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Worker reallocation across occupations: Confronting data with theory☆

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ABSTRACT

This paper studies the secular behavior of worker reallocation across occupations in the U.S. labor market. In the empirical analysis, we use microdata to construct consistent time series over a forty-five year period, and document that the fraction of employment reallocated annually across occupations is highly stable in the long run. We go beyond description and use an equilibrium model to identify potential changes in the productivity shocks and mobility costs that govern worker reallocation across occupations. We uncover the joint evolution of these factors by deriving a simple mapping between data and the model. Our analysis shows that constant reallocation rates across occupations mask slow-moving increases in the volatility of productivity shocks since the mid-1980s, and a pronounced upward shift in the cost of switching occupations in the period surrounding the Great Recession.

1. Introduction

There is an ongoing debate on whether labor markets have become more turbulent over the past half-century. This debate is to a large extent fueled by empirical studies that document time series of worker reallocation across, e.g., occupations or industries. Indeed, a standard view since the essays collected in Phelps et al. (1970) posits that the workforce is distributed over a range of distinct "islands" and reshuffles across them in response to island-specific productivity shocks. In this metaphor, more turbulent times should materialize through increased reallocation across segments of the labor market. The empirical evidence to date provides mixed results as there are trends in both directions, depending on the time series considered.[1] More importantly, the reason why the search for increased turbulence remains inconclusive is that the rates of worker reallocation may also be driven by other factors. Constant or even declining rates of reallocation could emerge in times of economic turbulence if there are counteracting changes in the other factors that affect these rates. One such example are changes in the cost of switching occupations, which are not easily controlled for because this cost is typically unobserved. Guidance from a model is, in this respect, paramount to interpret the patterns of worker reallocation found in the data.

In this paper, we contribute to this line of research at two levels. First, we construct new time series to analyze worker reallocation across occupations in the U.S. labor market. Relative to existing work, our time series exhibit several strengths, which we detail momentarily, and they cover a recent period that includes the Great Recession. Second, we map these data onto the parameters of an equilibrium model of worker reallocation that embodies productivity shocks and mobility costs. The mapping we establish allows us to disentangle the role of these two components in explaining the empirical patterns shown in the paper. We now provide details on our contributions.

The empirical sections of the paper document the evolution of net reallocation and excess reallocation from 1970 till 2015. Net reallocation measures the reshuffling required to accommodate changes in employment across occupations between two consecutive periods, ignoring the moves that cancel out in the aggregate.[2] Excess reallocation measures the latter, i.e. it is the difference between the total

☆ This version: October 2016. An online appendix is available at the web address: http://www.efm.bris.ac.uk/el13851/papers/APPislands.pdf. I am grateful to Iourii Manovskii and Etienne Wasmer for discussions that have greatly influenced this work. I also thank Christopher Flinn and two anonymous referees for their constructive comments that helped to improve the paper. All errors are my own.

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[1] For instance, on the one hand Kambourov and Manovskii (2008) document an increase in worker mobility across occupations and industries over the years 1968–1997. Davis et al. (2006), on the other hand, report a fall in job destruction rates and in the gross flows between unemployment and employment since the 1980s. Davis (2008) shows that the risk of unwanted job losses declined sharply in the U.S. during the same period.

[2] Formally, net reallocation is defined as the sum of the absolute changes in occupational employment shares, divided by two to adjust for double counting (Section 2). Murphy and Topel (1987) and Layard et al. (2005) use this measurement (applied to industry employment shares) in relation to the study of unemployment.

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number of occupational switches and net reallocation.[3] To our best knowledge, the behavior of these allocation processes in the U.S. has been documented in only two papers: Moscarini and Vella (2003), using data from the March Current Population Survey (henceforth March CPS) and Kambourov and Manovskii (2008), who use the Panel Study of Income Dynamics (henceforth PSID). Our estimates of net reallocation benefit from the much larger sample size of the March CPS relative to the PSID: every March CPS file provides us with a cross section representative of the U.S. population that allows to compute the employment share of each occupation even at a high level of disaggregation. In constructing our time series of excess reallocation, we take account of a number of pitfalls of the March CPS which have been pointed out by Kambourov and Manovskii (2013), and that imparted a substantial bias in previous estimates based on these data.[4]

In the subsequent step of the analysis, we use an equilibrium model to analyze the patterns of reallocation across occupations found in the data. We resort to the framework of Lucas and Prescott (1974) as it offers a direct formalization of the island parable put forward in the opening paragraph (Gallipoli and Pelloni, 2014). Recent research that has revamped this model, moreover, finds that it provides a basis for sound quantitative predictions; see, e.g., Alvarez and Shimer (2011). As in the study by Coen-Pirani (2010), we consider a version of the island model with gross flows that can be disentangled from net worker flows. We establish that, in the context of that model, occupational wages allow to estimate the parameters of the stochastic productivity process that drives worker flows in excess of net reallocation flows. Accordingly, we estimate these parameters using wage data, we feed them into the model alongside our estimates of net reallocation, and then we recover mobility costs which are pinned down by excess reallocation in the equilibrium of the model. By applying this procedure to each decade of the period under study, we quantify the importance of productivity shocks and mobility costs in explaining worker reallocation subperiod by subperiod. To be precise, we are able to identify and interpret *changes* in the levels of mobility costs across periods. We note that, at the same time, there are some limitations in using the model to interpret the *levels* of mobility costs. In sum, this semi-structural approach allows us to draw inferences on whether the role played by productivity shocks and mobility costs has evolved over time.

