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Creative destruction with on-the-job search

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ABSTRACT

This paper studies the consequences of creative destruction on unemployment in a frictional labor market with on-the-job search. For a benchmark calibration, a 1% increase in growth raises the unemployment rate by 1.72 percentage points in the economy without on-the-job search and by only 0.07 percentage points with on-the-job search. Rather than contributing to unemployment through more frequent job separations, in the presence of on-the-job search, creative destruction induces a direct reallocation of workers from low to high productivity jobs.

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1. Introduction

The relation between technological progress and employment has long been a popular concern. On the one hand, it is commonly believed that slow growth is one of the main causes of high unemployment, as the history of European economies over the last three decades might suggest; on the other hand, there are fears that new technologies might destroy existing jobs. These contradicting views are reflected in the economic literature which finds opposite effects of growth on unemployment depending on the nature of technological progress.

If innovations increase the productivity of existing jobs, i.e. progress is disembodied, then a faster rate of growth leads to a lower equilibrium rate of unemployment. Indeed, higher growth increases the net present value of newly created jobs without affecting job creation costs, leading to more employment. This is the capitalization effect (Pissarides, 2000, Chap. 3.3). If, on the contrary, innovations only increase the productivity of newly created jobs, i.e. progress is embodied, then growth and unemployment are positively related as, after a while, workers choose to quit their obsolete jobs and return to unemployment in order to find more lucrative positions. This is the creative destruction effect (Aghion and Howitt, 1994), on which I shall specifically focus in this paper.²

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² Carre and Drouot (2004) show that in the context of growth by creative destruction, allowing for an “on-the-job learning effect” could lead to a positive impact of technological progress on employment. Conversely, Prat (2007) shows that in the context of disembodied technological progress, accounting for

In an economy with creative destruction, newly formed matches benefit from the best technology available and, as a consequence, the highest revenues of the economy accrue to newly employed workers. As time passes, and as outside opportunities improve, the attractiveness of a job declines. We would therefore expect workers to engage in on-the-job search before their position becomes obsolete. However, to the best of my knowledge, this possibility has not seriously been considered yet. This is what I propose to do in this paper.³

I proceed by adding on-the-job search to the framework of [Mortensen and Pissarides \(1998\)](#) that has adapted the standard matching model of the labor market to allow for growth through creative destruction. Hence, as in their paper, the productivity of a firm is assumed to be determined by its date of creation and technological progress characterized by the ever-increasing productivity of newly established firms. A job eventually becomes obsolete when the surplus from the match, i.e. the difference between its productivity and the value of the worker's outside option, reduces to zero.

It is important to emphasize that on-the-job search is allowed rather than imposed and, as a consequence, its occurrence shows that creative destruction provides a justification for the very existence of on-the-job search. It is therefore natural and legitimate to consider on-the-job search in a model of growth by creative destruction.

In order to quantitatively assess the consequences of on-the-job search on the labor market equilibrium, I perform a calibration of the model. I obtain that the positive impact of growth on unemployment is considerably reduced, although not reversed, by allowing on-the-job search. A 1% rise in the rate of growth increases unemployment by 1.72 percentage point without on-the-job search and by only 0.07 with. What is even more surprising is that the main transmission channel at work in the traditional creative destruction model practically disappears when workers are allowed to seek jobs while employed. Indeed, the flow of obsolete jobs, which accounts for nearly half of the job destructions without on-the-job search, becomes negligible with. In fact, it is replaced by a flow of job-to-job transitions. The intuition for this result is that unemployment ceases to be a necessary step before moving to a better paid position. Moreover, on-the-job search leads to an increase in the maximum life span of a match since workers no longer need to resign in order to start prospecting for a better job. These consequences of on-the-job search considerably reduce the likelihood that a match survives until obsolescence.

It is interesting to note that these very strong effects are obtained even though, in the calibration, employed job seekers represent only about 15% of the workforce and they are not much more efficient than the unemployed at searching for jobs.

The fact that, in the presence of on-the-job search, growth only has a small impact on the rate of unemployment is robust to a wide range of values of the elasticity of the matching function and of the bargaining power of workers. It is nevertheless not robust to very high levels of unemployment insurance since, in that case, on-the-job search rapidly disappears as growth increases. However, my main result remains very robust if the generosity of unemployment benefits is determined by a replacement ratio.

Creative destruction models of the labor market have often been criticized on the basis of the lack of empirical evidence of a positive impact of growth on unemployment. A first answer to those criticisms was provided by [Postel-Vinay \(2002\)](#) who argued that the short-term dynamics of an economy with creative destruction are markedly different from those of the steady state. He showed that, following a sudden increase in the rate of growth, unemployment initially responds by a substantial decline. Thus, the positive impact of growth on unemployment is only a long-run phenomenon and it should be tested on that basis. By allowing for on-the-job search, this paper provides another defense of the creative destruction hypothesis. Indeed, the prediction that, in the long run, there is almost no correlation between growth and unemployment is certainly easier to reconcile with the data than the strong positive correlation that typically arises without on-the-job search.

Hence, my findings could potentially qualify the results of [Pissarides and Vallanti \(2007\)](#) who estimate that nearly all technological progress is of the disembodied form. They argue that even a moderate amount of embodied progress is not compatible with the negative impact of growth on unemployment which they find in their data. Also, [Hornstein et al. \(2007\)](#) propose an explanation for the rise in European Unemployment since the 1970's based on an acceleration of embodied technological progress. It would be interesting to allow for on-the-job search in the context of their paper, which might considerably reduce their simulated rise in European unemployment.

This paper proceeds as follows. The theoretical model is derived in Section 2. Then, a calibration is undertaken in Section 3. Finally, in Section 4, I investigate the interaction between growth by creative destruction and the provision of unemployment benefits. This paper ends with a conclusion.

uncertainty and endogenous job destruction, higher growth could lead to higher unemployment. Also, in a model where firms can choose whether or not to upgrade their technology, [Langot and Moreno-Galbis \(2008\)](#) allow for age heterogeneity and show that the creative destruction effect dominates for old workers while the capitalization effect is stronger for the young.

³ Note that [Miyamoto and Takahashi \(2011\)](#) is a complementary contribution which investigates the effects of on-the-job search in a matching model with disembodied, rather than embodied, technological progress.

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