Research Statement
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The private choices of organizations are often matters of public interest, such as how they create employment opportunities, how they compensate labor, and how they compete. Policy makers may therefore try to encourage organizations to make choices that have socially desirable outcomes, through policies such as pay transparency, background screening, and regulating communication between competitors. My research examines behavior inside organizations with the aim of understanding how policy and managerial practices can lead to socially desirable outcomes. Methodologically I combine surveys, administrative data, experiments and theory.

My research on pay transparency provides insights for business managers and policy makers. While policy makers often advocate for pay transparency with the expectations that it will raise wages, I show theoretically and empirically that mandated pay transparency lowers the average wage for workers because employers recognize that differential treatment will be used by other workers in future negotiations. The employers thus negotiate more aggressively (Econometrica, lead article, 2023[1]).

My research goes further to show that pay transparency policies can go well beyond targeting unequal pay by an employer, and in doing so, address information frictions hindering employers from setting competitive wages, and employees from responding to incentives. I show that vertical pay transparency, revealing pay of managers, motivates employees to work longer hours and increase their output, without eliciting demoralizing social comparisons that horizontal pay transparency between peer workers does (Journal of Political Economy 2022[2], Journal of Public Economics 2023[3]). I also show that employers lack accurate information about market wages, and when employers are newly able to access real-time salary benchmarks, both salaries and employee retention rise (R&R Review of Economic Studies 2023[4]). With a holistic understanding of the information frictions workers and firms face, I am able to identify pay transparency policies that can increase wages, productivity and well-being (invited Journal of Economic Perspectives 2023[5]).

I also examine information flows more broadly within organizations to understand differential treatment of minorities and disadvantaged workers. In "The Old Boys' Club: Schmoozing and the Gender Gap" (AER, lead article, 2023[6]), I document how socializing between a manager and employee affects information exchange, productivity, and career outcomes. My findings reveal the career advantage male employees gain from male managers explains a full third of the unconditional gender gap at the financial institution I study. In "Increasing Demand for Workers with a Criminal Background" (QJE 2023[7]), I conduct a randomized field experiment testing alternative approaches to reducing barriers to employment for workers with a criminal record. I show how additional information about workers with a criminal history can increase employers' hiring demand, offering an alternative approach to recent legislation that bans information early in hiring. Both papers identify organizational information frictions and point to policies that can better serve business and society.

My on-going research extends my collaboration with the largest U.S. payroll process firm, ADP, to launch field experiments that will help pinpoint frictions within organizations and tools to improve decision-making. For example, having documented that employers lack knowledge about their own internal pay and retention disparities, we are randomizing access to internal wage discovery tools to test its causal effect on pay-setting, pay equity and representation ("Internal Information Frictions, Pay, and Pay Equity", NSF Grant 2242542).

I complement my work with large organizations and labor platforms through a collaboration with a national network of small business owners. Small businesses have short operating runways, leaving them highly susceptible to shocks. I have documented how business owners' expectations predict behavior, and how expectations can be used to inform timely policy design. My work resulted in survey tools adopted by the U.S. Census, and used to design policies on small business lending (PNAS plus other outlets, 2021[8,9]). The societal value of understanding the unique challenges faced by small business owners and their employees, who together comprise half the workforce, continues to propel this research agenda forward.

I. Pay Transparency

My research on pay transparency is motivated by the observation that access to pay information is often limited and unequal despite the important implications pay information is theorized to have: pay information underpins individual and collective bargaining negotiations, anti-discrimination policies, competitive wage-setting practices, and longer run education and career decisions. Why is information limited and what are the implications for the labor market? How should we design pay transparency policies? I have taken several approaches to understanding this question: the first is to study how workers perceive the pay of others, and to measure how changing perception affects behavior, well-being and redistribution preferences. The second approach is to study how organizations strategically respond to employees' pay perceptions by adjusting their pay setting and hiring practices. A third approach asks how organizations themselves access pay information and use it to set pay and policies. Combining to form a holistic understanding of the information frictions workers and firms face, I am able to identify and design pay transparency policies that can increase wages, employment, productivity and well-being.

