Creative Destruction, Job Reallocation, and Subjective Well-Being

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Abstract

The recent research by Aghion et al. (2016) has looked at the effects of creative destruction on the reported subjective well-being of individuals using the Gallup US Daily Poll. Coupling the Gallup Dailies with the Quarterly Workforce Indicators (QWI) from the US Census, we build on this research by more carefully unpacking the components of labor market turnover, and exploring the rich detail of the Gallup data. We address some of their shortcomings by making use of a broader set of labor market measures of creative destruction that allows for a more nuanced investigation of how the dynamics of local labor markets interact with individual-specific characteristics. We decompose turnover and examine the heterogeneous effects of within-sector and cross-sector job reallocation on reported well-being across different sets of worker characteristics. This allows us to examine the well-being effects of business dynamism on different segments of labor market and suggests evidence of the importance of different forms of human capital. For example, log-years of schooling are associated with different well being levels for men and women. We find that the well-being effect of creative destruction measures varies from 50% to 65%, which suggests the importance of looking at different measures and being aware of the sensitivity of model specification. Furthermore, cross-sector and within-sector job reallocation both have heterogeneous effects on individuals—varying in their human capital and participation in different labor market segments.

Keywords: Subjective well-being, Job turnover, Business dynamism, cross- and within- sector churn, Human capital

1 Introduction

Schumpeterian creative destruction has come to play an important role in explaining the business dynamism and its contribution to modern macroeconomic growth theory (Aghion and Howitt, 1992; Grossman and Helpman 1991). Business dynamism reflects the degree of market change or volatility (Bakker Shepherd, 2017; Dess Beard, 1984) and it is an intrinsic property of the entrepreneurial ecology (Phan, 2006) that ignites the continual process of firm birth, failure, expansion, and contraction. Research has long established that this dynamic process is vital to productivity and sustained economic growth.

Business dynamism as a form of creative destruction is the churn of an economy that has it sources in the innovative activities of entrepreneurs. Entrepreneurs introduce new products or services to the marketplace or improve on already existing products by either higher quality or lower production cost. The process of creative destruction constantly leads to new products for consumers to purchase and new ideas to fuel further innovation. At the same time, new innovations also cause current technologies, processes, and products to become irrelevant, unneeded, or unwanted. This is the process of creative destruction whereby the new replaces the old; new firms are created (and existing firms expand) to provide the newly innovated products and services. These new and expanding firms seek to hire employees with specific human capital and skill-sets. As new firms (and existing firms) develop new products that attract consumer demand and use up some consumer disposable income, the demand for other products and services is necessarily diminished. This can lead to firm closures and contractions by failed firms, which in turn result in labor market separations and layoffs. Likewise, the process of creative destruction leads to a business environment characterized by new business starts and new labor market opportunities.

Scholarly studies have documented a decline in business dynamism throughout the U.S in last three decades (Hathaway and Litan, 2014). While this decline is a widely shared experience across the United States, it has become increasingly similar over time for different

regions, the effects of declining or growing business dynamism on individual well-being may vary substantially depending on a large number of understudied factors.

Business dynamism is well known to be a source of many positive economic benefits including growth (Aghion and Howitt, 1992 and 1994; Aghion et. al., 2005; Aghion, P., Howitt, P., and Mayer-Foulkes, 2005; Grossman and Helpman, 1991; Hirooka, 2006). Acs et al. (2018) provides empirical evidence that a strong entrepreneurial ecosystem contributes positively to national economic growth while Koellinger and Thurik (2012) demonstrate that entrepreneurship is a leading indicator of the world business cycle. Nobel Laureate Edmund Phelps (Phelps 2009, 2013, and 2017) and Diamond (2019) both posit that the processes of innovation and resultant environment of business dynamism lead to human flourishing. This happens as consumers confront more, higher quality, and cheaper alternatives in the marketplace but also as workers are given creative outlets that allow their many talents and virtues to develop. Thus, business dynamism leads to a more vibrant, meaningful and even happier life. This hypothesis has been tested empirically by the recent studies of Naudè et. al. (2014) and Aghion et. al. (2016).

Aghion et. al. (2016) employed a toy model of Schumpeterian growth through creative destruction to link the process to measures of subjective well-being through a labor-market-matching model. While they find evidence of direct and indirect effects of creative destruction on SWB, their model lumps together industrial sectors and segments of the labor market that could potentially mask the underlying dynamics of the labor market and more complex well-being effects. Our study will explore some of the complexity lurking behind these measures and tell a much more nuanced story of the relationship between the types of turnover and individual well-being. First, from the worker's perspective, looking only at aggregate turnover may miss potentially important variation in the turnover dynamics across sectors. Small and evenly distributed churn in a labor market is likely to have a very different well-being effect when compared to a growing overall economy with a few industries experiencing significant declines—yet these can result in the same overall measure of turnover. We there-

fore examine the distributions of turnover and its components to allow for more flexible relationships.

Second, aggregate measures of dynamism as offered by Aghion et al. (2016) fail to reflect the differential well-being effects that can arise from gaps between the skills or human capital of the existing workforce and those demanded by innovating firms. Depending on the value and specificity of a worker's human capital, reallocation across sectors may be particularly painful. Workers whose jobs are destroyed may or may not possess skills that are easily transferable to other existing or newly created jobs within or across sectors. Therefore, examining the within and between sector components of turnover may better reflect any shifts in the composition of labor demand and the generalized skill transferability of the existing workforce.

We decompose total labor-market turnover as proposed by Dunne, Roberts, and Samuelson (1989) into overall job growth, and into cross-sector and within-sector job reallocation that relate to structural and frictional churns in the labor market. The disentangling of these very different economic phenomena serves to more fully capture the worker's experience in the face of entrepreneurial innovation and dynamism where the skills of the existing workforce may or may not meet the demands of firms and also depends on the underlying matching efficiency of local labor markets. We provide the first look into the role individual worker heterogeneity plays in determining well-being in the face of shifting economic sands. Using our expanded measures of business dynamism measured in the US at the MSA level from Quarterly Workforce Indicator (QWI), and individual data from the Gallup U.S. Daily polls, we are able to empirically test whether business dynamism, in its expanded form, leads to increases in individual subject well-being along mulitpkle worker dimensions.

Third, analyzing the connection between subjective well-being and innovative dynamism requires careful attention be paid to well-known domains of subjective well-being. By omitting influential factors such as health and employment status in their main analysis, Aghion et al. overlook a potential for omitted variable bias in their estimated well-being effects of

creative destruction.

The remainder of this paper is organized as follows. Section 2 reviews the relevant literature on relations of dynamism, well-being, and human capital. Section **??** discusses the method for our study, our testable hypotheses as well as data. Section 4 gives the results. Section 5 concludes the paper.

2 Literature Review

2.1 Business dynamism, creative destruction and entrepreneurship

Schumpeter describes a world in which existing products, new products, new means of production and organization are always being created, innovated, destroyed, and replaced; in a condition where an innovative process is fueled by entrepreneur's vision and their drive to pursue it. Schumpeter explains creative destruction as the cornerstone of a prosperous capitalist economy:

> The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers, goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates... [This process] incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism. (Schumpter, 1942, pp 82-83)

While Schumpeter's ideas were not expressed in the formal mathematical models of modern economic theory, modern theorists have included his ideas in models of endogenous growth (Aghion & Howitt, 1992 and Aghion et. al. 2005) and introduced terms such as *Schumpeterian growth theory* and *Schumpeterian creative destruction* to recognize Schumpeter process of innovation and creative destruction as an important contributor to economic growth (Aghion and Howitt, 1994; Aghion et. al., 2005; Aghion, P., Howitt, P., and Mayer-Foulkes, 2005). Aghion and Howitt (1992) introduce an endogenous growth theory that embodies Schumpeter's idea of creative destruction by allowing for factor of obsolescence

in the model (i.e., better products render previous ones obsolete). Grossman and Helpman (1991) develop a model of endogenous growth from innovation whereby firms produce a continuum of products with each progressing along its own quality ladder[1]. In other words, entrepreneurs invest in research and development targeted at bringing a specific product to the next generation (step on the quality ladder) with the aim of becoming quality leaders and enjoying the stream of profits such status brings.

To Schumpeter "a study of creative response in business becomes coterminous with a study of entrepreneurship"(Schumpeter, 1947, p. 223), which make Schumpeter's creative destruction one of the fundamental premises of study of entrepreneurship. Creative imagination of entrepreneur is a "wellspring" of the entrepreneurial process (Chiles et. al., 2013), such that an entrepreneur's creative imagination — the creation of novelty through forward-looking imagination — disturbs the existing equilibrium, creating disequilibrium, and creates new opportunities (Chiles et. al., 2007).

While many consider the process of creative destruction and the concept of business dynamism to be synonymous, this isn't completely true. In the theoretical models of Hopenhayn (1992) and Hopenhayn & Rogerson (1993), dynamism in the form of job creation and destruction as well as firm starts and exits are driven by firm level stochastic productivity shocks which are the only source of uncertainty in their models. Business dynamism need not have its source in the process of creative destruction at all but can be the natural consequence of equilibrium behavior in a stochastic and dynamic environment. Because of this, measures of dynamism that depend only on job creation and destruction rates and/or firm start and exit rates may not correspond to the creative imagination and destruction processes characterized by the "innovative dynamism" of entrepreneurs as described by Diamond (2019).

[1]For an extensive treatment and review of the standard quality ladder model see Scotchmer (2004). It is standard in much of the quality ladder literature that innovating firms gain a patent which grants temporary monopoly power (O'Donoghue, 1998). Jackson and Smith (2015 and 2019) provide a quality ladder model of non-drastic innovation in which firms continue to compete for market share post innovation.

The concepts of innovative dynamism and creative destruction are, in the entrepreneurship literature, generally taken as synonymous (Decker et. al., 2016). Diamond (2019) discusses the process of creative destruction, re-termed as innovative dynamism, and the many benefits brought by it. Innovative dynamism brings the benefits of new goods, lower prices, reduced pains from labor market fluctuations, and improved jobs.

