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The impact of growth on unemployment in a low vs. a high inflation environment ☆

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ABSTRACT

The standard search model of unemployment predicts, under realistic assumptions about household preferences, that disembodied technological progress leads to higher steady-state unemployment. This prediction is at odds with the 1970s experience of slow productivity growth and high unemployment in industrial countries. We show that introducing nominal price rigidity helps in reconciling the model's prediction with experience. Faster growth is shown to lead to lower unemployment when inflation is relatively high, as was the case in the 1970s. In general, the sign of the effect of growth on unemployment is shown to depend on the level of steady-state inflation. There is a threshold level of inflation below (above) which faster growth leads to higher (lower) unemployment. The prediction of the model is supported by an empirical analysis based on US and European data.

1. Introduction

During the 1970s, industrial countries, including the US and continental Europe, experienced a combination of slow productivity growth and high unemployment. In a seminal theoretical contribution Pissarides (1990, ch. 2) argues that the observed negative relationship is consistent with the prediction of the standard search model of unemployment. He shows that, under the assumption of an *exogenous* and constant interest rate, exogenous job destruction and disembodied technological progress, the model predicts a negative effect of growth on steady-state unemployment. This is due to a positive *capitalization effect*—by lowering the effective discount rate, higher growth raises the surplus from an employment relationship and therefore leads to higher job creation.

However, subsequent research has shown that under alternative and more plausible assumptions the standard model actually gives counterfactual predictions. For example, under the assumption of an *endogenous* interest rate and a low degree of intertemporal substitution in consumption, Aghion and Howitt (1994) and Eriksson (1997) show that faster growth leads to higher unemployment due to a negative capitalization effect: the higher real rate of interest implied by faster

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consumption growth raises the effective discount rate and in turn lowers the surplus from an employment relationship, implying lower job creation.[2]

The present paper reexamines the impact of disembodied technological progress on unemployment in the presence of nominal rigidities and trend inflation. Whereas our analysis is motivated by the observation that the 1970s were characterized not only by a slowdown in productivity growth but also by higher inflation rates the role of trend inflation has so far not received attention within the growth-unemployment literature.[3]

Our analysis is based on a balanced growth version of a two-sector New-Keynesian model with nominal price staggering, labor market frictions and exogenous disembodied technological progress. Firms in sector one produce differentiated final goods using an intermediate input but adjust prices infrequently so that price setting decisions are forward looking. Firms in sector 2 produce the intermediate input under a perfectly competitive output market and face labor hiring costs so that hiring decisions are forward looking.[4] As in Aghion and Howitt (1994) and Eriksson (1997), we endogenize the rate of interest and assume a low degree of intertemporal substitution in consumption so that faster growth raises the effective discount rate.

In our framework, an increase in the effective discount rate leads to two opposing effects. The first is the familiar negative capitalization effect: an increase in the effective discount rate lowers the surplus from an employment relationship, thereby discouraging job creation by intermediate-goods firms. The second and novel effect is what we call a *markup effect*: an increase in the effective discount rate leads final-goods firms to choose a lower price markup, as the higher is the effective discount rate the less firms worry about the erosion of their markups (given the staggered nature of price setting) by ongoing inflation. The reduction in the price markup acts like a tax-cut on the intermediate good supply (i.e., raises its relative price), thereby encouraging job creation by intermediate-goods firms. The markup effect is stronger at higher trend inflation while the effect vanishes in the limiting case of zero trend inflation.

The intuition behind the markup effect is as follows. Since prices can be adjusted only infrequently, pricing decisions of final-goods firms are forward-looking—future conditions matter for current price setting. In such an environment positive trend inflation erodes the price markup as long as a firm is unable to revise its price. In anticipation the firm chooses a price markup higher than that implied by the absence of inflation when ever it gets a chance to reset its price (see e.g., King and Wolman, 1996). Moreover, given the level of trend inflation, the higher the effective discount rate the less a firm worries about the markup erosion by inflation and thus the lower the optimal price markup.

We show that if inflation is high enough the markup effect dominates the capitalization effect so that faster growth leads to lower unemployment. More generally, there is a threshold rate of inflation below (above) which faster growth leads to higher (lower) unemployment.[5] We use data for the US and for the four largest European economies (Germany, UK, France and Italy) to show that the model predictions are empirically plausible. Since the model predictions have implications for the long-run relation between growth and unemployment, we extract the low-frequency components of technology growth and unemployment data. The empirical results show that there is indeed clear evidence for a negative relation between growth and unemployment in a high inflation environment as predicted by the model. For a low inflation environment we find a positive relation between growth and unemployment, although the evidence here is somewhat less robust than for a high inflation environment.

While the focus of the paper is on the impact of productivity growth on unemployment, our framework can also be used to analyze the effect of trend productivity growth on the optimal steady-state inflation rate.[6] The markup effect by which faster growth lowers price markups of final-goods firms suggests that the welfare cost of inflation depends negatively on the growth rate of the economy (i.e. in a fast-growing economy the welfare cost of inflation is relatively low). For this reason the optimal steady-state inflation rate is higher the higher is trend growth.[7]

[2] This result also appears when relaxing the assumption of exogenous job destruction in Pissarides (1990). For instance, Prat (2007) shows that, by raising a worker's outside option disembodied technological progress intensifies the rate of job separation, an effect that outweighs, for plausible parameter values, the capitalization effect so that disembodied technological progress raises unemployment. Aghion and Howitt (1994) also identify a creative destruction effect brought about by embodied technological progress: by reducing the duration of an existing job match faster growth leads to higher job destruction and therefore unemployment. Pissarides and Vallanti (2007) provide empirical evidence for a negative effect of growth on unemployment, thus supporting the view that, if unemployment is a result of search frictions, then technology must be disembodied. Nevertheless, the authors conclude that, even if one assumes technology is mainly disembodied, a significant part of the impact of growth on unemployment remains unexplained.

[3] Our work bridges two strands of the recent literature. The first focuses on trend inflation within the standard New Keynesian model, abstracting from unemployment (e.g., Ascari, 2004; Graham and Snower, 2008; Amano et al., 2009 and Snower and Tesfaselassie, 2017). The second focuses on the role of labor market frictions for inflation dynamics, abstracting from trend inflation and growth considerations (e.g., Trigari, 2006; Christoffel and Kuester, 2010 and Blanchard and Gali, 2010).

[4] The two-sector framework is standard in the business cycle literature (see, e.g., Trigari, 2006; Christoffel and Kuester, 2010 and Blanchard and Gali, 2010). The assumption that hiring costs are the source of labor market rigidity follows closely Blanchard and Gali (2010).

[5] We also show that, the threshold inflation level is unique under plausible parameter restrictions and that it depends on key labor market parameters, such as the job destruction rate and workers' bargaining power.

[6] In a related work Amano et al. (2009) and Snower and Tesfaselassie (2017) study the effect of trend growth on the optimal steady-state inflation rate in the presence of price and wage staggering but abstract from search frictions in the labor market.

[7] In a separate exercise, results of which are available upon request, we find that the optimal inflation rate varies between 0.2% and 0.7%. Given our theoretical result that unemployment is negatively related to growth if trend inflation is high enough while the optimal inflation rate is quite low, one may interpret an episode of rising unemployment in response to slower productivity growth (like that of the 1970s) as a sign of a too high inflation target (to the extent that trend inflation is pinned by the inflation target).

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