To advance the first approach, I worked inside a large financial institution in Asia for two years, fostering the relationships required to collect data about employee perceptions, merge them with HR records, and disseminate pay information throughout the organization in an experimental manner. In **"How Much Does Your Boss Make? The Effects of Salary Comparisons," (Cullen and Perez-Truglia, 2022 *Journal of Political Economy*)**, I carried out the first of two randomized controlled trial. After documenting what is known about the salaries of peers and superiors, I tested the impact of providing truthful pay information on behavioral outcomes and career outcomes. I found employees substantially underestimate the salaries of their managers and have smaller unbiased misperceptions about the salaries of their peers. I showed that these perceptions have a significant causal effect on the employees' own behavior. When employees found out that their managers earned more than they thought, employees worked harder on average, swiping into the office to work longer days, sending more work emails, and generating more sales revenue. I showed these effects diminish, but do not become negative, even when the likelihood of being promoted into the manager's position is small both subjectively and objectively. I presented evidence that these findings are consistent with career concerns and inconsistent with social concerns about vertical inequality. Contrastingly, employees reduced their effort when they discovered their peers earned more. These findings help explain why firms lean heavily on hierarchical incentives, and why greater awareness of inequality within organizations has garnered limited social pressure for accountability.

Why did employees have so little information about each others' pay despite placing high value on the information? There was little direct evidence on the sources or magnitude of information frictions around the sensitive topic of pay. In **"The Salary Taboo: Privacy Norms and the Diffusion of Information" (Cullen and Perez-Truglia, 2023 *Journal of Public Economics*)**, I explicitly invited employees to share pay information with one another, and document the frictions preventing salary information from spreading. I enrolled 755 employees at the same multibillion-dollar corporation to be part of a second randomized controlled trial. I offered employees the opportunity to share salary information for rewards, and offered rewards to employees who could seek out salary information. This provided revealed-preference evidence that many employees are willing to forgo weeks' worth of salary to prevent their salaries from being shared with their coworkers and express a similar reluctance to ask coworkers about their salaries due to concern over reciprocation. This surfaced a unique asymmetry whereby employees that perceive themselves to be high earners relative to their peers are less willing to share information, suggesting fears of resentment and competition likely underlie the privacy norm, as opposed to status concerns or intimidation. This pattern of demand for privacy offers an explanation as to why individuals underestimate inequality, and perceive starker inequality under transparency, in many contexts.

To understand how employers respond strategically to greater levels of pay transparency, I model bargaining with incomplete information and test the model's predictions by examining the staggered enactment of U.S. state laws that protect workers' right to talk about pay.

"The Equilibrium Effects of Pay Transparency" (Cullen and Pakzad-Hurson, 2023 *Econometrica (lead article)*) shows theoretically and empirically that employers set more equal wages under greater pay transparency, while also setting lower average wages. A key theoretical insight is that increasing transparency decreases the bargaining power of workers, as employers credibly refuse to pay high wages to any one worker to avoid costly renegotiations with others. When workers have low individual bargaining power to begin with, such as under collective bargaining agreements, pay transparency has a muted effect. In an event-study analysis of U.S. state-level laws protecting the right of private sector workers to communicate salary information with their coworkers, I observed wages decline by approximately 2% on average, and wage declines that are twice as large when workers have high individual bargaining power, such as among college-educated non-unionized workers, and lower when workers are under a collective bargaining agreement. I also conducted a meta analysis of prior evaluations of pay transparency mandates, with attention to average wage levels (often a secondary outcome), in order to reconcile results under a unified framework. Consistent with the theory, wage levels fall across the wide range of settings, but fall significantly less when the share of workers covered by a collective bargaining agreement is high.

So far, I've described my research with an emphasis on the information set of workers. Most frameworks for pay-setting assume that *employers* have full information when choosing wages, and empirical work has correspondingly focused on the beliefs of workers. Yet, U.S. legislation explicitly restricts employer access to pay information. Organizations are prohibited from sharing pay information with competitors due to concern that they could use this information to engage in anti-competitive practices. The law does, on the other hand, permit employer access to third-party aggregated salary data, a practice under active scrutiny by the Department of Justice.[1] I assessed how organizations access and use pay information in their pay-setting and hiring decisions through a collaboration with the Society of Human Resource Management, and ADP, the largest payroll processing firm in the U.S., serving 650,000 firms, 20 million employees.

