



# Loss of skill during unemployment and TFP differences across countries



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## ABSTRACT

In an economy with search and matching frictions in which workers lose human capital during unemployment, TFP becomes endogenous and depends on workers' unemployment history. Using available estimates of labor market flows for a sample of OECD countries, this paper quantifies the amount of TFP differences due to skill losses during unemployment among developed countries. Continental European countries, with their low job finding rates, exhibit the lowest TFPs. Nordic countries display the highest levels of TFP due to their high job finding rate relative to the separation rate. TFP in Anglo-Saxon countries stands in-between the two groups. The paper further studies the effect of hiring subsidies on TFP and the labor market. Because TFP changes depend on the vacancy posting decision of firms, countries with the lowest TFP do not necessarily experience the largest productivity improvements from the policy implementation.

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## 1. Introduction

There is abundant evidence in the labor literature on the negative effects of unemployment on workers' wages. Workers separated from their jobs suffer large productivity losses compared to non-separated workers.<sup>1</sup> At the aggregate level this implies that, other things equal, an economy in which workers experience long and frequent unemployment spells is less productive than an economy in which workers' unemployment spells are shorter and less frequent. Since the number and duration of unemployment spells are determined by how quickly workers find and lose jobs, an economy's productivity is partly determined by its labor market flows. Using empirical evidence on labor market flows for a sample of developed countries, this paper investigates to what extent observed TFP differences can be accounted for by search frictions in the labor market and the associated skill losses during unemployment. Alternatively, the paper asks the question: if labor market flows in a rigid market such as Spain, were instead similar to labor market flows in a more dynamic economy such as the US, how much would its productivity improve?

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<sup>1</sup> Fallick (1996) and Kletzer (1998) review some of the findings in the early job displacement literature. See the references in Couch and Placzek (2010) for more recent results. An incomplete list of this big literature includes: Couch and Placzek (2010), Davis and von Wachter (2011), Jacobson et al. (1993), Jarosch (2015), von Wachter et al. (2009), which use administrative data; Ruhm (1991), Stevens (1997), which use the Panel Study of Income Dynamics (PSID); Addison and Portugal (1989), Carrington (1993), Farber (1997), Neal (1995) and Topel (1990) which use the Displaced Worker Survey (DWS) supplement of the Current Population Survey (CPS). Relatedly, Edin and Gustavsson (2008) use Swedish data on test scores that assess respondents' quantitative and analytical skills, and find that one full year of non-employment is associated with a loss of the equivalent of 0.7 years of schooling—even though most of the respondents are low skill workers.

The paper develops a Diamond–Mortensen–Pissarides (DMP henceforth) search and matching framework in which workers lose some human capital during unemployment.<sup>2</sup> In the model TFP is endogenous and depends on overall efficiency in the economy and the average human capital. In a dynamic labor market workers find jobs very quickly and lose them infrequently, so workers experience short unemployment durations and small human capital losses due to unemployment. As a result, human capital depends on workers' unemployment history—the cumulative duration of their unemployment spells. Since workers' unemployment history is determined by how quickly they find jobs and how frequently jobs are destroyed, the endogenous TFP is lower in economies with low job finding rates and high separation rates, other things equal.

The paper shows how the economy's average human capital and endogenous TFP depend on labor market flows and the amount of human capital depreciation during unemployment. Many of the countries considered in the paper have different labor market distortions, such as income taxes, firing taxes and subsidies, and may have different matching efficiencies and vacancy costs. However, TFP in the model depends uniquely on labor market flows and the rate at which skills depreciate, regardless of the exact mechanism behind labor market flows. Therefore, the endogenous TFP has a “sufficient” statistic property, in the sense that one can measure TFP differences among countries by looking at observed labor market flows, without having to model or calibrate the underlying distortions or frictions in detail.<sup>3</sup>

