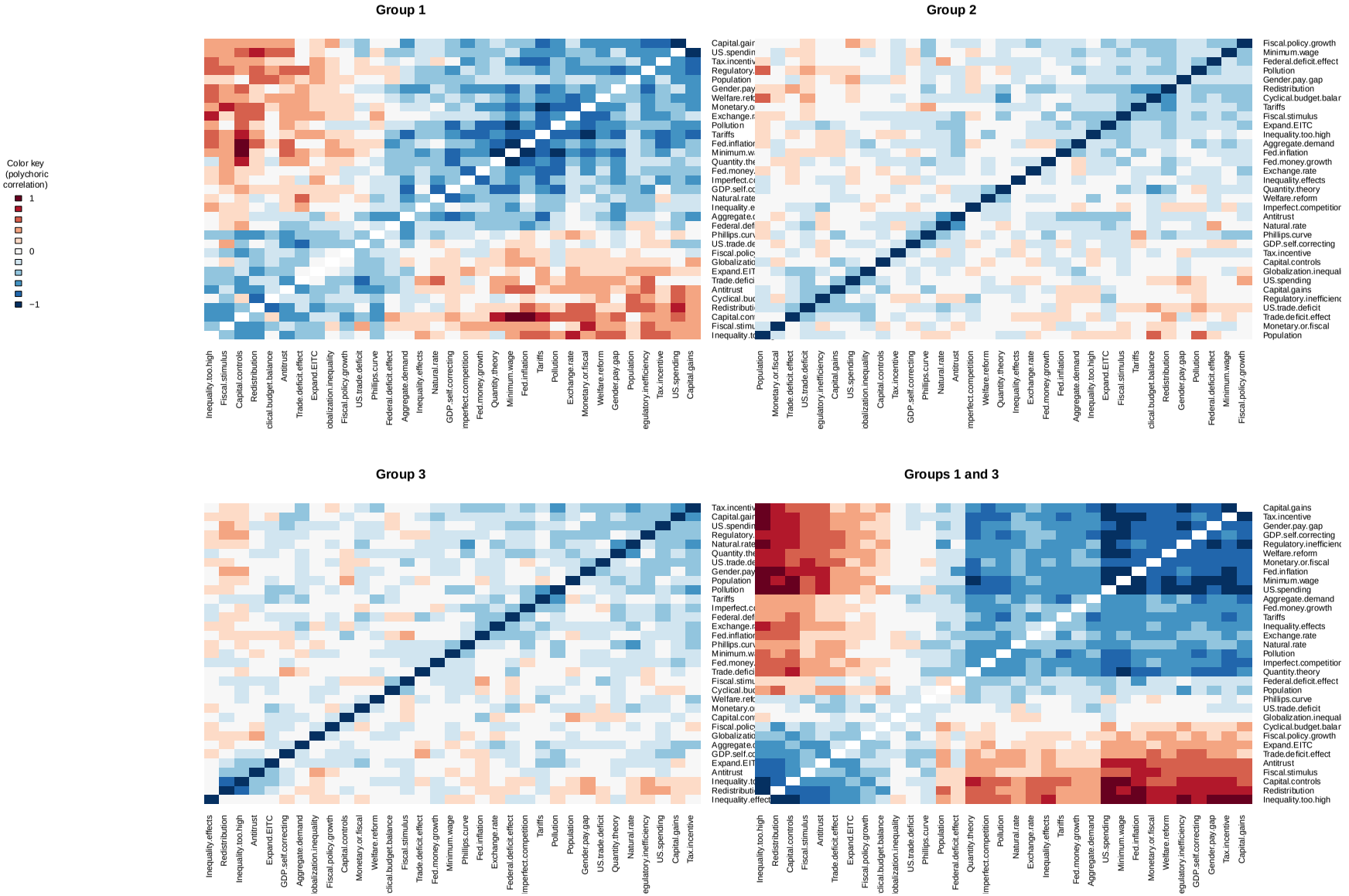
Figures show belief correlation networks based on AEA survey data for 2000 and 2011. Line shade and thickness are scaled to tie strength is given by the squared (polychoric) correlation between beliefs. Node size is scaled to betweenness centrality (see main text). Circled areas are belief clusters identified by the walktrap community detection algorithm (subgroups consisting of one belief are omitted)