[1] President Biden released an Executive Order, July 2021, to revisit the guidelines for sharing salary information through third party benchmarks. For details, see Statements and Releases from the White House, July 9, 2021 https://www.whitehouse.gov/briefing-room/statements-releases/2021/07/09/fact-sheet-executive-order-on-promoting-competition-in-the-american-economy/

In **"What's My Employee Worth? The Effects of Salary Benchmarking" (joint with Li and Perez-Truglia, *R&R Review of Economic Studies*)**, I surveyed over 1,000 human resource professionals in the U.S. about how they set pay in practice. Over 80 percent report using salary benchmarks to determine pay. To understand the causal effect these tools are having, I evaluated the roll-out of ADP's salary benchmarking tool, arguably the most comprehensive and reliable salary database available. I combined the benchmark browsing activity of clients and the HR records of their employees before and after gaining access to the tool. In an event study framework, I documented that access to the salary benchmark reduced dispersion in the wages of new hires by over 20 percent as salaries converged toward the median of the salary benchmark. Salaries did not fall on average, as was an expressed concern by policy makers. In fact, where the benchmark's effects were most concentrated, namely in low skill positions, salaries rose by 6.7% on average, and the likelihood a new hire remained at the firm one year later rose over 20 percent, consistent with the monopsony literature estimates of the labor supply elasticity. The study has broader implications for how we model the labor market; in particular, workhorse models of wage-setting do not admit uncertainty about aggregate wages, yet our findings suggest employers' uncertainty is large and economically meaningful. I provided a parsimonious framework for the observed pro-competitive effects, where a public signal about past winning bids for workers reduces private information rents and sharpens competition. The implication of these empirical and theoretical results is that salary benchmarks can improve pay equity and place upward pressure on wage levels.

"What's My Employee Worth?" is part of a larger research agenda unearthing what information employers use (and do not use) at the time they make decisions. In follow-up work with the same payroll processing firm, I am studying employer use of ADP software to observe their own internal pay and retention disparities, revealing both organizational failures to track valuable information and organizational responses to learning about internal disparities. Preliminary findings point to significant potential to close gender and minority gaps with information **(NSF Grant 2242542, "Internal Information Frictions, Pay, and Pay Equity")**.

At invitation, I wrote an article for the ***Journal of Economic Perspectives*** **(Cullen 2023)** that brings together insights from my work on transparency for a broad audience. Combining the three different approaches to studying pay transparency, I show the design of the pay transparency policy is of utmost importance for employer and employee outcomes. Policies that are not designed to target employers who pay unequal wages, but rather policies that educate workers about the full range of opportunities to earn higher wages through effort and career decisions or educate employers about real-time market wages, have proven potential to increase motivation, allocation of talent, and sharpen competition (Cullen and Perez-Truglia, 2022; Cullen et al. 2023). In sum, the outlook for pay transparency policies to benefit firms and workers is promising, but the policies must shift away from the narrow goal of targeting pay discrimination toward the more ambitious goal of access to decision-relevant information.

II. Organization practices & unequal opportunity

Informal workplace practices can influence access to information and exacerbate inequality in promotions and pay. I revisit common workplace practices that are, anecdotally, hindering disadvantaged workers. I ask what factors lead to these practices, and how policy might change organizational behavior in socially desirable ways. I focused on two practices for which there exists an abundance of anecdotal evidence, yet scarce rigorous investigation: the "old boys' club" whereby men at the top of organizations give more junior men a leg up; and the systematic screening out of workers that have involvement with the criminal justice system.

