Behavioral Economics: Economics as a Psychological Discipline

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1. Introduction

Behavioral economics is a relatively new field of economics that attempts to incorporate insights from psychology into economic models and analyses. The field has grown rapidly over the last decade and has produced a large amount of both theoretical and empirical research. The goal for this chapter is to review recent empirical findings in behavioral economics in order to provide the reader with a broad sense for where psychology has begun to permeate the economic discipline.

It is worth starting, however, with a quick review of what economics is and why incorporating psychology is a relatively recent phenomenon. Like psychologists, most economists study how individuals behave and interact. However, where psychologists are often interested in understanding the deep underpinnings of those behaviors at the level of the individual or social group, the primary interest in economics is usually in understanding how behavior and interactions play out in a system to shape economic outcomes. Economists are interested in system-level outcomes, such as the level and path of wages, the effect of taxes on economic output, how rates of savings respond to interest rates, and so on. Those economic outcomes, of course, depend on complex interactions of individuals. Economists have traditionally made traction on understanding these complex economic outcomes by developing mathematical models that allow them to map out and quantify economic dynamics. Most of these economic models are grounded in a utility framework (see Stigler (1950) for a history of Utility Theory) that assumes individuals' preferences can be represented by a "utility function" that maps consumption of goods and services to levels of "utility" (i.e., happiness, satisfaction). Since the utility of an economic agent cannot be directly measured, economists developed a set of relatively simple assumptions about individual rationality that, if true, often allow economists to understand individual utility by observing the choices people make in economic environments. Utility theory (and subsequently expected utility theory (von Neumann and Morgenstern, 1944)) has proven to be a powerful and unifying theory in economics. In part due to these simplifying assumptions about individual rationality, utility theory is able to make refutable predictions about individual behavior in various settings and can also be used to estimate the welfare impacts of policies and market designs.

The importance of utility theory and the assumption of individual rationality are not confined to economic theorists alone. Empirical economists also rely heavily on these underlying models. Empirical economists use either experimental or statistical methods (known as "econometrics") to test and evaluate predictions from economic models. For example, an economic model may predict that as the price of a good increases, individuals will buy less of that good. An

empirical economist using econometric techniques will test that claim by using archival data with information on past prices and observed quantities to estimate the relationship between prices and purchasing behavior. . While the reach of economics has grown over the past several decades to explore questions not traditionally thought of as economics (crime, media, family, etc.), most empirical economists have continued to tie their analyses to the estimation of an underlying economic model.

Behavioral economics is a small and growing field within economics that seeks to incorporate more realism and insights from psychology about individual behavior into economic models. The goal of this movement is not to refute economic principles, but rather to help improve our understanding of behavior in ways that allow economists to make better predictions and suggest better economic policies. While many economists continue to be hesitant, the past decade has revealed a growing interest in understanding how relaxing certain assumptions about behavior and incorporating new elements about information processing or individual preferences might impact economic models and analyses. The behavioral economics movement has shown that it is often possible to incorporate slightly richer assumptions about individual behavior into economic models without losing the fundamental tractability and purpose of those models. There are certain aspects of individual judgment and behavior that present a more fundamental challenge to the economic approach, but in many areas it has proven possible to incorporate psychological insights about well-known cognitive biases and heuristics in ways that mesh with main-stream economic analyses.

Leading figures in behavioral economics, such as Matthew Rabin, have argued that ideally behavioral economics will *not* become a field of study in and of itself. Instead, it would be a large achievement to simply have all economists in all economic fields be aware of and consider psychological concepts when forming hypotheses and doing theoretical and empirical work (Rabin, 2002). With the maturation of behavioral economics over the last several years, it is worth reflecting on whether Rabin's vision has been achieved. Is psychology influencing all fields of economics and influencing a large swath of economists, or is the work of incorporating psychology into economics restricted to a narrow set of economists working in an isolated field?

In this chapter, we provide a review of the recent empirical work that has incorporated psychology into economics. Our survey builds on earlier reviews of the behavioral economics literature (Rabin 1998; Rabin 2002; Mullainathan and Thaler 2001; Camerer 2006; and DellaVigna 2009). In order to get a better sense of how behavioral economics has had an impact on various fields and to address the question that we posed in the previous paragraph as to the scope of

influence that behavioral economics is having, we organize the review by field of study (labor economics, development, etc.). We think that this organization can provide a unique vantage point and distinguishes this chapter from other recent reviews (most notably, DellaVigna, 2009) of the empirical behavioral economics literature that tend to organize papers by psychological principles.

This review focuses on empirical contributions in field settings (as opposed to theoretical contributions and laboratory evidence) so as not to overlap too much with other chapters in this handbook. The data and methods used in these field studies are varied, but can be broadly put into one of two categories. First, many of these studies would be classified as "applied econometrics studies". This type of work generally uses existing archival or observational data and estimates relationships between variables of interest by either using naturally occurring variation in the data (i.e., "natural experiments") that can identify the relationship or by estimating a structural econometric model that identifies the relationship under certain economic assumptions. The second type of study considered here is "field experiments", which are settings where economists run experiments in an economic setting of interest and thereby collect primary data that directly generates the variation of interest for the study. While there is a spectrum of experimental economics studies, field experiments (and our focus here) are generally distinguished from on-campus "laboratory experiments" conducted with student populations. It is important to note that this chapter is far from an exhaustive review of all of the empirical behavioral economics literature. Rather our attempt is to highlight some of the interesting work that has incorporated psychology into various economic fields of study with a particular focus on work produced in the last five years. In this way, a reader who is more familiar with the literature in psychology and/or judgment and decision making can get a sense for the areas of economics where psychology is currently having the greatest impact.

We discuss how psychology has permeated the following fields of economics: public & health economics, industrial organization & consumer choice, labor & education, development, urban & environmental, and macroeconomics. This list excludes fields within economics that are defined by methods (experimental, econometrics, and theory). We also exclude a few smaller fields within economics (e.g., economic history and agricultural economics) as well as law and economics and political economy, both of which are already heavily intertwined with a secondary field of study. Lastly, we omit the field of finance. Perhaps more than any other field, behavioral economics has had a large impact on finance to the point that behavioral finance is often considered a separate field as opposed to being under the umbrella of behavioral economics. Due primarily to space

constraints, we do not review this literature but refer readers to surveys of behavioral finance (Barberis and Thaler, 2003; Thaler 2005).