> . . . a system of innovative dynamism does better than any other system at satisfying the needs, physiological and beyond physiological, that are helpful to achieving the narrower but still very wide range of life plans that involve the choice and pursuit of challenging, meaningful projects. . . such life plans provide the most promising paths to human flourishing. . . (Diamond, 2019, p 45)

Diamond (2019) expresses that like creative destruction, "innovative dynamism" implies new goods, new jobs, new challenges, ideas, and technology. However, it also suggests "directionless churn." Use of word "innovative" next to "dynamism" asserts that these changes are in a positive and progressive direction (Diamond 2019). While much innovation can be described as cumulative quality improvements of existing products (sometimes called Usherian innovation–Usher, 1929), this is certainly not the whole domain of innovation. Innovation as explained by Schumpeter (1939, pp. 84-86), is the commercialization or introduction of that newly invented product or service into the market. Schumpeterian innovation (sometimes called Radical or disruptive innovation–Schumpeter, 1934, 1939) is trend-breaking and renders existing products or methods obsolete (Carlino and Kerr, 2015), and often involves the creation of new, possibly even previously incomprehensible, products and services.

2.2 Subjective well-being and creative destruction

Researchers in a variety of fields are now becoming interested in the study of subjective well-being and grow consensus that subjective measures of well-being should be studied alongside other economic indicators to inform national public policy (Diener, 2000; Diener, 2006; Stiglitz, Sen, and Fitoussi, 2009; Layard, 2005; Forgeard et al., 2011). Therefore, while

subjective well-being studies were initially dominated by psychologists in the field of positive psychology (Ryan and Deci, 2001; Seligman and Csikszentmihalyi, 2014), there is a large body of work by researchers in other social sciences—particularly economics (Bjørnskov et. al. 2010; Frey and Stutser, 2000; Graham, 2012 and 2017; Jackson, 2017), and politics (Bok, 2010; Di Tella and MacCulloch, 2005; Jackson, 2018; Radcliff, 2001).

Well-being is also increasingly a topic of study by researchers in entrepreneurship as well (Wiklund et al., 2019). A recent issue of the *Journal of Business Venturing* (Wiklund et al., 2019) was dedicated to the topic of entrepreneurship and well-being.

> Entrepreneurship often energizes positive change in society providing breakthrough commercial or social innovations that contribute to social well-being. . . [Entrepreneurship] can become a force for a positive change in society that can increase individual and social well-being.(Wiklund et al., 2019)

Most research on well-being in the field of entrepreneurship has been dedicated to the study of the effect of entrepreneurial activity on the well-being of the entrepreneur. The consensus in this emerging literature is that those who start their own business report higher well-being than those with traditional wage based employment (Benz and Frey, 2008; Binder and Coad, 2013 and 2016; Bjørnskov and Foss, 2018; Hahn et. al., 2012). This higher well-being comes despite the higher stress (McMullen and Shepherd, 2006) and uncertainty (Monsen and Wayne Boss, 2009) experienced by an entrepreneur. In well known previous work (Ryff, 1989; Ryff and Singer, 2008) psychologists have developed a six-dimensional model of well-being somewhat loosely derived from the Aristotelian concept of eudaimonia. The six dimensions of the model are: autonomy, environmental mastery, personal growth, positive relationships with others, purpose in life, and self acceptance. While not all dimensions have a clear relationship to entrepreneurship, the dimension of *autonomy* "emphasizes that one is self-determining and independent as well as able to evaluate oneself by personal standards, and if need be, to resist social pressures to think or act in certain ways." (Ryff, 2019). Shir et. al (2018) uses a self-determination theoretic framework to show that the relationship between entrepreneurial activity and well-being is mediated by psychological

autonomy. Entrepreneurial activity increases psychological functioning which translates into higher well-being.

While it is clear how entrepreneurship can lead to increased autonomy for the entrepreneur, it can also lead to greater autonomy for others in society as well. Entrepreneurial innovation is constantly adding to the many consumption alternatives available. This comes in the form of higher quality goods and services in addition to producing them cheaper. Perhaps even more importantly, entrepreneurship adds variety in the form of previously non-existing options. It's now hard to imagine a life without the constant presence of a smart-phone even though such a device was inconceivable 20-30 years ago. Entrepreneurship increases autonomy by providing increased opportunities to individuals to spend their money on goods and services that satisfy their own wants and desires. Entrepreneurship also increases the autonomy of others through the labor market and employment. New firms are well documented (Decker et al. 2014) as the primary source of job growth in an economy. An increased stream of employment opportunities gives workers increased autonomy in the selection of not only the best paying employment alternative but also to find employment in a meaningful career. Innovative dynamism can lead to employment alternatives where the creative talents of employees, not just entrepreneurs, are allowed to develop and flourish in invigorating processes of discovery and challenge. This hypothesis leaves clear room for a competing hypothesis that vicious, as opposed to virtuous, entrepreneurs damage society. Baumol (1990) contrasts unproductive (damaging) entrepreneurship which stems from the rent-seeking activities of vicious entrepreneurs as opposed to Schumpeterian (productive) entrepreneurship which comes from the innovative activities of entrepreneurs in the process of innovative dynamism.

Carol Ryff (Ryff, 2019) highlights the importance of studying the effect of entrepreneurship on the well-being of others. She then calls for new research on the topic offering the hypothesis that "Virtuous entrepreneurs improve society... entrepreneurship, when virtuously enacted, makes for better societies, defined as ever greater numbers of individuals who

have opportunities to make the most of themselves, their talents, and their lives."

Few empirical and theoretical studies have looked at the effect of entrepreneurship and business dynamism on the well-being of individuals more broadly. The known exceptions to this are Naudé et. al. (2014) and Aghion et. al. (2016).

Naudé et. al. (2014) looks at the causal impact of entrepreneurship on happiness at the national level. They use measures of early stage entrepreneurial activity from the Global Entrepreneurship Monitor and happiness data from the World Database on Happiness and the Gallup World Poll. Each of these data sources provide aggregate measures at the national level. They conjecture that entrepreneurship increases national happiness through two main channels: (1) the direct channel we noted prior whereby the entrepreneurs themselves experience greater levels of happiness emanating from increased job satisfaction, health, and autonomy that comes with business ownership and (2) indirectly through spillover effects and provision of consumption and employment opportunities. They find evidence that the effect of entrepreneurship on national happiness follows a curvilinear path whereby entrepreneurial activity increases national happiness up to a point at which it starts to decline. The conjecture is that not everyone is well-suited to entrepreneurship and at especially high levels many people are acting as entrepreneurs who would be better served—and better serve others—if they were employees rather than business owners.

Aghion et al. (2016) presents a theoretical model which connects a labor market matching model (as in Pissarides, 2000) to a model of economic growth based on quality improving innovation (Aghion and Howitt, 1990 and 1994; Mortensen and Pissarides, 1998). Through this model, a link is made between job turnover rates in the labor market and individual well-being (utility). Job-turnover rates represent the business dynamism from creative destruction in their model. They proceed to empirically test their theoretical predictions using data from Gallup daily surveys and MSA level data on job creation and destruction from the Census Bureau Business Dynamics Statistics. Their empirical findings generally support their theoretical predictions demonstrating that creative destruction and job creation have a

positive effect on well-being, while job destruction has a negative effect. They also recognize the importance of heterogeneity of the effects by state level generosity of unemployment benefits, which moderate the effect of job destruction, and also that the job creation effect is larger for more forward looking individuals.[2]

While Aghion et al. (2016) explicitly link business dynamism to well-being in a formal mathematical model, most theorizing on the connections between entrepreneurship and dynamism are of a more psychological and discursive flavor. Standard economic models only recognize the wage returns to labor and work. "In such models, the reward for work is fundamentally the wage paid in the economy for the sort of work being done. There is no room in those models for any human agency by which a person might gain rewards other than the going wage - only room for endogenous responses to changes in the market wage." (Phelps, 2017) These models miss the value of work in contributing to a flourishing life and eudaimonic well-being (Phelps, 2013).

2.3 Creative destruction, human capital, and socio-demographic factors

While there is a deep literature on human capital formation, the financial return to schooling, and resultant labor market outcomes; less is understood about the relationship between these and subjective well-being. Recent studies have investigated the importance of industry-, firm-, and occupation-specific human capital in determining wages. Kambourov and Mankovskii (2009) find little evidence of the importance of firm or industry-specific human capital, but instead find human capital to be substantially occupation-specific, with 5 years of occupational experience leading to a 15–20% increase in wages.

Sullivan (2009) paints a more complex picture where the importance of each type of human capital varies by occupation. For example, they find that craftsmen earn a 14% increase in wages after 5 years of occupational experience, while managers see a 23% increase in wages not with occupational experience but after 5 years of industry experience. Professionals also

[2]Being more forward looking or hopeful in the Gallup data is frequently measured by comparing the difference in your expected life-satisfaction five years from now and its current level.

appear to accumulate skills that also transfer across industries, as they see a 14% wage gain for 5 years of industry experience but also a 22% increase for 5 years of occupational experience.

If human capital is an important determinant of economic productivity and wages, it is likely also to help protect one from spells of unemployment—and provide one with opportunities for advancement—during periods of higher labor-market turnover. How one's well-being is affected by higher turnover may differ according to both the type of turnover and the transferability of one's skills.

To the extent that human capital is industry specific, the type of churn in the labor market should matter. While reallocation of labor within an industry would allow workers to benefit from their accumulated capital, the same wouldn't be true with reallocation across industries. Workers may experience decreased productivity and wages, increased stress, or a loss of perceived status in the presence of these work-related life disruptions.

If human capital is primarily occupation-specific, the picture is less clear. Creative destruction that results in within or cross-sector job reallocation may not lead to much disruption in well-being if workers remain in similar occupations. To the extent that higher levels of general human capital indicate broader skill transferability, more highly educated workers should be better able to adapt to cross-sector shifts from the "perennial gale" of creative destruction as it churns the labor market.