Figure 2: Belief network centrality in AEA survey data



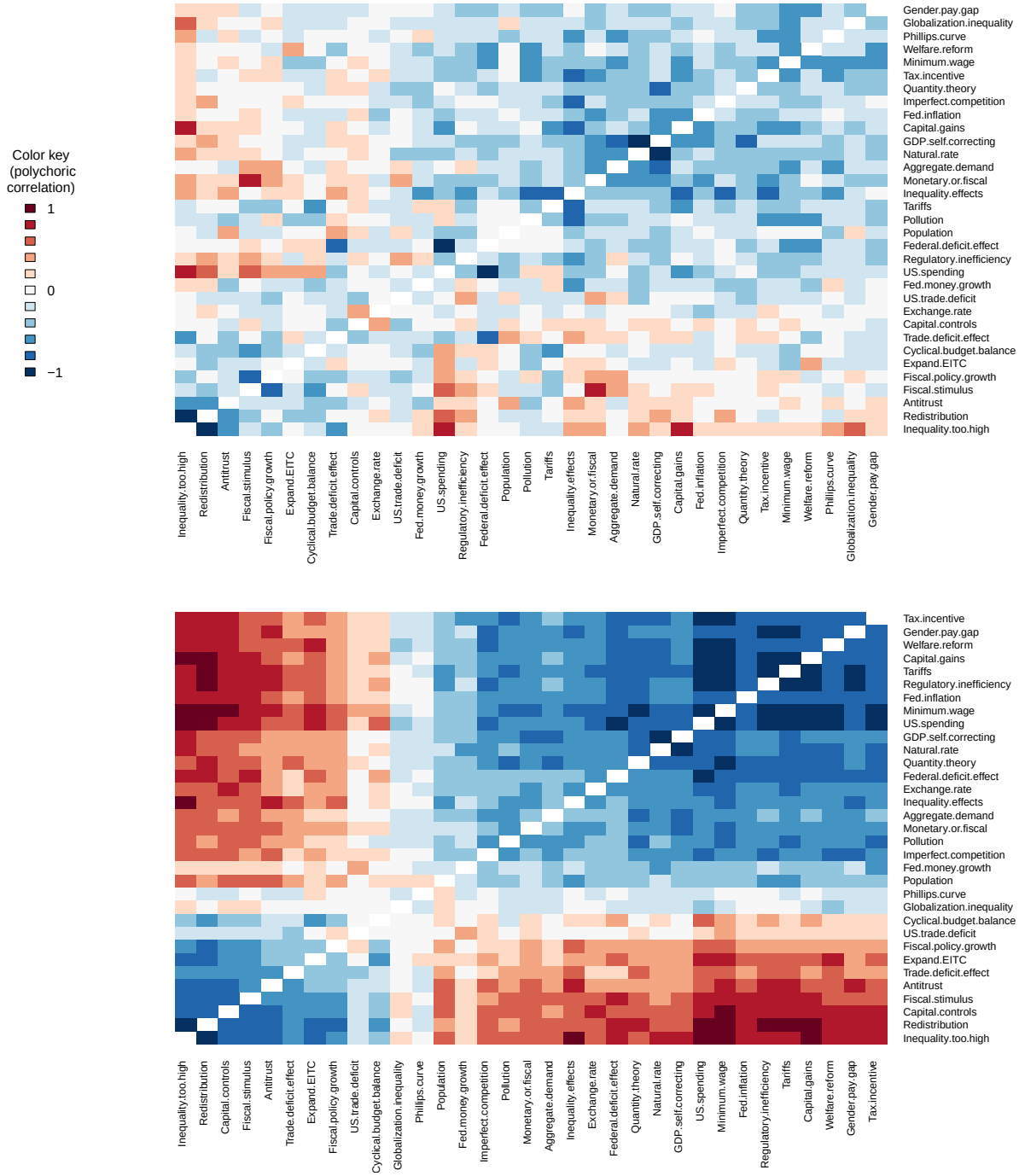
Note: See main text for explanation

Figure 3: Correlational class analysis of 2000 survey



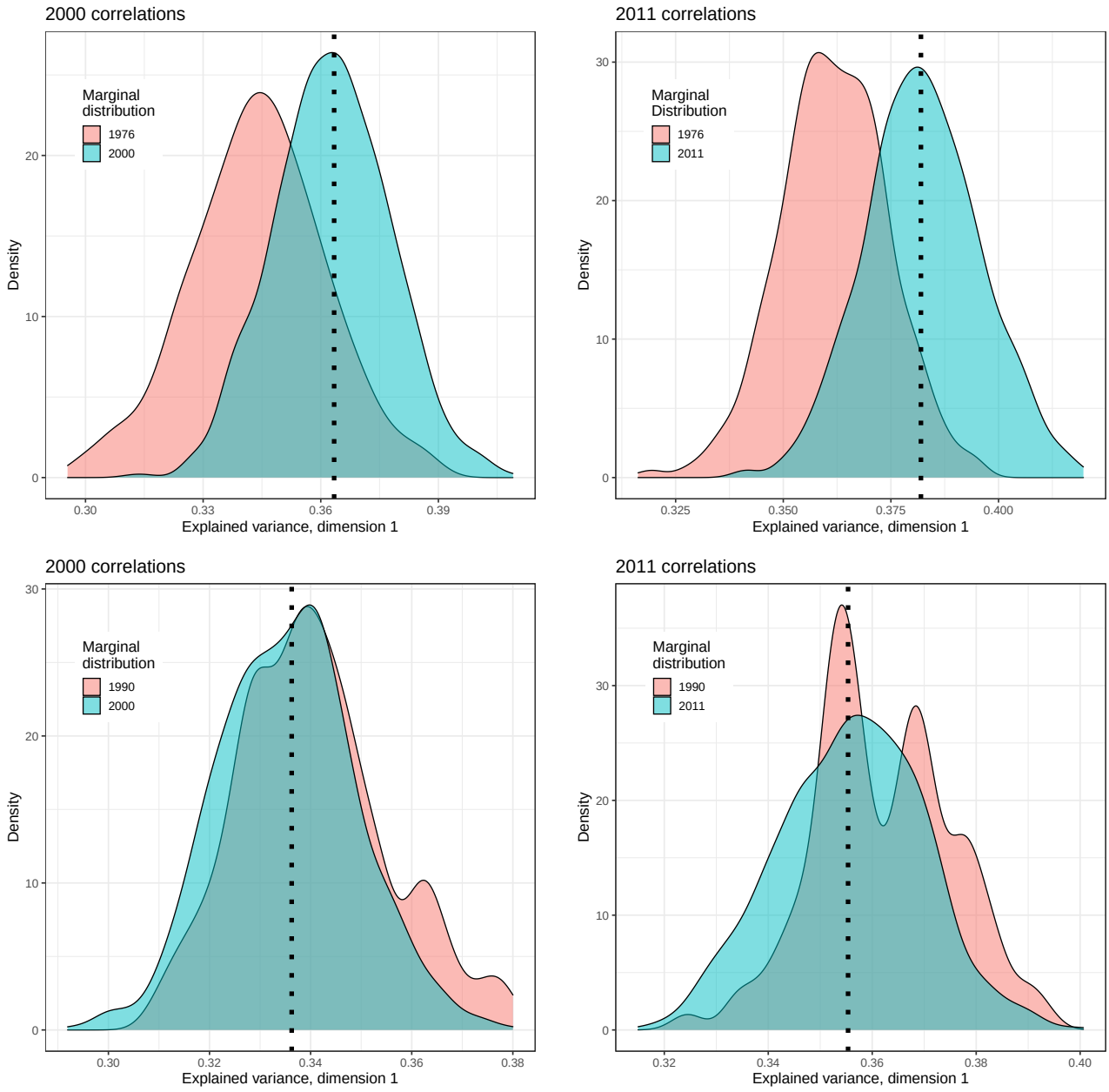
Note: See main text for explanation

Figure 4: Correlational class analysis of 2011 survey



Note: See main text for explanation.

Figure 5: Variance explained by first PC in simulated data



Note: see main text for explanation.