We conclude the paper with a discussion of the overall impact of psychology on economics and the implications that this growing literature has for both economists and psychologists.

2. Public and Health Economics

One could easily argue that the influence of psychology on economics in recent years has been largest in the field of public economics. Public economics is the study of how government policies influence economic markets. A primary emphasis of public economics involves the topic of taxation. Given the increasing role of government policy on the healthcare market, health economics has started to become intertwined with public economics and we will discuss both fields in this section. Bernheim and Rangel (forthcoming) discuss the emergence of "behavioral public economics" and survey much of the key early literature in the area. Here we survey primarily recent field studies in this literature.

Arguably the biggest impact that the behavioral approach has had in economics is in the analysis of retirement saving, particularly decisions of employees around 401k contributions.[1] A series of highly influential papers have documented that employees' decisions about their retirement savings are strongly influenced by defaults and that employees show substantial inertia in their behavior (e.g., Madrian and Shea, 2001; Caroll et al., 2009). The seminal paper in this area (Madrian and Shea, 2001) emphasized the importance of psychological theories that can help explain the effects that they find. They discuss theories including procrastination, complexity and choice overload, status quo bias driven by the endowment effect, anchoring, and framing. When employees do make active choices, empirical research has identified that they use naïve and often ineffective diversification strategies (Benartzi and Thaler, 2001; Choi, Laibson and Madrian, 2009a). Many employees also fail to take advantage of clearly valuable employer-match opportunities in their 401k plans, even if these options are carefully explained (Choi, Madrian, and Laibson, 2011). Choice overload is also an issue for employees: if 401k plans have too many options, fewer enroll and those who do enroll allocate more often to simpler options like money-market funds (Iyengar, Huberman, and Jiang, 2004; Iyengar and Kamenica, 2010).

[1] 401k funds are a common savings tool in the US. Workers can allocate a portion of their income to these funds (and sometimes employers provide matching funds as well) before paying taxes on this income. The fund then accumulates interest and is tax free until the funds are withdrawn. The tax advantage make these funds particularly appealing as a vehicle to save for retirement.

Building off of the empirical work documenting limitations to employee decision-making about 401k savings, there has also been a wave of experimental interventions aimed at testing whether insights about psychology can help improve savings behavior. Duflo and Saez (2003) find that a small incentive to attend a benefit fair increases 401k contributions and that this effect spills over even to non-incentivized employees who work with the ones that received incentives. In perhaps the most well-known intervention, Benartzi and Thaler's (2004) "Save More Tomorrow Plan" increased 401k allocations by allowing employees to pre-commit to future increases in savings at their next pay raise, which addresses issues of both loss aversion and present-bias that may be barriers to saving. The average savings rates for individuals that joined the plan to "save more tomorrow" increased from 3.5 percent to 13.6 percent over a 40-month period. Choi, Laibson and Madrian (2009b) also found that simplifying the enrollment process can substantially increase 401k participation. All of this work has had a profound effect on the design of 401k plans in practice; for example, this work helped lead to the development of default lifecycle-fund options that are now available in most 401k plans (funds that adjust the asset allocation automatically as a person ages).

A related area where the behavioral approach has gained traction in public economics is in understanding how individuals do (or do not) smooth consumption over time. Smoothing consumption is a normative implication of most standard economic models. It suggests that individuals should borrow or save in order to consume a similar amount throughout one's lifetime. For example, a teacher who is paid a salary 9 months a year should not starve for 3 months and live high on the hog for the other 9 months, rather, the teacher should smooth their consumption over the 12 month period. Consistent with predictions of time inconsistency (e.g. present-biased preferences as described in Strotz (1956), Laibson (1997), and O'Donoghue and Rabin (1999), a series of studies have documented that many individuals, fail to smooth consumption and see spikes and drops in their spending around receipt of paychecks, food stamps, and social-security payments (Stephens Jr. 2003; Huffman and Barenstein, 2004; Shapiro 2005).[2] Laibson, Repetto, and Tobacman (2007) estimate a full lifecycle model based on observations about consumption, savings and borrowing patterns and find evidence for substantial short-run discounting and time inconsistency. Finally, Bertrand and Morse (2009) find that payday loan borrowers in general use very little of their tax refunds to repay their expensive payday loans, suggesting an inability of many of these borrowers to make optimal decisions about their combination of consumption and borrowing over time.

[2] Present-biased preference or time inconsistency refers to the idea that individuals significantly discount future utility relative to present utility. This steep discounting can produce time inconsistency because an individual may want their future self to take a particular action, but then that individual chooses not to take that action when the time arrives.

One of the key focuses of the field of public economics is to understand how people respond to taxation and social-benefit programs. This has been an area that has seen an explosion of behavioral work in recent years. A series of papers have demonstrated that the salience of a tax strongly influences how taxation affects behavior (Chetty, Looney and Kroft, 2009; Finkelstein, 2009; Cabral and Hoxby, 2012). For example, Chetty, Looney, and Kroft (2009) posted tax-inclusive price tags in a grocery store and found that these tags reduced purchases of taxable goods by 8 percent relative to nontaxable goods. Individuals also appear to have cognitive limits that prevent them from fully understanding the tax system and in particular benefits available to them within the tax-and-transfer system. Jones (2012) shows that inertia is a big reason why so many people experience over-withholding and receive tax refunds. Saez (2010) finds that individual earnings do not "bunch" at kinks in the tax schedule, suggesting that individuals are not as aware of tax incentives as standard theory would predict. Two experiments also demonstrate that providing direct information about the earned income tax credit can significantly alter take-up (the decision to apply for and take advantage of the program) and related employment decisions (Chetty and Saez, 2013, Bhargava and Manoli, 2011). Liebman and Luttmer (2011) similarly find that a simple intervention clarifying social security benefits can significantly change the decisions of older workers about when to retire. Finally, Saez (2009) shows in an experiment that how incentives that promote saving around tax time are framed can have significant impacts on individual responses to the incentives.