3 Methodology and data

3.1 Measures of creative destruction

The economy is comprised of a large number of distinct labor market sectors segmented by industry, skill, occupation, geography, or a combination of these attributes (Sahin et al. 2014). As innovation affects and occurs in these industries unevenly, the effects of innovative dynamism on individuals well-being are likely to vary along individual characteristics—such

as human capital—that sort them into different segments of the labor market. Attempting to more thoroughly categorize the labor market dynamics, we split total job turnover into its components—namely net employment change, cross-sector job reallocation, and within-sector job reallocation—to analyze measures of innovative dynamism that may be more illustrative of important labor market heterogeneity.

For the expanded measure of dynamism, we utilize the decomposition of total job turnover into the sum of three components as introduced by Dunne et al. (1989) and later adapted by Hyclak (1996) to measure creative destruction. Total job turnover (T_{ct}), which is the most widely used measure of creative destruction in previous studies (Hyclak 1996, Aghion et al, 2016), reflects job turnover regardless of net growth or decline in an MSA economy as the economy grows by a process of many multiple simultaneous job creations and job destructions:

$$\text{Decomposition 1: } T_{ct} = GJC_{ct} + GJD_{ct} \tag{1}$$

where GJC_{ct} (gross job creation) is the number of job gains in all the firms ($f = 1...F$) throughout the quarter t in MSA c, and analogously, GJD_{ct} (gross job destruction) is the number of job loss due to establishment closings and economic contraction in all the firms throughout the quarter t in MSA c. The employment through the quarter is defined as the difference between the beginning of quarter and the end of quarter employment depending on the definition:

$$GJC_{ct} = \sum_{j=1}^{J} \sum_{f \in F} ((EndEmp - Emp)_f | (EndEmp - Emp)_f > 0)_{jct} \tag{2}$$

and

$$GJD_{ct} = \sum_{j=1}^{J} \sum_{f \in F} ((Emp - EndEmp)_f | (EndEmp - Emp)_f < 0)_{jct} \ , \tag{3}$$

where j indexes industries in MSA c at time t.

As it is presented in equation (4), job turnover can also be restated as two components of "net change in employment/job" and "excess job reallocation."

$$\text{Decomposition 2: } T_{ct} = |\Delta L_{ct}| + \text{Excess Job Realloc.}_{ct} \tag{4}$$

where $|\Delta L_{ct}|$ is the net change in employment and the lower bound of total job turnover ($|\Delta L_{ct}| = |GJC_{ct} - GJD_{ct}|$), and the excess job reallocation is the reallocation over and above what is needed to accommodate the net change in employment (Dunne et al., 1989). Close scrutiny of excess job reallocation reveals important information specially when the net change in employment fails to capture the vast majority of employment reallocation due to large churns in sectoral and regional labor markets. Therefore, to better investigate the potentially complex local labor market dynamics, we further disaggregate the measure of excess job reallocation (equation(6)) into its two components of: (1) cross-sector job reallocation ($\sum_{j=1}^{J} |\Delta L_{ct}^{j}| - |\Delta L_{ct}|$) reflecting the shift of employment across sectors and what is left in excess of the net change among all industries (two-digit NAIC industry codes); and (2) the within-sector reallocation ($\sum_{j=1}^{J} (T_{ct}^{j} - |\Delta L_{ct}^{j}|)$), which is employment turnover in excess of the net change among all plants within the same industry, which is summed over all industries (presented in (equation 5).

$$\text{Excess Job Realloc.}_{st} = [\textstyle\sum_{j=1}^{J} |\Delta L_{ct}^{j}| - |\Delta L_{ct}|] + [\sum_{j=1}^{J} (T_{ct}^{j} - |\Delta L_{ct}^{j}|)] \tag{5}$$

$$\text{Decomposition 3: } T_{ct} = |\Delta L_{ct}| + (\sum_{j=1}^{J} |\Delta L_{ct}^{j}| - |\Delta L_{ct}|) + \sum_{j=1}^{J} (T_{ct}^{j} - |\Delta L_{ct}^{j}|) \tag{6}$$

Previous studies argue that the within-sector job reallocation is indicative of labor market frictions while cross-sector reallocation is more likely representative of structural or mismatch unemployment (Hyclak 1996, Sahin et al. 2014). When jobs are reallocated for reasons other than frictions, such as the birth or death of a particular industry, the potential for skill mismatch is higher as new processes and products replace the old. Analyzing the covariation between well-being and the extent to which labor is reallocated across sectors should help us quantify aspects of the worker's adjustment costs and hint at the presence of mismatch unemployment.

To allow for more complex dynamics in the labor market, we separate job turnover into its components of excess job reallocation and net employment growth as a proportion of beginning-period employment at quarter t, in MSA c, which is dividing the estimated measure of creative destruction by $Emp_{ct} = \sum_{j=1}^{J} Emp_{jct}$ (Dunne, Robert and Samuelson 1989).[3]

A few remarks on the opportunities and limitations of the QWI data used to estimate the measure of creative destruction may be helpful here. First, while the QWI is not longitudinal at the firm level, its design is based on the Longitudinal Employer-Household Dynamics (LEHD), which is job-based data at the establishment/plant level[4]. Therefore, the measure of firm-based job flows [5] provided in the QWI enable us to estimate the total job turnover, (T_{ct}),

[3]The most conventional measure for the analysis of establishment and firm dynamics that accommodates the exit and entry has first been introduced by Davis, Haltiwanger, and Schuh (1996), which is estimated based on the second order of log difference and has its useful properties of symmetric growth rate, such that it allows for growth rate around zero and is bounded between -2 and 2 that illustrates exit and entry, respectively.

[4]The entity in the Business Register (or SSEL) which is the database used to identify firms in LEHD is either a single unit or multi unit establishments. If multi unit establishment, the Census Bureau (Economic Census and the annual Company Organization Survey) breaks the enterprise (firm) and its Employer Identification Number (EINs) into their constituent establishments.

[5]In QWI dataset, the measure of firm-based job gain (FrmJbGn), sector j, MSA c, at time t, and

and within-sector job reallocation that requires the establishment/plant-level data. Dunne et al. (1989) note that other components of total job turnover (net change in employment and cross-sector job reallocation) can be estimated using aggregate data at the sector level. In addition, using the firm-based job turnover instead of employment flows, accounts for temporary layoffs and recalls plus continual sorting and resorting of workers across a given set of jobs (Davis and Haltiwanger, 1992).

To lay out the full picture of economic dynamism as presented in the theory section, firms entry and exit should be accounted for in the measure of creative destruction. One other noteworthy analysis that emerges from disaggregating total job turnover into different components is the heterogeneous well-being impact of within-sector job reallocation in term of firms size and age (Davis and Haltiwanger, 1992). Decker et al. (2014) emphasize the role of entrepreneurship in job creation by looking at newly established firms and find that business startups account for 20% of U.S. total gross job creation. However, the measure of firm-based job creation and job destruction in the QWI is the aggregate of employment opportunities from expanding and newly established firms and the aggregate of job losses from shrinking and exiting firms, we therefore can not identify firm births and deaths to further refine our measures of CD.

3.2 Empirical model and hypotheses

We estimate a series of regressions analyzing the impact of creative destruction on subjective well-being (SWB) of individual i living in MSA c in state s at year t. Measures of creative destruction (CD) in this study are 1) total job turnover, and disaggregation of this measure into 2) gross job creation, 3) gross job destruction, 4) excess job reallocation, 5) net employment change, 6) cross-sector job reallocation, and 7) within-sector job reallocation. *We test the null hypothesis that different components of job turnover—reflecting the*

firm-based job loss (FrmJbLs), sector j, MSA c, at time t, are equivalent to terms $\sum_{f\in F}((EndEmp - Emp)_f|(EndEmp - Emp)_f > 0)_{jct}$ in eq (2) and $\sum_{f\in F}((Emp - EndEmp)_f|(EndEmp - Emp)_f < 0)_{jct}$ in eq (3), respectively.

business dynamism in the local labor market—have the same "direct" effect on SWB. The general form of our regression equation is given below in equation (7) where α_{1k} represents the parameter(s) of interest for alternative models that may include total job turnover or components of previously introduced decompositions of total job turnover. X_i is a matrix of individual characteristics of the survey respondent i, Y_{ct} is a vector of MSA c characteristics and conditions at time t, λ_c is a MSA fixed effect, λ_s is a state fixed effect, λ_t is a year effect, and ϵ_i is an idiosyncratic error term.

$$\text{SWB}_{icst} = \sum_{k\in[1,7]} \alpha_{1k}\text{CD}_{ctk} \; + \; \beta X_i \; + \; \gamma Y_{ct} \; + \; \lambda_c \; + \; \lambda_s \; + \; \lambda_t \; + \; \epsilon_i \tag{7}$$

For ease of interpretation and simultaneous test of nonlinearity, we discretize the variables of creative destruction. Using the estimation result from equation (8), *we test the hypothesis of nonlinearity in the impact of creative destruction by investigating the impact of job turnover (and net employment change) on SWB when it is coupled with larger cross-sector and within-sector job reallocation.* We answer series of questions:

1) *higher job turnover rate (and net employment change) increases well-being more when controlling for cross-sector and within sector job reallocation*

2) *Reshuffling of employment opportunities across plants within the same sector (reflecting frictional change) or across sectors (reflecting structural change) drives the effect of job*

turnover and net employment change on the individual well-being.

