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## Performance pay and changes in U.S. labor market dynamics

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## ABSTRACT

A shift in the design of labor compensation occurred at around the mid-1980s in the U.S. and deals with an increased role of performance pay in driving the cyclical movements of wages. Using a DSGE model we show that this structural change accounts at least qualitatively for many observed changes in the U.S. labor market dynamics. It generates the disappearance of the procyclical response of labor productivity to non-technology shocks and the reduction of the contractionary effects of technology shocks on hours. Moreover, it is conducive to a drop in the volatility of output, a parallel increase in the volatility of wages and to changes in unconditional correlations consistent with what documented in the U.S. between the pre- and post-1984 periods.

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## 1. Introduction

Substantial changes in the correlation structure of U.S. macroeconomic series have accompanied the downward shift in the volatility of output in the mid-1980s, which has been described as “the Great Moderation”.<sup>1</sup> Galí and Gambetti (GG hereafter; 2009) provide evidence of a significant shift in the patterns of unconditional and conditional co-movements between output, hours, and labor productivity as well as in the impulse responses to identified shocks. Similar results are obtained by Barnichon (2010) and Stroh (2009). Also Galí and Van Rens (2010) and Champagne and Kurmann (2013) detect several changes in business cycle moments over the post-1984 period and, in particular, a notable rise in the volatility of the real wage, which contrasts with the parallel decline in the volatility of output.

Whether these volatility breaks and large changes in the pattern of correlations have a common underlying explanation is an open question. In this paper, we claim that these observed developments are related to structural shifts in the design of labor compensation that have been documented for the U.S. economy. The first one is an overall reduction in the degree of real wage rigidities. The second striking fact is the substantial increase of firms’ reliance on pay-for-performance mechanisms after the early 1980s. Lemieux et al. (2009a), for example, document that the incidence of performance-pay jobs has risen considerably over the past decades and this has been associated with an increased responsiveness of pay to performance (see Cuñat and Guadalupe, 2005).

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E-mail addresses: [marianna.riggi@bancaditalia.it](mailto:marianna.riggi@bancaditalia.it), [marianna.riggi@gmail.com](mailto:marianna.riggi@gmail.com) (M. Riggi).<sup>1</sup> The Great Moderation was first documented by Kim and Nelson (1999) and McConnell and Perez-Quiros (2000), who estimate a break year of 1984 for the volatility of US GDP. An overview of the evidence and its explanations is provided by Blanchard and Simon (2001) and Stock and Watson (2002).

We argue that the increased flexibility of real wages driven by a higher incidence of performance-related pay may account to a significant extent for the empirical results uncovered by GG (2009), Stiroh (2009), Barnichon (2010), Galí and Van Rens (2010) and Champagne and Kurmann (2013). To appraise the validity of our claim we build a Dynamic New Keynesian (DNK) model which includes work effort as an additional dimension of firms' and households' choice. The level of effort exerted is our measure of worker's performance. The latter is assumed to be observable by the employer, with no cost for collecting and processing information about its actual provision. As in Galí (1999), labor compensation has two distinct components: one rewarding hours worked and the other rewarding performance. We use this setup to analyze the macroeconomic implications of the changes occurred in the structure of labor compensation. In particular, we allow for a rise in the responsiveness of labor pay to the business cycle and characterize this higher flexibility as being caused by an increased relevance of performance pay in the cyclical fluctuations of wages. In other words, we modify one single parameter, the degree of rigidity of performance compensation, and investigate what happens to macroeconomic correlations and volatilities when the role of performance pay in driving wage fluctuations increases.

We calibrate the model to U.S. data and using stochastic simulations we find that, on its own, the shift in the structure of labor pay yields the following implications:

- A vanishing procyclical response of labor productivity to non-technology shocks.
- A shrinking contractionary effects on hours worked of positive technology shocks.
- A dramatic decline in the procyclicality of labor productivity, measured by a notable drop in the unconditional correlation between labor productivity and output as well as by a sign switch in the unconditional correlation with hours, from positive to large negative values.
- A sizeable drop in the volatility of output, i.e. a great part of the “Great Moderation”.
- An increase in the relative and absolute volatility of real wages.

These predictions closely correspond to the empirical findings by GG (2009), Stiroh (2009), Barnichon (2010), Galí and Van Rens (2010) and Champagne and Kurmann (2013) on the shift in conditional and unconditional second moments of U.S. macroeconomic series between the pre- and post-1984 periods. As we elucidate later, the key intuition behind our results hinges on the fact that the structure of labor compensation and, in particular, the relative movements of the two compensation margins affect the firm's convenience to adjust workers' performance relative to hours in response to shocks.

The link between changes in labor market dynamics and the shift towards performance-pay contracts has also been investigated by Champagne and Kurmann (2013), who develop a Dynamic Stochastic General Equilibrium model predicting that a large fraction of the increase in relative wage volatility is explained by greater wage flexibility induced by two structural changes: a decline in private-sector unionization and a higher incidence of performance-pay schemes. Preliminary to this, they also show with micro-data that the rise in wage volatility is not due to compositional changes of the workforce. While their focus is primarily on wage volatility, our analysis spans the structure of conditional and unconditional co-movements between output, hours, and labor productivity.

Other explanations for the changes in the U.S. macroeconomic correlations have been put forward. For example, GG (2009) argue that the smaller contractionary effects on labor input of a technology improvement can be accounted for by a change in the monetary policy rule, in line with the evidence provided by Galí et al. (2003) that in the pre-Volcker period the Fed's policy tended to overstabilize output in the face of technology shocks (as is the case of a monetary targeting rule) at the cost of generating excessive inflation volatility, while it became consistent with an optimal rule in the Volcker-Greenspan period. The same hypothesis is upheld by Barnichon (2010). As for the response of labor productivity to non-technology shocks, a plausible interpretation would be based on the decrease of labor adjustment costs over the recent decades, due to higher competition, a more flexible labor market and tougher corporate governance. Indeed, a common explanation for the procyclical behavior of labor productivity is labor hoarding, which is caused by a variety of costs involved in adjusting the labor force. Since the latter cannot be costlessly adjusted in the short run, firms react to changes in demand by varying the intensity of labor utilization. Thus, the labor force is smoothed over the cycle, and the cyclical variations in labor effort, which increases in booms and decreases in recessions, generate a perception of short-run increasing returns to labor (see e.g. Sbordone, 1996). Along this line, GG (2009), Barnichon (2010) and Galí and Van Rens (2010) point to lower hiring costs as a major source of the vanishing procyclicality of labor productivity.<sup>2</sup> Furthermore, Barnichon (2010) suggests that the sectoral shift from manufacturing to services could have translated in a higher hours per worker elasticity, and shows that this could have contributed to a decrease in the procyclical response of labor productivity to non-technology shocks.

Of course, we do not rule out that the U.S. economy has undergone these and other structural changes which may well lie behind the Great Moderation and the parallel shift in the U.S. pattern of macroeconomic correlations. Our paper simply emphasizes that the structural change in pay setting, with a higher relevance of performance-pay in the cyclical fluctuations of wages, seems to account, at least qualitatively, for several observed changes in the U.S. labor market dynamics and the

<sup>2</sup> For example, Galí and Van Rens (2010) build a theoretical model with flexible wages and frictions in adjusting employment and derive predictions supporting this interpretation. Moreover, when they allow for endogenous wage rigidity, a reduction in labor market frictions is also able to match the evidence on the increased relative volatility of wages, albeit to a smaller extent than in the data.

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