There has also been a surge of interest in understanding how well individuals can make decisions about health-insurance coverage. Several papers have looked at Medicare Part D. Seniors have choices from many private providers offering different plan packages in the Medicare Part D market. There is clear evidence that the majority of seniors choose plans that are sub-optimal for them based on their prescription needs (Heiss, McFadden and Winter, 2006, 2010; Abaluck and Gruber, forthcoming). The elders appear to place too much weight on plan premiums relative to out-of-pocket costs and on benefits that are irrelevant for their needs. While there is some evidence that seniors learn and eventually select into better plans over time (Ketcham et al., forthcoming), even three years after the start of the market most seniors were still in suboptimal plans (Zhou and Zhang, 2012). Kling et al. (2012) randomly provide select seniors with information on the projected costs to them under different plans based on their prescription needs and find that this information causes many seniors to shift plans. The authors argue that these results show that seniors' face significant "comparison frictions" in this marketplace. Fang, Keane and Silverman (2008) show that in the Medigap insurance market seniors with better cognitive ability are more likely to select

insurance and that because they are also healthier, this creates advantageous selection in the market (advantageous selection in this context refers to the idea that people who are healthier will be more likely to select into the insurance market). Ericson (2012) shows that there is substantial inertia in the Medicare Part D choices of seniors and that over time this leads seniors to face higher costs. Handel (2012) finds a similar result for choices by employees in employer sponsored health insurance plans. While it is unclear whether these types of decision-making challenges extend generally to non-elderly populations, these results are clearly relevant for a range of policy discussions around insurance provision, including debates about the design of private health-insurance exchanges for the non-elderly mandated under the Affordable Care Act.

Policymakers and insurers are also increasingly turning to psychology for novel approaches to improv health behaviors. Traditionally health-policy focused largely on information provision, assuming that as long as individuals were well informed, their decisions would maximize their health choices in light of other tradeoffs. Influential work on the effects of smoking taxes, however, shows that the subjective well-being of smokers appears to increase with higher taxes, which in turn suggests that health behaviors are not completely rational (Gruber and Koszegi, 2001; Gruber and Mullainathan, 2005). Recently there has been a surge of interest in using incentive programs informed by psychology to address spiraling health-care costs (Volpp et al., 2011). A series of recent field experiments have shown that temporary financial incentives can generate lasting changes in exercise frequency, suggesting that individuals may fail to establish exercise habits due to issues such as present-bias and projection bias (Charness and Gneezy, 2009; Acland and Levy, 2010; Royer, Stehr and Sydnor, 2012).[3] Employees offered a temporary incentive program for exercise also showed a demand for and benefits from an available commitment contract that allowed them to place money at stake to motivate their own continued use of the gym (Royer, Stehr and Sydnor, 2012). Milkman, Minson and Volpp (2012) show that a program that allows people to bundle a temptation (e.g., listening to a fun novel) with exercise increases attendance at the gym. Volpp et al., (2008) and John et al., (2011) conduct weight-loss experiments with the clinically obese and find that lottery incentives that exploit overweighting of small probabilities and deposit contracts that exploit loss aversion can be effective at inducing weight loss. However these studies find little effect of these short-term incentives on long-term weight loss.

[3] Projection bias in this case refers to the idea that people project their current utility (which is in part determined by the state of the world they find themselves) on their future selves (which may be in a different state of the world).

Behavioral economics has also had a small impact on the study of criminal behavior. For example, Lee and McCrary (2005) use a regression-discontinuity design to show that individuals are not less likely to commit a crime when they turn 18 and the punishment of doing so increases dramatically. This evidence runs counter to a standard model of forward-looking economic agents, but is in line with behavioral models of myopia. Bushway and Owens (2013) test for framing effects in how criminals perceive their imposed prison sentence. They find evidence that prisoners who felt like they were able to get away with a smaller amount of time in prison than recommend were more likely to recidivate - consistent with a story that framing can impact how people feel about a punishment.

Finally, one of the areas of public economics where psychology has long had an impact is in studies of charitable giving. Although charitable giving is widespread, it has never been easy for economists to fully explain the motivations people have for giving to charity, and there is a very long history of economists seeking to understand the psychological motivations for charitable giving (see Andreoni, 2006 for a review). A number of recent field studies have begun to shed new light on the various motives underlying charitable giving. For example, Landry et al., (2006) show that potential donors respond not only to fairly well-understood incentives to give like seed money and lotteries, but also react strongly to the attractiveness of female charity solicitors. Shang and Croson (2009) manipulate information about the giving of others and find that individuals give more when they think others are giving. DellaVigna, List and Malmendier (2012) conduct a field experiment that randomized whether potential donors knew a solicitor would be coming to their house and find clear evidence that social pressure to give, rather than purely an altruistic desire to give, is a significant driver of charitable giving. Fong and Luttmer (2009) find evidence that attitudes toward public assistance for Hurricane Katrina victims are affected by racial attitudes, though they do not find that race has much effect on decisions of individuals to donate to a Katrina-relief charity in an experiment. Ariely, Bracha and Meier (2009) find that social image can be a powerful driver of charitable behavior and that as such, financial incentives to give crowd out charitable behaviors that are very public because the incentives erode the social-image value of these behaviors. Finally, Kessler (2013) finds that announcements of support for a public good can have a large impact on how much other people decide to donate. By providing workers with an option to wear a pin that announces their support for a charity, total giving increased by approximately 10%. Overall, this literature suggests that charitable donations are highly influenced by social factors (social comparison and social pressure).

It is clear from this review that psychology and behavioral economics are now central parts of the field of public economics. They are also increasingly important to public policy in practice. Terms such as "choice architecture" and a general approach to considering the psychological foundations of decision-making have begun to pervade public-policy discourse (Cronqvist and Thaler, 2004; Thaler and Sunstein, 2008). As these insights have taken root in public economics and the field has begun to substantially relax the rational-choice paradigm, the forefront of current research appears to be in trying to better understand how to conduct welfare analysis in light of these changes. While behavioral approaches create significant challenges to assessing individual welfare and the roll of public policy, researchers are beginning to make substantial progress in determining how to think about welfare within a behavioral paradigm (Bernheim and Rangel, 2009).