$$
\begin{aligned}
&\text{SWB}_{icst} = \alpha_0 + \alpha_1 \text{CD}_{ct} + \alpha_2 \text{Cross-sector job realloc.}_{ct} + \alpha_3 \text{Within-sector job realloc.}_{ct} + \\
&\alpha_4 \text{CD}_{ct} \times \text{Cross-sector job realloc.}_{ct} + \\
&\alpha_5 \text{CD}_{ct} \times \text{Within-sector job realloc.}_{ct} + \\
&\alpha_6 \text{Cross-sector job realloc.}_{ct} \times \text{Within-sector job realloc.}_{ct} + \\
&\alpha_4 \text{CD}_{ct} \times \text{Cross-sector job realloc.}_{ct} \times \text{Within-sector job realloc.}_{ct} + \\
&\beta X_i + \gamma Y_{ct} + \lambda_c + \lambda_s + \lambda_t + \epsilon_i
\end{aligned}
\tag{8}
$$

We estimate equation (8) for two alternative CDs of total job turnover and net employment change. The measure of creative destruction (CD) takes value one when it is identified as being above the median of the distribution (presented in figure (1) and (2)).
With regard to the attenuating/exacerbating effect of individual socio-demographic characteristics in skill transferability and mediating the relationship between creative destruction and well-being, *we investigate the heterogeneous effects of employment status and educational attainment* adding the complete sets of interaction terms of variable of interest to equation (8). Presented in equations (9) and (10), we introduce the six-category employment status variable to the model as five indicator variables, where "Employed full time with employer" is the reference group (l=2..6), and the five-category variable of educational attainment as

four indicator variables where, "High school diploma" is the reference group (l=2..5),

$$\begin{aligned}
&\text{SWB}_{icst} = \alpha_0 + \textstyle\sum_{l=2}^{6} \alpha_{1l}\text{Employment}_{ctl} + \alpha_2\text{CD}_{ct} \\
&\alpha_3\text{Cross-sector job realloc.}_{ct} + \alpha_4\text{Within-sector job realloc.}_{ct} + \\
&\textstyle\sum_{l=2}^{6} \alpha_{5l}\text{CD}_{ct} \times \text{Employment}_{ctl} + \\
&\textstyle\sum_{l=2}^{6} \alpha_{6l}\text{Cross-sector job realloc.}_{ct} \times \text{Employment}_{ctl} \\
&\textstyle\sum_{l=2}^{6} \alpha_{7l}\text{Within-sector job realloc.}_{ct} \times \text{Employment}_{ctl} + \\
&\beta X_i + \gamma Y_{ct} + \lambda_c + \lambda_s + \lambda_t + \epsilon_i
\end{aligned} \tag{9}$$

$$\begin{aligned}
&\text{SWB}_{icst} = \alpha_0 + \textstyle\sum_{l=2}^{5} \alpha_{1l}\text{Education}_{ctl} + \alpha_2\text{CD}_{ct} \\
&\alpha_3\text{Cross-sector job realloc.}_{ct} + \alpha_4\text{Within-sector job realloc.}_{ct} + \\
&\textstyle\sum_{l=2}^{5} \alpha_{5l}\text{CD}_{ct} \times \text{Education}_{ctl} + \\
&\textstyle\sum_{l=2}^{5} \alpha_{6l}\text{Cross-sector job realloc.}_{ct} \times \text{Education}_{ctl} \\
&\textstyle\sum_{l=2}^{5} \alpha_{7l}\text{Within-sector job realloc.}_{ct} \times \text{Education}_{ctl} + \\
&\beta X_i + \gamma Y_{ct} + \lambda_c + \lambda_s + \lambda_t + \epsilon_i
\end{aligned} \tag{10}$$

To investigate the gender divide of the well-being effect of business dynamism, we further disaggregate the heterogeneous effect of education by self-reported binary gender status. *We hypothesize that (1) reshuffling of employment opportunities across sectors heterogeneously effects individual well-being depending on the ease of generalized skill transferability. Specifically, we expect that higher educational attainment improves well-being in the presence of higher cross-sector job reallocation. (2) On the other hand the within-sector job reallocation component of excess job reallocation imposes a different heterogeneous effect on individuals by gender and educational attainment.*

3.3 Data

To test our hypotheses, we use the Gallup U.S. Daily Poll from the Gallup organization. Gallup collects cross-sectional household information along the measure of life satisfaction from the U.S. residents. Our primary measure of subjective well-being is captured by Cantril's ladder-of-life question of global life evaluation:

> *Please imagine a ladder with steps numbered from zero at the bottom to ten at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time?*

Respondents can choose discrete values from 0 to 10 that rank their self-anchored life evaluation from the worst to the best possible life, respectively. Following previous studies in the literature of SWB (see Ferrer-i-Carbonell and Frijters 2004 for more details), we assume that there is no evident gain in utilizing the ordinality of measure of life satisfaction, we therefore treat this measure as a cardinal continuous variable in our regression analysis.

The first panel of Table (1) presents the summary statistics of the life satisfaction questions, the socio-demographic characteristics (age, number of children, marital status, general health, race, gender, education, income level, and employment status) from Gallup. The average for the continuous measure of current life satisfaction is 6.7. Using the sampling weights in estimating the summary statistics, all the measures of socio-demographic variables are representative of the measure of SWB for the U.S. population. To account for the impact of local amenities on life satisfaction and controlling for urban agglomeration, we use non-linear measure of population and household median income from United States Census Bureau American community survey. As the measures of creative destruction are closely related with the unemployment rate (individuals who fail to find new jobs as a result of job destruction may get unemployed), we also control for unemployment rate from Bureau of Labor Statistics.

[Table 1 about here]

We combine the individual-level data from Gallup with detailed information from the Quarterly Workforce Indicators (QWI) of the United States Census Bureau for the period of this study from 2009–2016. The QWI contains information on the quarterly measures of total employment for NAIC industry codes at the MSA level. Utilizing this data, we estimate a more refined measure of creative destruction that reflects sectoral and within sector job reallocations. Table 2 shows the summary statistics of measures of creative destruction depicted in section (3.1).

[Table 2 about here]

In the period of our study (2009–2016), the rate of total job turnover is 0.09, and the average rate of gross job creation and gross job destruction are 0.05 and 0.04, respectively. The positive value of average rate of net job creation or employment growth rate shows that on average a representative MSA economy within the U.S has experienced net job growth over the sample period. Reflecting how many of the jobs created and destroyed are being met by cross-sector and within-sector job reallocation, overall excess job reallocation is 0.08. Comparing the average rate of total job turnover and excess job reallocation shows that a relatively large portion of turnover is due to cross- and within- sector job reallocation and we emphasize the importance of including them in analyses of the well-being impact of creative destruction.

Figure 1 and 2 present three possible decompositions of creative destruction used in this study and explained in section (3.1). As proposed by Aghion et al. (2016), the first decomposition is based on total job turnover, gross job creation, and gross job destruction is presented in equation (1). Close investigation of these measures shows that in the period of study total job turnover has a rather similar distribution as gross job creation. The second decomposition of creative destruction into net employment change and excess job

reallocation shows that excess job reallocation above what is needed to accommodate net change in employment has the highest correlation with the total job turnover.

It should be noted that leaving out this portion of creative destruction from the analysis of well-being masks how important and complex dynamics in the labor market interact with individual socio-demographic characteristics. We then further decompose the measure of excess job reallocation into its within- and cross- sector components. Using a Pearson chi-squared test on categorical variables of excess, within- and cross- sector job reallocation (into three tertiles), we reject the hypothesis that these measures have the same distribution[6].

[Figure (1) and (2) about here]

Figure 3 map the average regression adjusted life satisfaction across the U.S. from 2009 to 2016 (for more details on the estimation method see Ahmadiani and Ferreira, 2019). Consistent with previous studies, the large significant regional variation in the measure of SWB is evidence of the impact of locally influential factors. Lower map that presents MSA-level life satisfaction accounting for total job turnover illustrates how individuals are unequally influenced by job turnover across the space and may fall above or below their average long-run SWB comparing with the upper map.

[Figure 3 about here]

4 Results

Table (3) shows regression results estimating the effect of different components of creative destruction on individual well-being (equation (7)). All regressions control for a full set of individual control variables in addition to MSA, state, and year dummies. [7] Depicted in columns (1) and (2), we find consistent results with Aghion et al. (2016) that increases

[6]H0: Excess job realloc.= cross-sect. job realloc: Pearson chi2(4) = 9.8e+03; H0: excess job realloc.= within-sect. job realloc: Pearson chi2(4) = 5.2e+03; H0: cross-sect. job realloc.= within-sect. job realloc: Pearson chi2(4) = 90.4592

[7]These have been suppressed for brevity but are available from the authors by request.

in total job turnover and job creation, increase the average life satisfaction. However, we couldn't reject the hypothesis that gross job destruction has a negative effect on individual well-being. In contradiction with Aghion et al. (2016) finding, this result suggests that individual are not affected by higher risk of unemployment. One explanation for the distinction between our finding and Aghion et al. (2016) might be driven from different periods of study. While their study was limited to years during and immediately following the financial crisis of 2008, ours cover a longer period including a period of consistent labor market expansion after the recession.

Table (3), column (3) presents the second decomposition of job turnover into net employment change and excess job reallocation. Net employment change is the minimum change in the number of jobs that have been filled out without reflecting the dynamic churn in the labor market. Therefore, it is a measure of creative destruction in the sense that it gives the same weight to created and destroyed jobs but also is an estimate of the minimum flux around the extensive margin of the labor market. The estimated coefficient of net employment change is statistically significant, suggesting that labor market churn in any direction leads to higher SWB due to benefits accruing from a more dynamic labor market—even after controlling for income and employment.

We find that 1% increase in rate of net employment change increases individual well-being by 0.64 in a 0-10 SWB scale points. As stated before, excess job reallocation is a measure of creative destruction that captures between and within-sector reallocation churns. We found that increase in excess job reallocation does not have any association with the SWB.

The regression results displayed in Table (3), column (4) shows the estimated effect of net employment change on well-being when we simultaneously control for cross-sector and between-sector job reallocation (e.g., two components of excess job reallocation). Each of these components conveys distinct information about regional labor markets. Investigating the evidence of direct effect of between-sector job reallocation and within-sector job reallocation, We couldn't reject the null hypothesis that they have no direct effect on SWB.