In order to quantify TFP differences due to human capital depreciation, I focus on a sample of OECD countries for which empirical estimates of labor market flows exist. The paper draws from the empirical findings in [Elsby et al. \(2013\)](#), who use a similar approach to [Shimer \(2005\)](#) and [Shimer \(2012\)](#) to estimate the job finding and separation rates in Australia, Canada, France, Germany, Ireland, Italy, New Zealand, Norway, Portugal, Spain, Sweden, United Kingdom and United States. Although this group consists of developed countries that may seem homogenous along a number of measures, as [Elsby et al. \(2013\)](#) show, the unemployment rate and labor market flows vary considerably among these countries. Anglo-Saxon and Nordic countries have high job finding and separation rates, whereas in continental Europe both rates are much lower. To calibrate the human capital depreciation rate during unemployment, the paper uses estimates from the Panel Study of Income Dynamics (PSID) in [Ortego-Martí \(2016b\)](#). The PSID estimation shows that an additional month of unemployment history is associated with a 1.22% wage loss, which is comparable to other estimates from the job displacement literature.<sup>4</sup>

To measure the amount of TFP variation due to unemployment history the paper considers the following two exercises. First, assuming the same overall efficiency level across countries and that countries differ only in their labor market flows, I calculate the implied endogenous TFP. There is substantial variation across countries, and as in [Elsby et al. \(2013\)](#) there is a natural partition between continental European, Anglo-Saxon and Nordic countries. The highest TFP corresponds to Norway, with a value that is 5.1% larger than in the US. Although Norway does not have the highest job finding rate (which would reduce unemployment duration and lower human capital losses), its separation rate is extremely low, meaning that workers experience very few unemployment spells. At the other end of the spectrum Spain has the lowest TFP, which is not surprising given its high unemployment rate and sclerotic labor market. Spain's endogenous TFP is around 12% lower than in the US. To get a sense of how big these TFP differences are, as in [Caselli \(2005\)](#) I compare the variance of the model's endogenous TFPs to the variance of observed TFPs, using TFP measures from the Penn World Table (PWT) 9.0.<sup>5</sup> Around 17% of the variance in TFP can be explained by differences in human capital due to skill losses.<sup>6</sup>

Secondly, using observed TFP from the PWT 9.0, the paper asks the question: how much would each country's TFP change if labor market flows were the same as in the US? Not surprisingly, continental European countries have the largest predicted productivity gains, ranging from a 4.8% increase in Portugal to 13.5% in Spain. Anglo-Saxon countries would see smaller gains, with an average gain of 3.8%. On the other hand, Nordic countries would see productivity losses. Even though the job finding rate is higher in the US, the separation rate in Nordic countries is relatively much smaller. The losses range from 4.5% in Sweden to 5.1% in Norway.

Finally, the paper analyzes the impact of a hiring subsidy on TFP. This policy has a positive impact on the labor market and stimulates job creation. Even though the country that would benefit the most from this policy is Spain, the analysis shows that it is not always true that countries with the lowest TFPs benefit the most from the policy. This happens because the impact of a hiring subsidy depends on several factors: the separation rate, the job finding rate, the ratio of the two—which determines the distribution of human capital—and the effect on labor market tightness—which determines the increase in the job finding rate and captures firms' vacancy posting decision. Countries that have a bigger change in the job finding–separation rates ratio experience the highest TFP gains after the policy implementation.

**Related literature.** This paper is most closely related to [Lagos \(2006\)](#) and [Petrosky-Nadeau \(2013\)](#). [Lagos \(2006\)](#) introduces a model of TFP in a frictional labor market à la [Mortensen and Pissarides \(1994\)](#) and studies the effect of labor market policies on TFP. [Petrosky-Nadeau \(2013\)](#) studies TFP in a model with frictional labor and credit markets to explain the surge of TFP during the Great Recession despite a sharp decline in output and employment. As in these papers, I adopt a search

<sup>2</sup> See [Pissarides \(2000\)](#) for a textbook treatment of the DMP framework.

<sup>3</sup> This is similar to [Hornstein et al. \(2011\)](#), where wage dispersion is measured directly by looking at labor market flows, independently of the exact mechanism that generates the wage distribution. The model of TFP in [Lagos \(2006\)](#) exhibits a similar property, the reservation productivity uniquely determines TFP.

<sup>4</sup> [Addison and Portugal \(1989\)](#) find a monthly depreciation rate of 1.44% and [Neal \(1995\)](#) finds a monthly rate of 1.59%.

<sup>5</sup> See [Feenstra et al. \(2015\)](#) for details on the PWT 9.0.

<sup>6</sup> Other measures give larger values. The model explains around 45% of the observed mean absolute deviation and 89% of the observed 90–10 percentile ratio.

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