3. Industrial Organization and Consumer Decision Making

Industrial organization economists study why firms exist and how they function and compete with each other. Insights from psychology and behavioral economics have made a significant contribution to recent theoretical models developed in industrial organization that model the interactions of profit-maximizing firms with their customers. A number of models have been developed to explore how firms should design contracts or structure products if they are selling to customers with psychological biases (DellaVigna and Malmendier, 2004; Ellison, 2005; Ellison, 2006; Eliaz and Spiegler, 2006; Gabaix and Laibson, 2006; Kamenica, 2008; Heidhues and Koszegi, 2008; Grubb, 2009; Heidhues and Koszegi, 2010). Some of the key results of this literature are that firms will often have some incentive to obfuscate and "shroud" attributes, that firms will often offer products with pricing features that appeal to naïve agents, and finally that such behaviors can frequently survive even in situations with market competition.

Many of these theoretical models were motivated by studies that documented patterns of consumer choice that seem to suggest that consumers have difficulty predicting their own use of products. DellaVigna and Malmendier (2006) demonstrated that gym-members pay for flat fee contracts even though they use the gym so infrequently that they could save significant money with available pay-per-use options. They argue that their findings are most consistent with a view that individuals are naively overoptimistic about their future gym attendance.[4] Ausubel (1999) has a somewhat similar finding for credit-cards, where he shows that many obtain "teaser-rate" cards and

[4] They also find that individuals delay for long periods before cancelling memberships they no longer use at all, which is also consistent with predictions from models of naïve present-biased agents showing pervasive procrastination.

accumulate debt in ways that would make them clearly better off if they had instead had a card with a constant and more modest interest rate. In a very influential piece, Grubb (2009) showed that individuals choose cell-phone plans with fixed minute allotments and steep charges for going over the minute limits, but frequently exceed their plan limits. He shows that this behavior is best explained by a model in which people overestimate the precision of their demand forecasts - which relates to a growing psychology literature on types of overconfidence (Moore and Healy, 2008; Chapter 16 of this volume). Miravete (2003) also presents evidence that many individuals initially choose suboptimal calling plans, though learn to switch to better plans over time. Finally, there are two empirical papers that have documented patterns of "projection bias", in which customers purchase goods in one state of the world and appear to neglect how their preferences will change (projection bias is conceptually similar to work on hot/cold empathy gaps and visceral states which has produced a substantial amount of research in psychology such as Nisbett and Kanouse (1969), Loewenstein (1996), Nordgren, van der Pligt, and van Harreveld (2006, 2007)). Conlin, O'Donoghue and Vogelsang (2007) show that individuals order heavier coats from catalogues on days that happen to be unusually cold and then end up returning those purchases at high rates. Busse et al. (2012) show that this effect is relevant even in very large-stakes durable-goods markets by showing that the demand for convertibles, SUVs, and houses with pools all react to seasonal effects and short-term variation in the weather.

There is also a growing literature showing that the salience of various product features and the way customers allocate their limited attention affects product markets. A number of influential studies have shown that prices vary across different firms even in situations where the firms are selling very similar products and it looks like it is easy to comparison shop (Baye and Morgan, 2004; Ellison and Ellison (2009)). There is also evidence from Ebay auctions that sellers can make more money in their auctions by charging high shipping fees and attempting to hide those fees (Brown, Hossain and Morgan, 2010), which suggests there are returns to firms that suppress information. Bertrand et al. (2010) conduct a marketing experiment and show that salient marketing features that draw attention, such as pictures of attractive models, have very large effects on the takeup of credit-card offers but that consumers respond much less to the interest rate on those cards. Lacetera, Pope and Sydnor (2012) show that limits to attention can matter by affecting how fully people use available information about a product. They find that used-car prices fall sharply around 10,000-mile odometer readings, consistent with the idea that used-car buyers show a "left-digit" bias in how they process information about mileage. Finally, in one of the best examples of how the behavioral

approach has infiltrated otherwise standard analysis in industrial organization, Hastings and Shapiro (2013) analyze how consumers react to changes in gasoline prices. They find that when gas prices change, consumers adjust the type of gas they purchase (premium vs. regular) by much more than they adjust the type of gas they purchase when their income changes - which run contrary to the predictions of a normative model of behavior. They argue that this behavior can be at least partially explained by mental accounting, loss aversion, or salience.

Within the literature that has explored bounded rationality and cognitive limits to consumer decision making, there has been an especially vibrant stream of work exploring consumer financial products. Agarwal et al. (2008) show that many new credit-card holders incur substantial fees for late payments, going over limit, etc. Customers learn to avoid these fees, but the learning appears to wear off quickly as the salience of a recent fee is lost over time. Agarwal, et al. (2009) document that the young (who are inexperienced) and the elderly (who may face cognitive limits) incur more fees than the middle-aged. Agarwal and Mazumder (2013) show that tests of cognitive ability can predict problematic borrowing behavior for credit-card customers. Meier and Sprenger (forthcoming) find that lab-style measures of present-bias can have predictive power for explaining who holds credit-card debt. Stango and Zinman (2009) show that the degree to which individuals misunderstand compound interest predicts rates of borrowing, saving and decisions about loan products. Finally, there is emerging evidence that among payday-loan users limited attention to the consequence of repeat borrowing and limited awareness about their own future behavior affects decisions about this costly borrowing (Bertrand and Morse, 2011; Carter, Skiba and Sydnor, 2013).

The influence of psychology and behavioral economics in industrial organization has been particularly strong in empirical studies of auction markets. Lee and Malmendier (2011) document frequent overbidding in EBay auctions and provide suggestive evidence that bidders pay very limited attention to the prices on alternative auctions once they start bidding on a particular item (see . Lacetera, Pope and Sydnor (2013) show that individual auctioneers create substantial variation in the outcomes of wholesale used car auctions, suggesting that auctioneers can affect what expert buyers are willing to bid at auctions. They provide evidence consistent with bidders that are influenced by forces such as excitement at the auction. Augenblick (2011) shows that a new auction format called the "penny auction" often leads bidders to bid 150% of the value for an object as bidders with naïve sunk-costs fallacies get caught up in bidding and end up overpaying.[5] EBay bidders are also drawn

[5] Penny auctions require participants to pay a small fee for each incremental bid that they make. The auction ends after a set period of time (often less than a minute).

irrationally to auctions with many bidders (Simonsohn and Ariely, 2008). Finally, in one of the few papers that has considered the cognitive limits that might be relevant on the firm side in markets, Simonsohn (2010) shows that sellers in EBay auctions suffer from "competition neglect" and fail to recognize that other sellers perceive demand in the same way they do. This leads too many sellers to time their auctions at high demand periods, generating low expected profits during high-demand periods.