However, we find that controlling for components of excess job reallocation in the local labor market, slightly increases the association between net employment change and SWB.

Aghion et al. (2016) argue that controlling for the local unemployment rate should eliminate the negative effect of job destruction on well-being only if the negative effect is driven by a higher risk of unemployment. We investigate the effects of creative destruction are driven primarily by the negative effect of higher risk of unemployment (through job destruction), or the positive effect of a growing economy (through job creation) (based on prediction 1 in Aghion et al., 2016). To test this hypothesis, in table (4), we control for the unemployment rate and find that while unemployment has an expected negative effect on well-being, it does not change the association between SWB and creative destruction measures (we conduct the test of statistical difference between the estimated coefficients of corresponding columns in tables 3 and 4). Insignificant coefficients of the job destruction variable in table 3 and 4 also reconfirm this finding that on average the positive effect of creative destruction dominates its negative effect, which is in contrast with what Aghion et al. (2016) found in their studies.

We examine next the different distributions of our measures of creative destruction and their decompositions into the excess job reallocation components. We investigate the non-linear well-being effect of total job turnover and net employment change relative to cross- and within-sector job reallocation. Table 5 provides the results needed to test hypotheses investigated in equation (8). Column (1) in table 5 shows that relative to below median total job turnover, the impact of living in a location with a more dynamic labor market has a larger effect on well-being when within-sector job reallocation is above the median. However, investigating this hypothesis for net employment change as the second measure of creative destruction that excludes excess job reallocation, reveals a different and more interesting pattern.

As presented in column (2), table (5), we find that larger net employment changes lead to the largest impact on individual well-being when coupled with high cross-sector and within-

sector job reallocation in a labor market (estimated coefficient: 0.054). Table 6 presents the estimated marginal effect of the return to high job turnover (and net employment change) relative to other characteristics of labor markets, when either cross- or within- sector job reallocation is fixed. In the first panel of table (6), when cross sector job reallocation is low (below median) and within sector job reallocation is fixed, both larger total job turnover and larger net employment changes have a larger positive contribution to life satisfaction (0.014, and 0.018, respectively). Similarly, in the lower panel of table (6), when cross-sector job reallocation is fixed and within-sector job reallocation is larger, both larger job turnover and net employment changes improve well-being (0.021, and 0.018, respectively).[8] To investigate the robustness of our nonlinear well-being effect, we allow for simultaneous changes in components of job turnover by categorizing all the above/below median combinations of our different component measures of creative destruction. This generates 7 binary variables based on combinations of the different measures of CD (relative to the combination of 1)low cross-sector, low within-sector and low measure of CD). Presented in table (11), we find that among all the combinations, living in a location with above median net employment change, above median cross-sector, and above median within sector job reallocation has the largest positive well-being effect.

The heterogeneous well-being effects of creative destruction for individuals by employment status are presented in table (7). Higher local job turnover and net employment changes both contribute more to well-being when individuals are unemployed. The construct of the variable of employment status in Gallup is consistent with economic definition of employment status, such that it is not a self-anchored variable, and defined by the interviewer based on series of questions in the questionnaire. For instance, an individual is defined as unemployed if "in past four weeks, have been actively looking for jobs." Presented in first column of table (7), the unemployed are better off in locations with high job turnover such that 1%

[8]Since the distribution of measures of creative destruction are heavily right skewed, presenting MSAs with very high job turnover, we also investigate the monotonicity of the effect using three tertiles of the creative destruction distribution (k=1,2,3) and find similar effects for the first and second tertiles in most of the specifications.

increase in the rate of total job turnover increases subjective well-being by 0.036. We disaggregate this effect into the third decomposition of job turnover (equation (6)) and test how sectoral and regional heterogeneity in labor markets impacts individuals by employment status. Regarding decomposition of job turnover into net employment change, cross-sector job reallocation, and within-sector job reallocation, Column (2) in table (7) presents marginal effects of the return to each component of job turnover by employment status when two other components are fixed. [9]

Depicted third panel of column (2), table (7), the positive and significant impact of larger job turnover on well-being of unemployed is driven by larger within-sector job reallocation (estimated marginal effect: 0.058). This suggest that individuals can easily transfer their skills in the same sector and benefit when the local labor market has large within-sector turnover.

If an individual is jobless and not actively looking for a job, then they are not in the labor force. Because we restrict the sample to those of working age (18-65), the category "not in work force" is most likely reflecting both discouraged workers who are not actively looking for work and individuals of working age who opt out of labor market. We find that above median net employment and within-sector job reallocation increases well-being of individuals not in the work force, while the self-employed are better off in locations with higher cross-sector job reallocation (estimated marginal effect: 0.038).

We estimate the well-being impact of different components of job turnover relative to education as a proxy for human capital in equation (10). The estimated marginal effects from the model interacting education and components of job turnover suggest evidence of heterogeneity in the well-being by different levels of educational attainment. The disadvantage of looking at total job turnover instead of exploring its decomposition is that it lumps together different kinds of turnover that may be very different from the workers perspective, especially by educational attainment. For instance, column (1) in table (8) illustrates that

[9] regression results are presented in Appendix table 1.A)

when job turnover is above the median, only individuals with less than a high school diploma are enjoying higher life satisfaction (significant marginal effect: 0.05). However, the decomposition exercise reveals a more detailed and important picture on the moderating impact of human capital. Column (2) shows that while individuals with the lowest level of education benefit the most from larger net employment changes (the statistical test of the marginal effect of less than high school is statistically significant from high school degree and some college), this impact is mainly driven by within-sector job reallocation. This suggests that the human capital of the least educated may be easier to transfer between firms within a sector rather than between sectors of labor market (third panel of table (8). On the other hand, the estimated marginal effect of larger cross-sector job reallocation (second panel of (8)) shows that individuals with post graduate degrees may be better able to transfer their skills across sectors and therefore benefit even in the presence of larger structural changes in the labor market.

In table (9) we present the estimated marginal effect of a regression analysis that investigates the moderating effect of gender for larger within and between-sector job reallocation. We found that the positive effect of larger total job turnover on well-being in table (8) is partially driven by men with less than a high school diploma (significant estimated marginal effect: 0.111), with no other group displaying any statistically significant marginal effect of turnover. The positive effect of having a college or graduate degree when cross-sector job reallocation is high appears to be largely driven by increased life-satisfaction among these highly educated women (significant estimated marginal effect: 0.022 and 0.037, respectively).

As we argued in section 2 for a thorough analysis of SWB research questions, one should consider SWB as a measure of quality of life that consists of different life aspects (such as employment status, health status, work/life balance (leisure satisfaction), education and skills, social connections, civic engagement and governance, environmental quality, personal security), and control for as many important factors as the data allow. Studies show that different domains of life satisfaction have different determinants that all contribute to general

satisfaction with life. While accounting for income, age, and education as shared determinants that account for differences in these domains, the three domains of financial, job, and health satisfaction are most important (van Praag et al., 2003). In table (10) we test the implication of omitting variables of health status and employment status in SWB studies in Aghion et al. (2016), which both have been described as highly influential factors in the SWB literature. The cross-equation test of total job turnover across regressions in columns (1) and (2) of (10) shows that excluding individual level employment status from the SWB regression leads to over estimation of impact of economy-wide job turnover. Comparing the estimated coefficients of CD between columns (1) and (3), and columns (1) and (4), we couldn't reject the hypothesis that impact of job turnover is biased if we fail to control for variables health status and employment status.

5 Conclusion and Discussion

In this study we integrate two decompositions of the labor market flows of creative destruction to study the heterogeneous relationships with individual's reported subjective well-being. The study of the effects of entrepreneurship, creative destruction, and business dynamism on well-being is still nascent (Wiklund et al., 2019). As such, our work is the first to analyze the complexity of both the measures of creative destruction and their differential impacts on well-being. Our analysis can be considered exploratory as the effect of dynamism on well-being and economic growth has many potential paths, consequences, and causes. We focus our attention on the overall effect of dynamism on well-being which is the accumulation of individual effects that may prove to be positive or negative. Our study utilizes measures of subjective well-being (SWB) as important complements to more objective economic indicators such as GDP or unemployment. The study of business dynamism is also of great importance as economic growth is essential for the increased income and broad prosperity of an economy's members. The increased income brought by economic growth allows individu-

als to have more autonomous lives as they are inherently less reliant on others to provide for their needs and wants. Likewise, the increased income brought by economic growth allows individuals to purchase more of the goods and services they need and desire. This produces a direct impact on well-being stemming from economic growth.

In this analysis, we unpack the work of Aghion et al (2016), which estimates the effect of entrepreneurial creative destruction in the spirit of Schumpeter on individual subjective well-being. Aghion et al. (2016) were unable to control for varying labor market conditions at the MSA level that result from creative destruction. In particular, the creative destruction process of innovation destroys an existing industry replacing it with something new. As this happens, some jobs are destroyed while new ones are created. However, the human capital requirements of the jobs that are destroyed need not resemble those of the jobs created. This creative destruction process of constant labor market churn can lead to sectoral mismatch in the labor market whereby the skills demanded by firms with open positions need not match the skills being offered by the labor supply.

To thoroughly investigate these dynamics, we adapt the measures used by Dunne, Roberts and Samuelson (1989) and create measures of within- and cross- sector labor reallocation using Quarterly Workforce Indicators data from the United States Census Bureau. The sign and magnitude of our measures of creative destruction (job turnover, gross job creation) are largely consistent with those found in Aghion et al (2016) and we find the expected sign and magnitude for other measures of creative destruction (net employment change, excess job reallocation, within- sector job reallocation). Interestingly, we cannot confirm their findings of a negative relationship between gross job destruction and life satisfaction.