In **"The Old Boys' Club: Schmoozing and the Gender Gap," (Cullen and Perez-Truglia, 2023 *American Economic Review (lead article)*)**, I shed light on the social nature of the workplace. After embedding myself for two years inside a large financial institution headquartered in Asia, I was able to collect direct evidence on the social breaks that employees take with their managers. Through these social interactions, employees would form bonds with their managers; they proved able to more accurately guess the sports team preferences of their manager, for example, and potentially better able to perform productive tasks at work. A causal test of the impact that social interactions have on productivity, career outcomes and the gender gap, however, require going beyond an examination of the correlation between social breaks and outcomes. Since time spent with the manager could reflect the underlying ambition of the employee, complicating interpretation of the correlation, a causal analysis hinges on identifying exogenous variation in breaks.

I causally estimated the impact that social activities at work have on productivity, career trajectories and the gender gap by using quasi-random variation induced by smoking habits and manager rotations, along with access to HR and sales records. When male managers who smoke were newly assigned to manage male employees who smoke, they took social breaks together more than twice as often. The smoking male employees were subsequently promoted at higher rates than male smokers assigned to non-smoking managers or their non-smoking co-workers. I showed that a similar boost in social interactions occurs between male managers and male employees when they are assigned to one another for quasi-exogenous reasons. As with co-smokers, when male employees were assigned to male managers, they were promoted faster in the following years than male employees assigned to female managers, and faster than female employees assigned to either male or female managers. The co-male and co-smoker career advantage were only present among employees who worked in close proximity to their managers, underscoring the essential role of face-to-face interaction. I showed that the career advantages in promotion and pay was not accompanied by any improvement in effort or performance. Throughout the financial institution, the male-to-male advantage I identified accounted for approximately 40% of the unconditional gender gap in promotions.

One of the most significant contributors to labor market disparities today is thought to be the use of criminal background records to screen out applicants from work. Unemployment among those previously incarcerated rose to nearly 30% in 2008.[2] Moreover, nearly one-third of working age individuals have a "rap sheet" that can be accessed by employers. Where labor laws have made strides to limit the look-back period for past crimes, labor market intermediaries have responded by legally pre-screening candidates before employers advertise their position. One such intermediary, a large online staffing platform, agreed to work together to understand why employers use background checks to screen applicants, and to design alternative solutions that are more inclusive and effective at achieving the employer's objective. In **"Increasing the Demand for Workers with a Criminal Record" (Cullen, Dobbie and Hoffman, 2023 *Quarterly Journal of Economics*)**, alongside this nationwide staffing platform, I offered opportunities to over 1,000 employers to hire workers who have a criminal record under experimentally varied policies and information about the worker. I found that 39% of

[2]Couloute and Kopf, 2018, Out of Prison & Out of Work, Prison Policy Initiative Report

businesses in the sample were willing to work with individuals with a criminal record under the status quo. Under modest crime and safety insurance, or with access to a past performance review, over half of employers were willing to hire workers with a criminal background; whereas to achieve similar hiring boosts, wage subsidies had to be more than 15% of the wage bill. I also directly elicited beliefs about the performance of workers with a past record and observed pessimistic perceptions that could be corrected with group level performance information. Based on these findings, the staffing platform relaxed the criminal background check requirement, creating 30,000 additional jobs for workers with a criminal background, and offered crime and safety insurance to businesses willing to hire from this pool.

In another vein of my research, I focus on marketplace determinants of wages. In my paper, **"Outsourcing Tasks Online: Matching Supply and Demand on Peer-to-Peer Internet Platforms" (Cullen and Farronato, 2021 *Management Science* (featured article))**, I found that the wages for independent contract workers remain almost constant regardless of large shocks to labor demand. The reason was that workers adjusted the supply of their labor almost instantaneously in response to rises in demand, offsetting any upward pressure on wages. The implication is that the market-maker, such as the online labor platform making matches between the employer and independent contractor in our setting, has minimal control over the wages of workers – bonuses and additional work opportunities are quickly redistributed among more workers who enter the market in response. Since this paper, the result has been replicated in several settings including on Ubers' platform, where John Horton and Jonathan Hall corroborate that the realy hourly wage is largely outside the control of marketplace designers due to the highly responsive labor supply.