Studies of insurance markets have also been heavily influenced in recent years by psychology and behavioral economics. Sydnor (2010) showed that the majority of homeowners pay for low-deductible contracts at prices that far exceed the expected value of that additional insurance. He shows that these choices are difficult to reconcile with standard economic rationales for risk aversion, but can be rationalized by models that incorporate loss aversion and probability weighting. Barseghyan et al. (forthcoming) estimate a structural model of risky choice from deductible choice and show that overweighting of small probabilities is important for explaining insurance choice. Barseghyan, Prince and Teitelbaum (2011) show, however, that the choices customers make in different insurance markets are difficult to rationalize with models of stable preferences and suggest that other psychological factors (framing, choice effects, reference-dependence, etc.) not captured in standard models of risk preferences may be needed to explain choice. There is also evidence that the effect of salience and memory affects demand for catastrophe insurance. Gallagher (2012) finds that individuals purchase federally subsidized flood insurance in high rates after a flood hits their area but then cancel their policies over time in a way that is difficult to reconcile unless the lack of salience of a recent catastrophe affects assessments of risk.

A small literature has looked at the nature of demand for news coverage and has concluded that readers display "confirmation bias" in which they prefer to receive news coverage that fits with their underlying beliefs and ideology (Mullainathan and Shleifer, 2005; Gentzkow and Shapiro, 2010). This work has shown that it appears that the news media caters to this demand for "slanted" coverage and that underlying customer demand for confirmation appears to drive the provision of slanted coverage.

Finally, there is also work that has explored the social determinants of consumption decisions. Frank (2005) argued that conspicuous consumption distorts spending to "positional" goods in an inefficient way. More recently, Heffetz (2011) shows that the visibility of a product is directly linked to the estimated income elasticity for the product. Spending on products that are very visible rises much faster with incomes than does spending on less visible products.

This section reveals that there has to date already been a substantial body of empirical studies that one could say have been influenced by the psychology-and-economics revolution. The basic idea that consumer biases affect behavior in a range of markets is now fairly well established, and in fact has been a driving force in some pushes for alternative approaches to market regulation (see for example, Kamenica, Mullainathan and Thaler, 2011) There are also some obvious places where the psychology literature has not yet made much of an impact on industrial organization. For example, there has been fairly little work that addresses whether consumer-decision-making biases fundamentally affect "standard" industrial organization questions like the degree of market concentration. The literature to date has also focused almost exclusively on the demand side. Are insights from psychology relevant for understanding the supply side and questions of market entry, decisions about mergers, and pricing decisions by firms as well?[6] We anticipate that these types of questions will increasingly be addressed in the literature as issues such as bounded rationality, the effects of salience, loss aversion, and myopia continue to be absorbed into traditional industrial organization research.

4. Labor and Education Economics

Given the unique social interactions that exist in job settings, it is no surprise that psychological concepts have begun to have a substantial impact on how economists understand labor markets. We begin by discussing insights that behavioral economics has brought to the literature on labor supply and then move to other topics within labor economics. Many of the early theoretical models in behavioral economics used labor supply as a motivating example (e.g. O'Donoghue and Rabin, 1999). Empirical work has since demonstrated the potential importance of these insights.

Camerer, Babcock, Loewenstein, and Thaler (1997) illustrated how reference dependent preferences can result in negative labor supply elasticities (reference dependence refers to the idea that outcomes are evaluated with respect to a reference point as in Prospect Theory). They provide evidence that taxi cab drivers work fewer hours when wages are high - consistent with a model of daily income targeting. The intuition behind this finding is that when wages are high (perhaps it is raining and thus it is easy to find people who want a taxi ride), taxi drivers are able to hit their daily target quickly and then go home. When wages are low, taxi drivers are not able to hit their target

[6] Laboratory evidence suggests that psychology - and in particular overconfidence - may explain excess entry by firms into markets (Camerer and Lovallo, 1999).

quickly and thus work additional hours in order to hit their target. This intuition can produce the perverse effect that taxi drivers work more when wages are low than when wagers are high. This work has resulted in a number of papers that analyze labor supply decisions with daily reference points in non-taxi domains (Oettinger, 1999; Fehr and Goette, 2007) along with additional papers that continue to discuss taxi driver decisions (Farber, 2005; Farber, 2008; Doran, 2009; Crawford and Meng, 2011). The most recent articles in this area have benefitted from and apply advances in our theoretical understanding of reference-dependent preferences that suggest that reference points are based on rational expectations (e.g. Koszegi and Rabin, 2006).

Present-biased preferences have also been shown to impact labor supply decisions. Early work by DellaVigna and Paserman (2005) explored exit rates from unemployment and found evidence consistent with individuals overvaluing the present relative to the future having an impact on job search behavior. Fang and Silverman (2009) find evidence of time inconsistency when analyzing patterns of welfare use and entering the workforce. Augenblick, Niederle, and Sprenger (2013) find that while time inconsistency is limited in monetary choices, present bias is very robust in a real effort task domain. Evidence of time-inconsistency in real effort decisions have also led several papers to explore and show the potential importance of commitment devices for effort (Ariely and Wertenbroch, 2002; Augenblick, Niederle, and Sprenger, 2013; Kaur, Kremer, and Mullainathan, 2010).[7]

In addition to hours worked, the quality of work that is produced is an important topic within labor economics. This topic has a foundation in early work on the "fair wage-effort" hypothesis of Akerlof and Yellen (1984). Recently, papers have put this hypothesis to the test by analyzing whether workers provide greater effort when they are compensated more than they expect ("gift exchange"). Field evidence by Falk (2007) showed that providing individuals with a small gift increased the willingness of people to donate to a particular charity - to the point that it could be profitable from a charitable organization's standpoint to provide gifts. Gneezy and List (2006) conducted a field experiment that directly related to a labor market scenario.[8] They find evidence that providing higher than expected wages did indeed increase the productivity of workers, but only

[7] Inattention may also impact labor supply decisions. Chetty (2012) discusses the implications that inattention can have on labor supply - particularly elasticities on the intensive margin (the decision of how much to work as opposed to the decision of whether to work at all). Another labor market where behavioral economics has been shown to be important is in the sports market. Professional athletes playing for large stakes have been shown to exhibit psychological biases (Berger and Pope, 2011; Pope and Schweitzer, 2011; Massey and Thaler, forthcoming).