We find that cross-sector and within-sector job reallocation appear to affect individuals differently by employment status, educational attainment, and gender. We show that broad investigations ignoring decompositions of the measures of creative destruction and their nonlinear relationships tend to overlook important dynamics of the labor market and underestimate the magnitude of the effect of higher creative destruction on well-being.

Figures

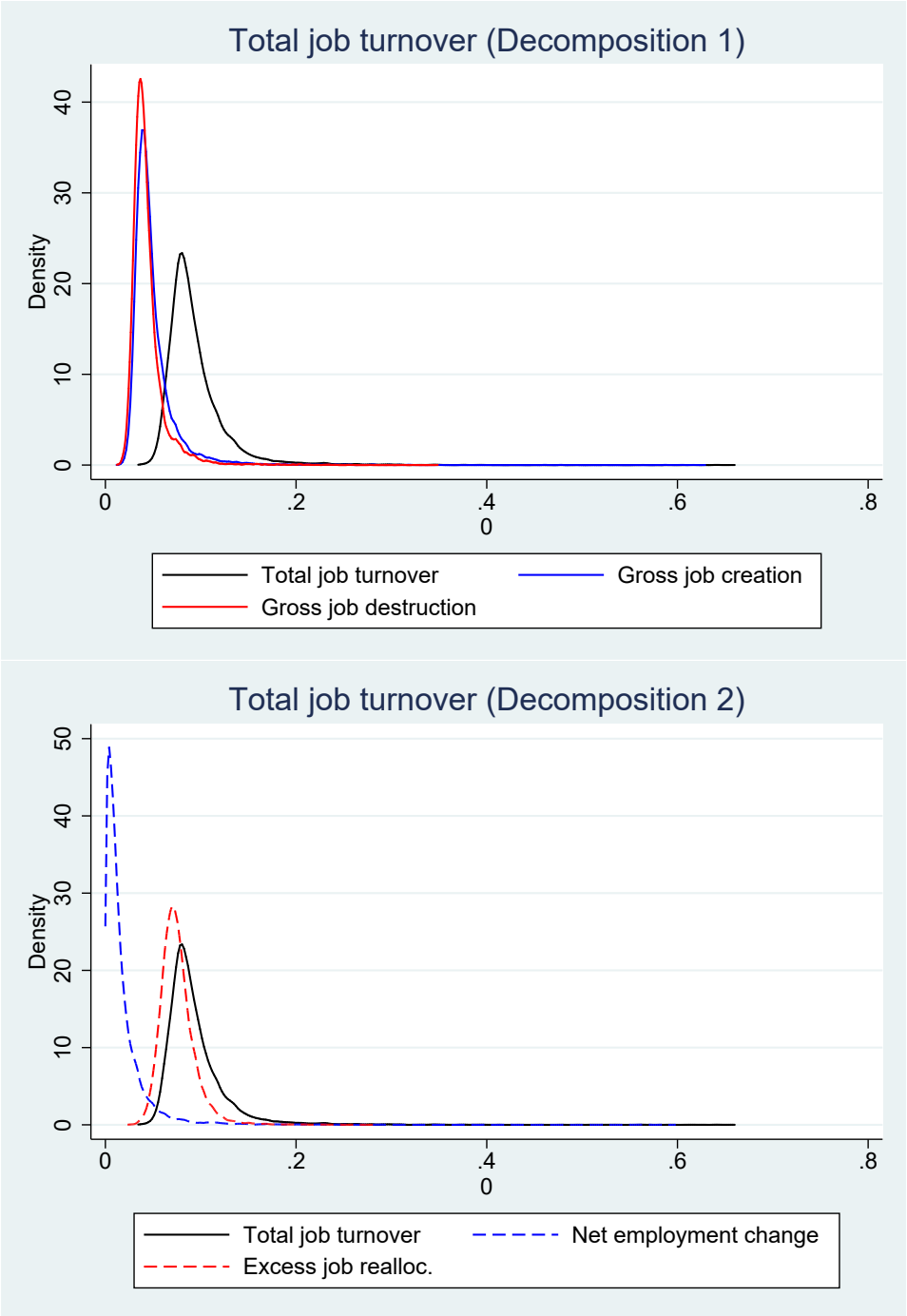


Figure 1. Job turnover decomposition 1 2 (density function)

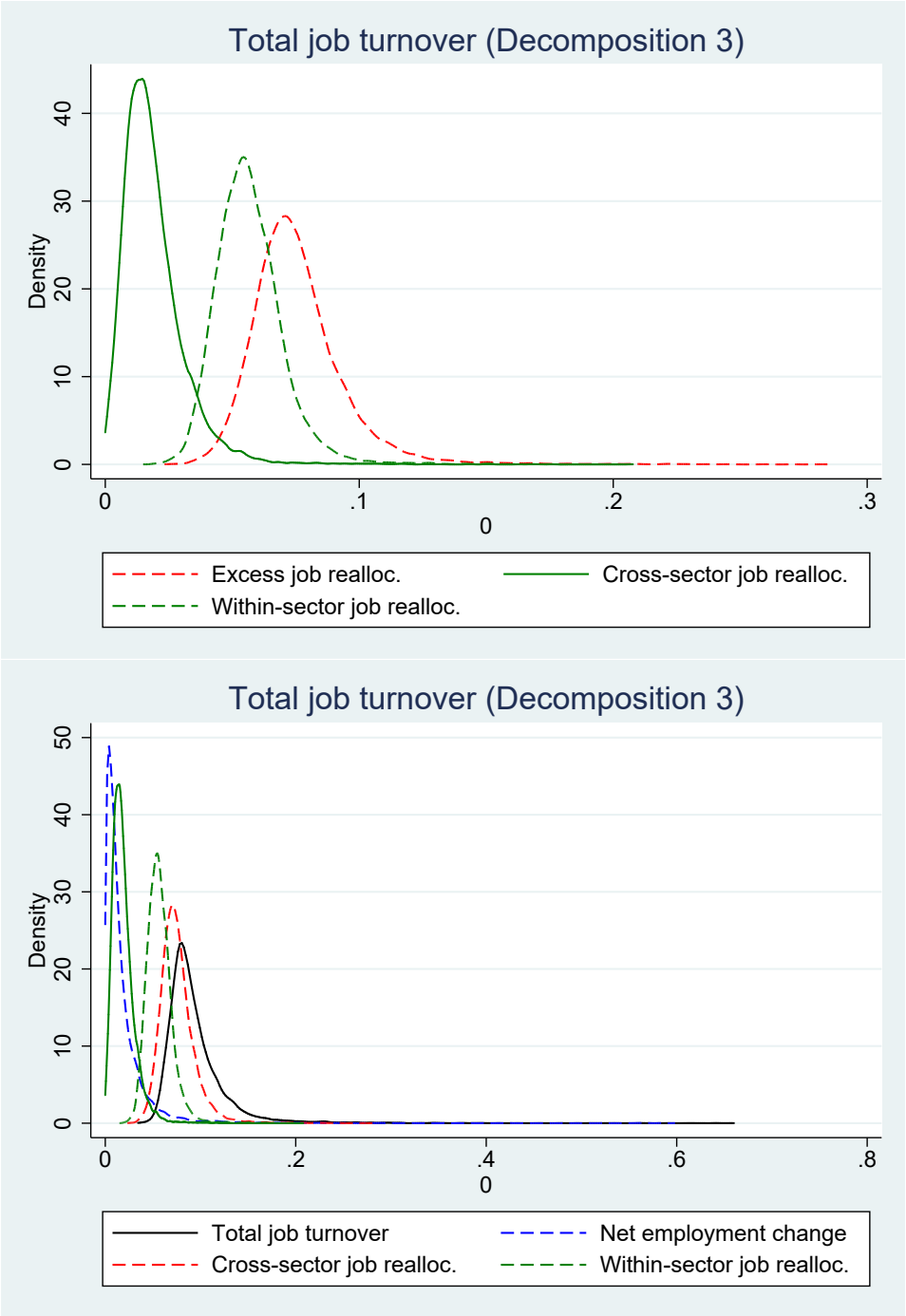
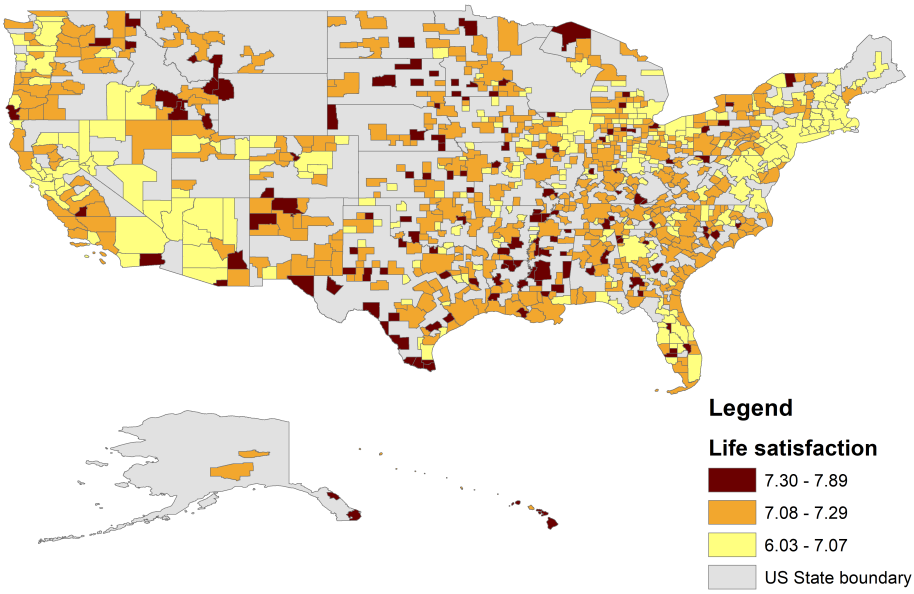


Figure 2. Job turnover decomposition 3 (density function)