III. Research on small business decision-making

Collectively, small business owners and their employees comprise nearly half the workforce. They also face unique challenges: on average, businesses with fewer than 500 employees have no more than two-weeks operating runway.[3] For this reason, both owners and employees are especially susceptible to fluctuations in demands and economy-wide shocks. My research on this topic brings to the fore how business owner *expectations* about the future are critical to understanding their behavior today. With an understanding of owner expectations, we can design policies in time to help small businesses meet commitments to their employees.

The pandemic placed these challenges center stage. Starting in March of 2020, I began real-time data collection of the expectations of small business owners about the disruptions they would face from changing consumer and supplier behavior, as well as their private preparation and public support. Typical data sources do not collect forward looking expectations, so I worked with a network of 5-million small business owners, organized as a non-profit called Alignable, to gather facts. Several of the resulting survey tools were adopted by the U.S. Census to create the Business Pulse, and used to inform the Payroll Protection Program (PPP) for small business lending where the efficacy of public support hinged on the time-sensitive expectations about what it would take to continue operating.

In a survey of more than 5,800 small businesses nation-wide, I document how business owner expectations about the duration of pandemic related disruptions affected current closing and layoff decisions. With experimental variation that shifted beliefs about available public support, I estimated

[3] JP Morgan Chase & Co. Research, 2016 "For Small Businesses: Cash is King"; Bartik et al. (2020)

anticipated take-up of loans and grants and affect on worker retention. In a separate paper, I use the repeated survey waves before and after local regulations came into place to examine whether the legal restrictions on businesses impacted their decisions to when to re-open. Indeed, I found that only a minority of businesses internalized contagion and would have delayed re-opening voluntarily, even among high-proximity, high-risk businesses. In a third paper, I directly study the implementation and efficacy of the Payroll Protection Program (PPP), the most substantial support for small businesses and distributed primarily in the form of forgivable loans allocated through private banks. While private banks may prioritize different organizations than a social planner, in practice, they have the advantage of speed. Since small businesses are particularly sensitive to the timing of support, I wanted to understand the trade-off between social alignment and delay in distribution, a trade-off that many programs confront. I used an instrumental variables approach that exploits variation in private banks' loan processing speeds to measure heterogeneity in the impact of aid on small businesses, and the cost of delay. I then compared the optimal allocation with the realized allocation: better targeting would not have been worth forgoing speed **(Bartik et al. 2020 *Proceedings of the National Academy of Sciences*, Balla-Elliot et al. 2021 *Journal of Policy Analysis and Management*, Bartik et al. 2023 *Review of Economics and Statistics*)**.

[1]Cullen and Pakzad-Hurson (2023) Equilibrium Effects of Pay Transparency *Econometrica* Vol. 91 (3), pp. 765-802 (Lead Article)

[2]Cullen and Perez-Truglia (2022) How Much Does Your Boss Make? The Effects of Salary Comparisons *Journal of Political Economy* Vol. 130 (3), pp. 766-822

[3]Cullen and Perez-Truglia (2023) The Salary Taboo: Privacy Norms and the Diffusion of Information *Journal of Public Economics* Vol. 222, 104890

[4]Cullen, Li, and Perez-Truglia (2022) What's My Employee Worth? The Effects of Salary Benchmarking, under revision at *Review of Economic Studies*, NBER Working paper 30570

[5]Cullen (2023) Is Pay Transparency Good? Invited for the *Journal of Economic Perspectives*, NBER Working paper 31060

[6]Cullen and Perez-Truglia (2023) The Old Boys' Club: Schmoozing and the Gender Gap, *American Economic Review* Vol. 113 (7), pp. 1703-1740 (Lead Article)

[7]Cullen, Dobbie and Hoffman (2023) Increasing Demand for Workers with a Criminal Background *The Quarterly Journal of Economics* Vol. 138 (1), pp. 103-150

[8]Bartik, Bertrand, Cullen, Glaeser, Luca, and Stanton (2020) The Impact of COVID-19 on Small Business Outcomes and Expectations *Proceedings of the National Academy of Sciences* 117, no. 30

[9]Bartik, Cullen, Glaeser, Luca, Stanton, Sunderam (2021) The Targeting and Impact of Paycheck Protection Program Loans to Small Businesses, under revision at the *Review of Economics and Statistics*, NBER Working paper 27623