[8] For an early version of an experiment very similar to Gneezy and List (2006), see Pritchard, Dunnette, and Jorgensen (1972).

for a short time. Due to the limited duration of the productivity shock, the gift exchange was not profitable from the employer's perspective. Bellemare and Shearer (2009) also test for gift exchange in a field setting and find evidence of an increase in worker productivity - although not enough to make the gift profitable from the employer's perspective. The way in which "gifts" and bonus compensation are given can also impact the effect size. Hossain and List (2012) show that bonuses and incentives that are framed as losses (as opposed to gains) induce a larger response and Kube, Marechal, and Puppe (2012) reveal the value of non-monetary gifts relative to monetary gifts on worker performance.

Just as positive actions by an employer (e.g. gifts) can lead employees to work harder, actions by the employer that are seen as negative can lead to lower worker productivity. This has been shown in the case of labor strife and tire production (Krueger and Mas, 2004), salary negotiations and police performance (Mas, 2006), and labor unrest and construction production (Mas, 2008).

Behavioral economics has also influenced the understanding of how peers can impact worker productivity and job satisfaction. Goette, Huffman, and Meier (2006) use the random assignment of individuals to platoons in the Swiss Army and finds that in-group membership is rewarded with increased cooperation in various laboratory games. Falk and Ichino (2006) find that worker productivity increases and that variation in worker productivity falls when workers work side by side. Bandiera, Barankay, and Rasul (2010) also find that the variation in worker productivity decreases when workers are with friends (as opposed to working with people with whom they do not have social ties), but find a net effect of zero on overall productivity. Mas and Moretti (2009) also find evidence that workers increase effort when they are working near a high-productivity coworker. While these field studies are seldom able to delve into the deeper psychological mechanisms that may be driving these findings, the motivation for these studies can be traced back to fundamental theories within psychology such as norms (Asch, 1956) and social facilitation (Zajonc, 1965).

While coworker environments can impact productivity, social comparisons can have an impact on job satisfaction. Card, Mas, Moretti, and Saez (forthcoming) find that workers' job satisfaction and search intentions are affected by knowing about the salaries of their peers. There is also evidence that social comparisons take place within families such that there is an aversion to the wife earning more than the husband (Bertrand, Kamenica, and Pan, 2012).

Recent work has also shed light on how psychology impacts the market for education. Studies have concluded that behavioral concepts such as projection bias and inattention can impact

college choice decisions by high school seniors (Simonsohn, 2010; Pope and Pope, forthcoming). There is also a growing body of literature that suggests that small information treatments and small reductions in transaction costs (e.g. simplification of financial aid procedures) can have big effects on college-going rates (Dynarski and Scott-Clayton, 2006; Bettinger, Long, Oreopoulos, and Sanbonmatsu, 2009). A knowledge of psychological processes can also be employed to more effectively leverage financial and other incentives to encourage students and teachers to work harder (see Levitt, List, Neckermann, and Sadoff (2012) for students and Fryer, Levitt, List, and Sadoff (2012) for teachers).

As this brief review shows, there has been a substantial recent empirical literature examining psychological influences that affect workers. One of the areas that has yet to be much explored, however, is in understanding how psychological insights affect the demand side of the labor market. Do employers optimally respond to the psychology of their employees when designing compensation and work environments? Are there psychological factors at play that cause departures from classical predictions on the part of employers? We anticipate that in coming years these demand-side questions could be an important new area of research for behavioral labor economics.

5. Development Economics

Development economics is a field of economics that is centered around issues that are faced by individuals in developing, or low-income countries. Researchers in this field attempt to use the lens of economics to address important questions related to poverty, corruption, and budding institutions. Behavioral economics is increasingly being used in the field of development economics.[9] More than other fields of economics, development economics has focused in recent years on field-experiment methods, and most of the behavioral economics studies highlighted here fit with that methodology.

Perhaps the most important psychological concept explored in development settings so far has been present-biased preferences. This theoretical foundation has been used to motivate research that offers commitment devices. Ashraf, Karlan, and Yin (2006) offered a commitment device to individuals in the Philippines who wanted to save money. The take-up rate for the commitment device was relatively high (~28%) and this commitment led to significantly increased savings. Gine, Karlan, and Zinman (2010) also find small but significant changes to smoking behavior when commitment devices were offered to Philippine smokers.

[9] Mullainathan (2007) provides an earlier review of this literature.

A preference for the now over the future can also help to explain why certain technological innovations have such slow diffusion rates (e.g. de-worming pills (Miguel and Kremer, 2003)). A leading example of slow diffusion can be found in work by Duflo, Kremer, and Robinson (2008, 2011) that focuses on fertilizer adoption decisions by farmers in Kenya. In their 2008 article, the present an empirical puzzle: the rate of return for fertilizer use is very high for Kenyan farmers. In their 2011 article, the authors provide a model of farmers with present-biased preferences that continually put off the adoption of new fertilizer technology. They go on to conduct a field experiment in which they "nudge" farmers to purchase fertilizer by providing them with up-front benefits (e.g. free fertilizer delivery). They find that the benefit of using the fertilizer is greater than the value of the up-front offering. Other research has explored a variety of reasons for low product adoption. For example, Cole et al. (forthcoming) explore liquidity constraints, trust, and a variety of psychological mechanisms and find mixed evidence that psychological mechanisms are a significant factor that limits product adoption using rainfall insurance in India as the product example. By conducting a field experiment with seaweed farmers in Indonesia, Hanna, Mullainathan, and Schwartzstein (2012) argue that inattention to available (but difficult to attend to) data can also explain why some farmers may not be using optimal farming procedures.

Various other psychological concepts have been tested in development settings. For example, Ashraf, Bandiera, and Jack (2012) explore the impact of non-financial awards on pro-social behavior and find that non-financial rewards can be more effective than financial rewards in motivating individuals to act pro-socially. Shah, Mullainathan, and Shafir (2012) provide evidence that scarcity and attention allocation can help to explain the empirical puzzle of why individuals in developing countries often engage in behaviors such as excessive borrowing. It is also worth noting tests of behavioral concepts that have been documented in the lab, but have not worked in the field. Perhaps the best example of this is work by Cohen and Dupas (2010) and Ashraf, Berry, and Shapiro (2010) that test for sunk-cost effects by running field experiments that analyze whether charging people a higher price for a product can lead to a greater usage of the product. Both of these studies find no evidence of sunk cost effects.