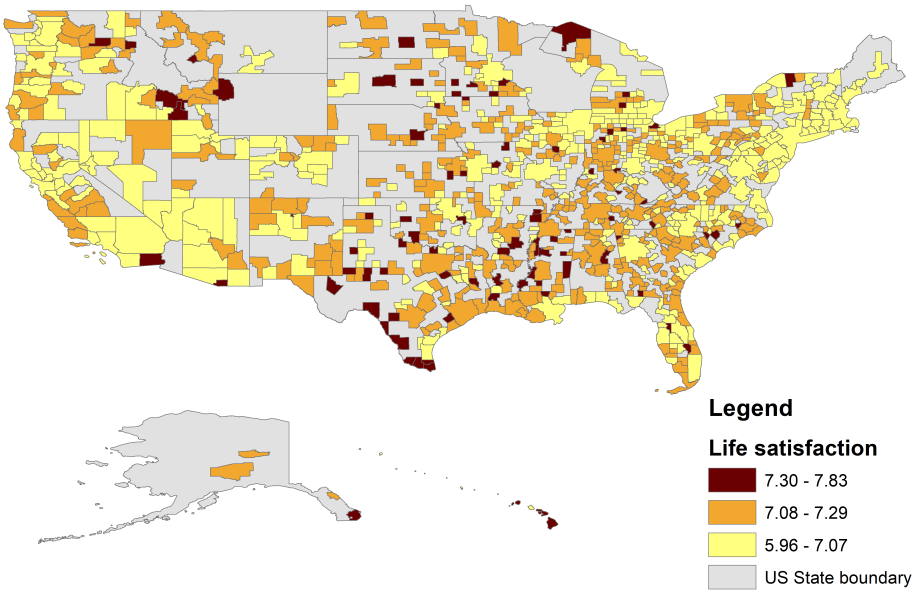


Figure 3. Regression adjusted life satisfaction across U.S. (without and with accounting for total job turnover from 2009-2016)

Tables

Table 1. Summary statistics

	Mean	Sd.	Min	Max
Individual level variables[(1)]				
Life satisfaction	6.89	1.92	0.00	10.00
Age	41.43	13.67	18.00	65.00
Marital status				
Single/Never been married	0.28	0.45	0.00	1.00
Married	0.52	0.50	0.00	1.00
Separated	0.03	0.16	0.00	1.00
Divorced	0.09	0.29	0.00	1.00
Widowed	0.02	0.14	0.00	1.00
Domestic partnership	0.06	0.25	0.00	1.00
General Health status				
Excellent	0.22	0.41	0.00	1.00
Very good	0.31	0.46	0.00	1.00
Good	0.29	0.45	0.00	1.00
Fair	0.14	0.34	0.00	1.00
Poor	0.04	0.20	0.00	1.00
Race				
White	0.68	0.47	0.00	1.00
Other	0.02	0.16	0.00	1.00
Black	0.13	0.34	0.00	1.00
Asian	0.03	0.16	0.00	1.00
Hispanic	0.14	0.35	0.00	1.00

Male	0.50	0.50	0.00	1.00
Female	0.50	0.50	0.00	1.00
Log(years of schooling)	2.63	0.17	2.30	2.89
Education				
Less than high school diploma	0.10	0.29	0.00	1.00
High school degree or diploma	0.27	0.44	0.00	1.00
Technical/Vocational school/Some college	0.30	0.46	0.00	1.00
College graduate	0.19	0.39	0.00	1.00
Post graduate work or degree	0.14	0.35	0.00	1.00
Income				
Under $720	0.02	0.14	0.00	1.00
$720 to $5,999	0.02	0.14	0.00	1.00
$6,000 to $11,999	0.06	0.24	0.00	1.00
$12,000 to $23,999	0.13	0.34	0.00	1.00
$24,000 to $35,999	0.13	0.34	0.00	1.00
$36,000 to $47,999	0.11	0.31	0.00	1.00
$48,000 to $59,999	0.10	0.31	0.00	1.00
$60,000 to $89,999	0.18	0.38	0.00	1.00
$90,000 to $119,999	0.09	0.28	0.00	1.00
$120,000 and over	0.16	0.36	0.00	1.00
Employment status				
Employed Full Time (with Employer)	0.54	0.50	0.00	1.00
Employed Full Time (Self)	0.05	0.22	0.00	1.00
Employed Part Time, Do Not Want Full Time	0.06	0.24	0.00	1.00
Unemployed	0.06	0.24	0.00	1.00
Employed Part Time, Want Full Time	0.07	0.26	0.00	1.00
Not in Work Force	0.22	0.41	0.00	1.00

Occupation				
Professional workers	0.25	0.43	0.00	1.00
Manager, executive, officials and business owners	0.12	0.32	0.00	1.00
Clerical or office worker and Sales worker	0.14	0.34	0.00	1.00
Service worker	0.16	0.36	0.00	1.00
Construction or mining/Manufacturing or production	0.12	0.32	0.00	1.00
/Farming, fishing, or forestry				
Transportation worker/Installation or repair worker	0.06	0.23	0.00	1.00
Others	0.16	0.37	0.00	1.00
MSA level variables[(2)]				
Log(Population)	13.91	1.71	9.48	16.81
Log(Household median income)	10.90	0.20	9.98	11.58
Unemployment rate	7.48	2.45	1.10	28.94
Observations	856,243			

Notes:(1) All individual level data are from U.S. Gallup daily. (2) Population and household median income are obtained from U.S. census American Community Survey, and unemployment rate is collected from Bureau of Labor Statistics.

Table 2. Quarterly measures of creative destruction at MSA level

	Mean	Sd.	Min	Max
Continuous measure				
Total job turnover	0.09	0.03	0.03	0.66
Gross job creation	0.05	0.03	0.01	0.63
Gross job destruction	0.04	0.02	0.01	0.35
Net employment change	0.02	0.03	0.00	0.60
Excess job reallocation	0.08	0.02	0.02	0.28
Cross-sector job reallocation	0.02	0.01	0.00	0.21
Between-sector job reallocation	0.06	0.01	0.01	0.18
Categorical measure				
Observations	23,825			

Notes: Measures of creative destruction are estimated using Quarterly Workforce Indicator.

Table 3. Well-being effect of creative destruction

	(1)	(2)	(3)	(4)
	SWB	SWB	SWB	SWB
Total job turnover	0.542***			
	(0.168)			
Job creation		0.603***		
		(0.176)		
Job destruction		0.289		
		(0.296)		
Net employment change			0.646***	0.649***
			(0.183)	(0.183)
Excess job reallocation			0.230	
			(0.307)	
Between-sect. job realloc.				0.281
				(0.409)
Within-sect. job realloc.				0.166
				(0.456)
Constant	11.961***	11.880***	11.866***	11.864***
	(2.272)	(2.265)	(2.261)	(2.262)
Observations	856,243	856,243	856,243	856,243
bic	3388883	3388895	3388894	3388908

Notes: (1) Standard errors in parentheses are clustered at the MSA level. All regressions include MSA fixed effect, state fixed effects, quarter, and year dummies. Dependent variable is SWB in all models. (2) Other controls in models include general health status, age (and age square), categorical individual income variables, categorical marital status variables, log of years of schooling, gender, race, log of population, and log of household median income. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4. Well-being effect of creative destruction (unemployment rate)

	(1)	(2)	(3)	(4)
	SWB	SWB	SWB	SWB
Total job turnover	0.540***			
	(0.168)			
Job creation		0.597***		
		(0.175)		
Job destruction		0.302		
		(0.297)		
Net employment change			0.641***	0.643***
			(0.183)	(0.183)
Excess job reallocation			0.238	
			(0.306)	
Between-sect. job realloc.				0.296
				(0.408)
Within-sect. job realloc.				0.163
				(0.457)
Unemployment rate	-0.009*	-0.008*	-0.008*	-0.008*
	(0.005)	(0.005)	(0.005)	(0.005)
Constant	10.626***	10.568***	10.549***	10.545***
	(2.421)	(2.418)	(2.417)	(2.418)
Observations	856,243	856,243	856,243	856,243
bic	3388889	3388901	3388900	3388914

Notes: (1) Standard errors in parentheses are clustered at the state level. All regressions include state fixed effects, quarter, and year dummies. Dependent variable is SWB in all models. (2) Other controls in models include age (and age square), categorical individual income variables, categorical marital status variables, log of years of schooling, gender, race, log of population, and log of household median income. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5. Nonlinear relationship between measures of creative destruction

	(1)	(2)
Dependent variable	SWB	SWB
Key creative destruction (CD) measure in the models:	Job turnover	Net employ. change
CD (binary)	-0.014	0.033**
	(0.014)	(0.014)
Cross-sect. job realloc. (binary)	0.021	0.036**
	(0.015)	(0.016)
CD (binary)# Cross-sect. job realloc. (binary)	-0.001	-0.033
	(0.023)	(0.022)
Within-sect. job realloc. (binary)	-0.004	0.017
	(0.010)	(0.012)
CD (binary)#Within-sect. job realloc. (binary)	0.036**	-0.020
	(0.015)	(0.016)
Cross-sect. job realloc. (binary)	-0.020	-0.032*
# Within-sect. job realloc. (binary)	(0.020)	(0.019)
CD (binary)# Cross-sect. job realloc. (binary)	-0.001	0.054**
# Within-sect. job realloc. (binary)	(0.029)	(0.027)
Constant	10.650***	10.554***
	(2.416)	(2.403)
Observations	856243	856243

Notes: (1) All regressions include MSA, state fixed effects, quarter, and year dummies. (2) Other controls in models include age (and age square), categorical individual income variables, categorical marital status variables, log of years of schooling, gender, and race. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6. Nonlinear relationship between measures of creative destruction (marginal effect)

	(1)	(2)
Dependent variable	SWB	SWB
Key creative destruction (CD) measure in the models:	Job turnover (binary)	Net employ. change (binary)
Marginal effect of CD when:		
Cross-sect. (binary=0)	0.014*	0.018***
	(0.008)	(0.007)
Cross-sect. (binary=1)	0.012	0.026**
	(0.012)	(0.011)
Within-sect. (binary=0)	-0.014	0.025**
	(0.012)	(0.012)
Within-sect. (binary=1)	0.021***	0.018***
	(0.008)	(0.007)
Observations	856,243	856,243