The findings of the paper are as follows. First, we document that worker reallocation across occupations has been remarkably stable since 1970. Over the period considered, the rates of net reallocation across (3-digit) occupations have remained around 4.4% and those of excess reallocation at 14.6% per year. In line with Kambourov and Manovskii (2008), we find a mild increase in net reallocation between the mid-1980s and mid-1990s. We also find that this was reverted in the 10-year period that followed. Second, generally there has been a slow-moving increase in the volatility of productivity shocks during the period 1976–2015, albeit with an interruption between 1996 and 2005. Excess reallocation has been slightly higher in more recent decades too, but viewed through the lens of the model, mobility costs have remained rather steady in the long run. Third and conversely, the last decade stands out by displaying much higher volatility of productivity shocks, which supports the idea of *increased* turbulence. Meanwhile, the rates of excess reallocation in the last decade were not too different from those previously observed. The model therefore implies that the increase in turbulence was accompanied by an increase in the costs of moving to a different occupation. These changes may have been felt at the level of occupation-industry cells: indeed, we obtain a similar picture when the model is employed to study worker reallocation across industries.

This paper is related to a strand of literature concerned with economic turbulence and its implications for labor markets. The term "economic turbulence" was coined by Ljungqvist and Sargent (1998) to denote the idea that changes in the macro-environment (e.g., the advent of new technologies) may result in more disruptive labor market trajectories. This view is not undisputed, however, and there are also controversies as to the labor market implications of increased turbulence. For instance, Ljungqvist and Sargent (1998), Ljungqvist and Sargent (2008) argue that the high European unemployment rates are a consequence of more turbulent times, whereas in den Haan et al. (2005) turbulence leads to lower unemployment. Other examples include Fujita (2015) who studies the secular decline of the separation rate in the U.S. labor market, and Lalé (2016) who studies employment trends among older workers on the two sides of the Atlantic. The approach we take is different from that in these papers. We study worker reallocation through the lens of a model which has unambiguous predictions as to the labor market implications of turbulence. We do not posit that turbulence has increased; instead, we use a wage equation derived from the model to confront this hypothesis.

The analysis also contributes to research that uses the island model of Lucas and Prescott (1974) as a tool for quantitative investigations. Prominent examples include Alvarez and Veracierto (2000), Alvarez and Veracierto (2012) and Kambourov and Manovskii (2008) who analyze, respectively, the effects of labor market policies and the link between human capital and wage inequality. In the migration literature, the island model has been used to study the behavior of worker flows across U.S. states (Coen-Pirani, 2010), the dispersion of house prices across metropolitan areas (Van Nieuwerburgh and Weill, 2010) or the dynamics of migration in and out of cities following a productivity shock (Davis et al., 2016). As already mentioned, we relate our work to Coen-Pirani (2010) who demonstrates how the joint behavior of gross and net flows is informative as to the underlying allocation process. There is also a relationship between this paper and the study by Alvarez and Shimer (2011). They develop a continuous-time, tractable version of the island model, wherein one can obtain a mapping between industry-level wages and unemployment. This is similar in spirit to the mapping we derive between wages and the process for productivity shocks in the model. The difference is that they seek to uncover the parameters of a regulated Brownian motion (recall that their model is set in continuous time) whereas our mapping is for a discrete-time, mean-reverting process. Further, their focus is on unemployment whereas we interpret reallocation as net mobility across occupations and we do not study whether this is mediated by a spell of unemployment.[5,6]

Finally, although we do not study business-cycle fluctuations explicitly, there seems to be a link between our findings for the period that includes the Great Recession and the literature on mismatch unemployment along the lines of Şahin et al. (2014). The authors build a measurement framework that bears resemblances with the island metaphor of the labor market. They find that mismatch across

[3] Excess reallocation is often referred to as "churning"; see Moscarini (2001). Jovanovic and Moffitt (1990) emphasize the importance of studying net reallocation and excess reallocation jointly. They interpret net reallocation as stemming from shifting demands across different segments of the labor market, which is emphasized by Lucas and Prescott (1974), Lilien (1982) and recently by Kambourov and Manovskii (2009) and Alvarez and Shimer (2011). In contrast, excess reallocation is supposed to result from idiosyncratic uncertainty at the job-match level rather than economy-wide changes. According to Jovanovic and Moffitt (1990), this in turn would explain why most of these moves cancel out.

[4] We find excess reallocation rates that are more than twice higher than those tabulated by Moscarini and Vella (2003). Appendix B discusses the underlying measurement issues at length. Another difference with Moscarini and Vella (2003) is that we use occupational classifications the categories of which are invariant over the entire period examined. So doing, we avoid several breaks and inconsistencies in the time series derived from these classifications.

[5] The relationship between unemployment and reallocation across industries as in the island model of Lucas and Prescott (1974) is at the heart of the sectoral shift hypothesis studied by Lilien (1982), and discussed in a subsequent paper by Abraham and Katz (1986). See Gallipoli and Pelloni (2014) for an overview of this debate.

[6] The theme of unemployment is also pursued by Carrillo-Tudela and Visschers (2013), Lkhagvasuren (2012) and Wiczer (2015); they develop computationally tractable variants of the island model.