While behavioral economics has only had a modest effect so far on the development economics literature, it appears to be making inroads. One unique aspect of behavioral economics in development is that papers tend to be less interested in uncovering new psychological principles or exploring human behavior, and more interested in simply applying concepts in order to make particular treatments more effective.

6. Urban and Environmental Economics

In this section, we explore how behavioral economics has permeated into academic studies of housing markets and the environmental economics literature.

The housing market in many ways is an ideal place to test for behavioral biases. Buyers and sellers in this market are typically very inexperienced but are making very high-stakes decisions - a combination that could lead to mistakes with important consequences. Several papers have found evidence consistent with non-normative behavior in house buying and selling. An early and important finding in the field of behavioral economics is a paper on loss aversion and housing by Genesove and Mayer (2001). The authors use housing data in Boston during the 1990s to analyze how homeowners who face the prospect of a nominal loss when selling their home are impacted by the reference point of their original purchase price. They find that owners who face nominal losses set higher ask prices, achieve higher sale prices, and leave their homes on the market longer than other sellers. Simonsohn (2006) finds that homebuyers who are moving from a city where long commute times are common are more likely to choose a housing location that has a long commute in their new city. Similarly, Simonsohn and Loewenstein (2006) show that homebuyers who are moving from a city with high housing prices rent pricier apartments than those coming from cheaper areas. In both of these studies, the authors find evidence that homebuyers eventually adjust to the average commute and housing prices of their new city.

Behavioral economics penetrated environmental economics very early. In 1986, Kahneman wrote a book chapter criticizing contingent valuation theory.[10] He provided evidence that individuals were not very responsive to the scope of the problem when stating their valuations (e.g. survey respondents valued cleaning up the lakes in a small town by about the same amount as cleaning up all of the lakes in the entire region). The endowment effect and the Coase theorem were also discussed very early on in environmental economics (see Hoffman and Spitzer (1993) for a review and applications to environmental policy).

Despite early inroads, behavioral economics has had a fairly minor role in the recent environmental economics literature (see Shogren and Taylor (2008) for a brief review). The primary contributions continue to be largely in the non-market valuation literature. Behavioral economics has contributed to both the discussion of some of the failings of valuation studies - particularly

[10] Contingent valuation theory attempts to place a value on non-market goods such as environmental amenities by way of surveying individuals and asking them questions to obtain their valuation. Contingent valuation uses a "stated preferences" approach as opposed to the more standard "revealed preferences" approach typically used in economics.

contingent valuation - and the provision of new ideas and support for alternative systems (Kahneman and Knetsch, 1992; List, Sinha, and Taylor, 2006; Landry and List, 2007; Ehmke, Lusk and List, 2008; Alevy, List, and Adamowcz, 2011).

In addition to non-market valuation, psychology has been featured in a few papers that could be classified as environmental. For example, probability weighting and water markets (Ranjan and Shogren, 2006), learning about infrequent environmental events such as floods (Gallagher, 2012), limited attention when purchasing a house (Pope, 2008a; Pope, 2008b), energy policy with "internalities" (Allcott, Mullainathan, and Taubinsky, 2012), and the "MPG Illusion" (Larrick and Soll, 2008; Allcott, forthcoming). Behavioral economics has also begun to contribute to our understanding of catastrophic risk (often caused by natural disasters) and insurance markets (e.g. Kunreuther, Pauly, and McMorrow, 2013) where probability weighting, framing, and other psychological phenomenon can be of first-order importance.

Lastly, behavioral economics is starting to have an impact on the recent literature of pro-social behavior and energy conservation. A nice example is work by Allcott (2011) that builds on research in social psychology suggesting that people care about social norms. He analyzes data from a very large field experiment where homeowners were provided information about the energy usage of their neighbors. Treatments of this type were found to significantly reduce energy consumption, suggesting that non-price interventions may be a productive method for policy makers to employ in this setting. This has become a burgeoning area of research with academics working side-by-side with utility companies and apartment owners to test various treatments (Ayres, Raseman, and Shih, 2009; Ferraro and Price, 2011; Costa and Kahn, 2010).

7. Macroeconomics

It can be relatively easy to imagine how certain psychological principles can impact decisions by economic agents at a microeconomic level. The direct impact of psychology on macroeconomic issues (inflation, trade, monetary economics, etc.) is less obvious.

Of course many of the microeconomic findings that we have highlighted in this review can have macroeconomic implications. For example, behavioral influences can affect the savings behavior of individuals, and aggregate saving rates are a key consideration in macroeconomics. In this section, we will try to go beyond simply "adding up" all of the microeconomic findings, and instead focus on how empirical work in behavioral economics has impacted the way we model and think about macroeconomics.

A good place to start when thinking about behavioral macroeconomics is with George Akerlof. In his Nobel Prize Lecture (Akerlof, 2002), he lays out six important macroeconomic phenomena that are difficult to account for with the new classical model. Examples of these include involuntary unemployment, the failure of deflation to accelerate when unemployment is high, and the impact of monetary policy on output and employment. He goes on to address how incorporating psychological insights into our models can help to account for these phenomena. We will take this as a launching point and simply highlight several recent contributions to this literature - some of which continue to address and add insight to the questions that Akerlof raises.

One of the key macroeconomic areas impacted by behavioral economics is price and wage rigidity.[11] Drawing on the growing literature about the importance of fairness (see the labor section of this review) and money illusion (Shafir, Diamond, and Tversky, 1997), analyses have found evidence of downward nominal wage rigidity (Lebow, Stockton, and Wascher, 1995; Kahn, 1997; Card & Hyslop, 1997; Bewley, 1999; Dickens, et al., 2006).[12] These findings have had a significant impact on policymakers decisions regarding optimal inflation levels.

Another area that has garnered considerable attention is how psychology can help us understand bubbles and financial crises like the one that took place in 2007-2008. Akerlof and Shiller (2009) provide an extensive overview of how psychology can help guide our understanding of what happened during the lead up to and the recent crash that took place. While there, of course, continues to be considerable uncertainty and disagreement about the causes of bubbles, Akerlof and Shiller discuss "animal spirits" and their psychological origins (overconfidence, fairness, etc.). From a finance perspective, Barberis (forthcoming) also provides a discussion of the recent recession and the likely impact of psychology.