Notes: (1) The estimated marginal effects are from regressions including state fixed effects, quarter, and year dummies. (2) Other controls in models include age (and age square), categorical individual income variables, categorical marital status variables, log of years of schooling, gender, and race. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7. Heterogeneous well-being effect of creative destruction (marginal effects relative to employment status)

	(1)	(2)
	SWB	SWB
	Total job turnover	Net employ. change
	(above median)	(above median)
Employed Full Time (Employer)	0.006	0.005
	(0.006)	(0.005)
Employed Full Time (Self)	0.012	0.008
	(0.017)	(0.016)
Employed Part Time	0.013	0.002
	(0.014)	(0.014)
Unemployed	0.036*	0.035*
	(0.020)	(0.020)
Employed Part Time	-0.003	0.027
(looking for full-time job)	(0.019)	(0.018)
Not in Work Force	0.005	0.021**
	(0.010)	(0.010)
		Cross-sect. job realloc.
		(above median)
Employed Full Time (Employer)		0.001
		(0.006)
Employed Full Time (Self)		0.038**
		(0.017)
Employed Part Time		0.009
		(0.016)
Unemployed		-0.018
		(0.022)
Employed Part Time		0.031
(looking for full-time job)		(0.021)
Not in Work Force		-0.011
		(0.011)
		Within-sect. job realloc.

		(above median)
Employed Full Time (Employer)		-0.005
		(0.007)
Employed Full Time (Self)		-0.007
		(0.021)
Employed Part Time		-0.017
		(0.015)
Unemployed		0.058**
		(0.026)
Employed Part Time		0.013
(looking for full-time job)		(0.021)
Not in Work Force		0.029***
		(0.011)
Observations	856243	856243

Notes: (1) The estimated marginal effects are from regressions including MSA and state fixed effects, quarter, and year dummies. (2) Other controls in models include age (and age square), categorical individual income variables, categorical marital status variables, log of years of schooling, gender, and race. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 8. Heterogeneous well-being effect of creative destruction (marginal effects relative to education)

	(1)	(2)
	SWB	SWB
	Total job turnover	Net employment change
	(above median)	(above median)
Less than high school diploma	0.050*	0.051**
	(0.027)	(0.024)
High school degree or diploma	0.011	0.020*
	(0.010)	(0.011)
Technical/Vocational school/Some college	0.002	0.015**
	(0.007)	(0.007)
College graduate	0.005	0.000
	(0.007)	(0.007)
Post graduate work or degree	0.007	-0.002
	(0.010)	(0.007)
		Cross-sector job realloc.
		(above median)
Less than high school diploma		0.018
		(0.028)
High school degree or diploma		-0.009
		(0.014)
Technical/Vocational school/Some college		-0.013
		(0.008)
College graduate		0.005
		(0.008)
Post graduate work or degree		0.027***
		(0.009)
		Within-sector job realloc.
		(above median)
Less than high school diploma		0.063*
		(0.033)
High school degree or diploma		0.031**

		(0.013)
Technical/Vocational school/Some college		0.008
		(0.009)
College graduate		-0.009
		(0.009)
Post graduate work or degree		-0.015
		(0.011)
Observations	856243	856243

Notes: (1) The estimated marginal effects are from regressions including MSA and state fixed effects, quarter, and year dummies. (2) Other controls in models include age (and age square), categorical individual income variables, categorical marital status variables, log of years of schooling, gender, and race. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 9. Heterogeneous well-being effect of creative destruction (marginal effects relative to education and gender)

	(1)	(2)
	SWB	SWB
	Total job turnover	Net employment change
	(above median)	(above median)
Less than high school diploma # Male	0.111***	0.051
	(0.034)	(0.032)
Less than high school diploma # Female	-0.019	0.048
	(0.036)	(0.035)
High school degree or diploma # Male	0.020	0.012
	(0.013)	(0.015)
High school degree or diploma # Female	-0.001	0.030**
	(0.015)	(0.015)
Technical/Vocational school/Some college # Male	0.007	0.016*
	(0.010)	(0.009)
Technical/Vocational school/Some college # Female	-0.003	0.014
	(0.010)	(0.010)
College graduate # Male	-0.000	0.003
	(0.010)	(0.011)
College graduate # Female	0.011	-0.003
	(0.011)	(0.010)
Post graduate work or degree # Male	0.002	-0.009
	(0.013)	(0.011)
Post graduate work or degree # Female	0.013	0.006
	(0.012)	(0.009)
		Cross-sector job realloc.
		(above median)
Less than high school diploma # Male		0.032
		(0.034)
Less than high school diploma # Female		-0.003
		(0.040)
High school degree or diploma # Male		-0.007

	(0.017)
High school degree or diploma # Female	-0.014
	(0.019)
Technical/Vocational school/Some college # Male	-0.013
	(0.011)
Technical/Vocational school/Some college # Female	-0.013
	(0.012)
College graduate # Male	-0.011
	(0.010)
College graduate # Female	0.022*
	(0.012)
Post graduate work or degree # Male	0.019
	(0.012)
Post graduate work or degree # Female	0.037***
	(0.012)
	Within-sector job realloc.
	(above median)
Less than high school diploma # Male	0.044
	(0.040)
Less than high school diploma # Female	0.084**
	(0.041)
High school degree or diploma # Male	0.047***
	(0.017)
High school degree or diploma # Female	0.011
	(0.018)
Technical/Vocational school/Some college # Male	0.008
	(0.013)
Technical/Vocational school/Some college # Female	0.008
	(0.012)
College graduate # Male	-0.002
	(0.012)
College graduate # Female	-0.016
	(0.013)

Post graduate work or degree # Male	-0.014
	(0.013)
Post graduate work or degree # Female	-0.016
	(0.016)
Observations	856243

Notes: (1) The estimated marginal effects are from regressions including MSA and state fixed effects, quarter, and year dummies. (2) Other controls in models include age (and age square), categorical individual income variables, categorical marital status variables, log of years of schooling, gender, and race. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 10. Well-being effect of creative destruction: subjective well-being domains

	(1)	(2)	(3)	(4)
	SWB	SWB	SWB	SWB
Employment status (Ref.: Employed Full Time)				
Employed Full Time (Self)		-0.003		-0.038***
		(0.011)		(0.011)
Employed Part Time, Do Not Want Full Time		0.241***		0.231***
		(0.011)		(0.010)
Unemployed		-0.678***		-0.592***
		(0.013)		(0.011)
Employed Part Time, Want Full Time		-0.442***		-0.376***
		(0.011)		(0.010)
Not in Work Force		-0.134***		0.102***
		(0.009)		(0.007)
General health (Ref.: Excellent)				
Very good			-0.319***	-0.314***
			(0.008)	(0.008)
Good			-0.713***	-0.701***
			(0.008)	(0.008)
Fair			-1.266***	-1.259***
			(0.011)	(0.011)
Poor			-2.349***	-2.388***
			(0.017)	(0.018)
Unemployment rate	-0.012**	-0.008	-0.012**	-0.009*
	(0.005)	(0.005)	(0.005)	(0.005)
Total job turnover	0.529***	0.479***	0.572***	0.540***
	(0.186)	(0.184)	(0.170)	(0.168)
Other control variables	Yes	Yes	Yes	Yes
Constant	8.558***	8.885***	10.803***	10.626***
	(2.484)	(2.498)	(2.413)	(2.421)
Test [(1)]Job turnover - [(2)]Job turnover		5.90*		
Test [(1)]Job turnover - [(3)]Job turnover			0.52	

Test [(1)]Job turnover - [(4)]Job turnover				0.03
Observations	856,243	856,243	856,243	856,243
BIC	3464555	3454961	3398291	3388889

Notes: (1) Standard errors in parentheses are clustered at the MSA level. All regressions include MSA fixed effect, state fixed effects, quarter, and year dummies. Dependent variable is SWB in all models. (2) Other controls in models include age (and age square), categorical individual income variables, categorical marital status variables, log of years of schooling, gender, race, log of population, and log of household median income. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Appendix

Table 11. A. Heterogeneity of well-being effect across measures of creative destruction

	(1)	(2)
Dependent variable	SWB	SWB
Key creative destruction (CD) measure in the models:	Job turnover	Net employ. change
Reference: CD (Q1) # Cross-sect. (Q1) # Within-sect. (Q1)		
CD (Q1) # Cross-sect. (Q1)# Within-sect. (Q2)	-0.004	0.017
	(0.010)	(0.012)
CD (Q1) # Cross-sect. (Q2) # Within-sect. (Q1)	0.021	0.036**
	(0.015)	(0.016)
CD (Q1) # Cross-sect. (Q2) # Within-sect. (Q2)	-0.003	0.020
	(0.017)	(0.014)
CD (Q2) # Cross-sect. (Q1) # Within-sect. (Q1)	-0.014	0.033**
	(0.014)	(0.014)
CD (Q2) # Cross-sect. (Q1) # Within-sect. (Q2)	0.018	0.030**
	(0.013)	(0.013)
CD (Q2) # Cross-sect. (Q2) # Within-sect. (Q1)	0.006	0.036*
	(0.017)	(0.018)
CD (Q2) # Cross-sect. (Q2) # Within-sect. (Q2)	0.017	0.054***
	(0.013)	(0.016)
Constant	10.650***	10.554***
	(2.416)	(2.403)
Observations	856,243	856,243

Notes: (1) Standard errors in parentheses are clustered at the MSA level. All regressions include MSA fixed effect, state fixed effects, quarter, and year dummies. Dependent variable is SWB in all models. (2) Other controls in models include age (and age square), categorical individual income variables, categorical marital status variables, log of years of schooling, gender, race, log of population, and log of household median income. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$