Recent work has focused on continuing to use the standard macroeconomic models, but simply making parsimonious changes that are in line with psychological insights. These "quasi rational" models allow for systematic deviations from perfect rationality and can help explain puzzling empirical phenomena. It may be useful to provide an illustration of how psychology can be built into a macroeconomic model. To do this, we refer to the recent work by Fuster, Hebert, and Laibson (2012). The authors of this paper assume that economic agents are just like the agents from the new classical model, but that they make one simple mistake. In this case, the authors assume that

[11] Levy, Lee, Chen, Kauffman, and Bergen (2011) provide a more micro example of how psychology can cause price rigidities.

[12] While fairness and loss aversion may be primary causes of downward nominal wage rigidity, other factors such as negative reciprocity may also be at play.

agents underestimate the rate of mean reversion when formulating beliefs about rewards to investment - a finding that has support from the psychology literature (representativeness and availability heuristics can generate this finding (Kahneman and Tversky, 1973)). The authors analyze a standard investment model with agents of the type described above and then compare the predictions that come out of this exercise with real data. This simple adjustment to how agents formulate their beliefs can help to explain several puzzling macroeconomic findings. For a nice review of this approach, see Fuster, Laibson, and Mendel (2010).

A small literature has also looked at how macroeconomic outcomes can impact microeconomic decisions. Malmendier and Nagel (2011) find that experiencing low stock-market returns during an individual's lifetime makes him/her less willing to take financial risks and participate in the stock market.[13]

Lastly, behavioral economics has provided some of the impetus for policy makers to begin considering objective functions other than maximizing GDP (e.g. the U.K.'s push to consider measures of subjective well being along with more standard measures of progress). Capitalizing on the large amount of subjective wellbeing data that has recently been collected by organizations such as Gallup, many behavioral (and more standard) economists have been exploring how these data might provide useful insights into economic well being (e.g. Stevenson and Wolfers, 2008; Kahneman and Deaton, 2010; Benjamin, Heffetz, Kimball, and Rees-Jones, 2012; Benjamin, Heffetz, Kimball, and Szembrot, 2013).

8. Conclusion

Behavioral economics has produced significant findings in a variety of fields over the last decade. As this review illustrates, behavioral economics does not seem to be an isolated discipline within economics, but rather is being incorporated into models and analyses to better understand core concepts in a variety of fields. This review also suggests that the practice of behavioral economics has not been restricted to a few "behavioral economists", but has garnered the attention of prominent economists in other fields. Economists who are recognized as leading figures in their respective fields now routinely incorporate insights from psychology and behavioral economics into their research, including David Card in labor, Raj Chetty and Emmanuel Saez in public, Douglas Bernheim and Glenn Ellison in industrial organization, and Esther Duflo and Michael Kremer in

[13] For related work, see Giuliano and Spilimbergo (2009), Mudd, Pashev, and Valev (2010), and Ehrmann and Tzamourani (2012).

development. On the other hand, despite the growing influence of psychology on economics, it would be fair to argue that most of the work highlighted in this literature is still seen as incorporating "novel insights" and "alternative approaches". We believe that the integration of psychology into economics has gone far enough that we are likely to soon see the integration of some of these ideas into "standard" economic practice, and in our opinion that bodes well for the field of economics.

An obvious question that this chapter highlights given its organization by field, is why behavioral economics has more of a presence in some fields (e.g. public, labor) than in other fields (e.g. urban/environmental, macroeconomics). There are likely some idiosyncratic reasons related to the relative strengths of various fields within economics departments that also have a strong presence in behavioral economics. A more interesting explanation may lie in the importance of high-quality data for convincingly distinguishing between a behavioral mechanism and a more standard "rational" mechanism. Fields such as public and labor economics often have large datasets that contain a lot of detail. In contrast, the data for other fields such as macroeconomics and development can be sparser. This distinction reveals itself in our review, where we observed that many of the empirical papers using behavioral economics that have relied on econometric techniques come from data-rich fields like industrial organization, whereas behavioral economics appears more linked to field experiments in other fields like development economics. Thus a simple story about data quality could help explain the variation in behavioral economics' penetration across these fields. If data quality is the primary reason for why behavioral economics has spread quicker in some fields, this bodes well for the future of behavioral economics as the amount and availability of data across all fields continues to grow at unprecedented levels and experimental methods in field settings are growing in popularity. Another possibility is that fields such as public and labor economics study decisions that are made at the individual level where a researcher can cleanly test for individual psychological effects. In contrast, fields such as macroeconomics and urban economics are often focused on measures that are aggregated across individuals (e.g. urban economics studies housing prices at the MSA level) where individual psychological biases may cancel each other out, be eliminated by market forces, or simply be harder to directly measure.

What does the expansion of psychology into economics - as illustrated by this review - mean to researchers who study psychology or judgment and decision making? It does not seem to be the case that behavioral economics is producing new psychology that is likely to transform models within psychology. Perhaps the clearest value that behavioral economics is bringing to psychologists

is providing evidence that some psychological concepts that have been studied primarily in the laboratory are externally valid and have important effects in real-world decision making. Another important contribution is that several of the studies discussed in this paper test for different psychological effects in the same domain (e.g. Bhargava and Manoli (2011) sent letters to taxpayers with various psychological manipulations in an attempt to increase their willingness to file a tax form). These types of studies can help psychologists compare the relative strength and robustness of different theories and manipulations which could lead to a focusing of future work on the most real-world relevant theories. Additionally, seeing the effect of psychology in real-world situations can lead to a better understanding of how certain effects are moderated by various domains, the boundaries of psychological phenomena, and the range of individual differences on various dimensions exhibited by the population at large. Finally, this review also gives us some insight into which psychological principles appear to be having the largest impact. Present-biased preferences and reference-dependent preferences are perhaps the clearest winners in this regard, which likely reflects the early success theorists had incorporating these ideas into otherwise standard economic frameworks. Some other important topics within judgment and decision making – for example, overconfidence, anchoring, and the role of transitory emotions -- have had less of an impact on empirical work in economics to this point, and these may point to potential frontier research areas for behavioral economics.

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