



## Wage-setting patterns and monetary policy: International evidence<sup>☆</sup>

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### ABSTRACT

Systematic differences in the timing of wage-setting decisions among industrialized countries provide an ideal framework to study the importance of wage rigidity for the transmission of monetary policy. Synchronization in wage-setting decisions is prevalent in Japan and the United States, yielding varying degrees of wage rigidity within the year; instead, in France, Germany, and the United Kingdom decisions are more uniformly spread over time. Exploiting within-year variation in the timing of wage-setting decisions in these economies, we find support for the long-held but scarcely tested view that wage rigidity plays a critical role in the transmission of monetary policy.

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### 1. Introduction

A wide body of empirical evidence suggests that monetary policy has an important effect on the behavior of real variables at business-cycle frequencies. Most theoretical models that seek to identify the connection between nominal causes and real effects posit some form of nominal rigidity in wages and (or) prices.<sup>1</sup> Empirical evidence assessing the extent of nominal wage rigidity and its relevance in the transmission mechanism from monetary policy to real variables is, however, regrettably scarce.<sup>2</sup> This paper attempts to partially fill this empirical void by providing a study that exploits differences in the effective degree of nominal wage rigidity within and across countries. Synchronization of wage-setting decisions varies significantly across advanced economies. In Japan, the best-known example of synchronization of wage-setting decisions, the majority of firms set wages during the first and second quarters of the calendar year in what is known as “Shunto”, (or spring offensive), and wages remain in place until the following year. In the United States, the available evidence suggests that a large fraction of firms set wages once a year, typically at the end of the calendar year. In contrast, wage-bargaining renegotiations in Germany take place throughout the year, and contracts tend to last one to three years. Theories of the transmission of monetary impulses to real variables based on wage rigidity would hence predict that, other

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<sup>1</sup> Christiano et al. (2005) argue that wage rigidity – unlike price rigidity – is crucial for standard dynamic stochastic general-equilibrium (DSGE) models to match key features of the data.

<sup>2</sup> For prices, instead, there is now rich information on the frequency of adjustment, though authors differ in their reading of the evidence. (See Bils and Klenow, 2004 and Nakamura and Steinsson, 2008).

things equal, monetary policy innovations in Japan should have a larger effect when the shock takes place in the second half of the year, that is, after the Shunto has occurred and wages are relatively rigid. In the United States, the effect should be larger when the shock occurs in the first half of the year, as wages tend to be reset at the end of the calendar year. However, in Germany, where there appears to be little bunching in wage-setting decisions within the year, the effect should not vary with the quarter in which the shock takes place.

The aim of this study is to test whether these predictions find support in the data. More precisely, this study assesses whether the response of the economy to monetary policy shocks differs according to the time of the year in which the shock takes place and whether this difference can be reconciled with the observed variation in the timing of wage-setting decisions. To this end, this study introduces quarter dependence in an otherwise standard, recursive VAR setup and analyzes the empirical impulse responses of aggregate variables to a monetary policy innovation in five large and highly developed countries. The countries considered are France, Germany, Japan, the United Kingdom, and the United States. The focus on these countries is related to the extant literature on central banking practices: The wider consensus in the literature on the monetary instruments used by these countries' central banks provides a natural baseline from which we deviate to study the potential for seasonal dependence in monetary policy effects.<sup>3</sup>

Our empirical exercise has a “difference-in-difference” flavor, in that it tests for potential differences in the effect of monetary policy across quarters of the calendar year for each of the countries considered, and then relates the findings across countries to each country's degree of wage rigidity over the calendar year.<sup>4</sup> The findings indicate that, for both Japan and the United States, there are, indeed, important differences in the response of the economy to monetary policy shocks that depend on the timing of the policy innovation. These differences, in turn, can be related to the differing degree of wage rigidity across the calendar year. Specifically, a monetary policy innovation in Japan that occurs during the first or second quarter – that is, during the Shunto period in which wages are being reset – has a relatively small effect on output, whereas an innovation in the third quarter – that is, immediately after the Shunto – has a remarkably large effect. The pattern is reversed in the United States: A monetary policy innovation in the first half of the calendar year has a significantly larger effect on output, whereas an innovation in the second half has a relatively small effect. Again, this pattern conforms well with the degree of wage rigidity in the United States, which is high in the first half of the year and low in the second half. In sharp contrast, in Germany, France, and the United Kingdom, where the degree of wage rigidity is more uniform within the year and the contracts are of longer duration, the quarter in which a monetary policy shock takes place appears to be less relevant.

Our findings for the United States essentially replicate those in Olivei and Tenreyro (2007). This paper extends their empirical analysis to test whether the degree of synchronization in wage-setting decisions also matters for the transmission of monetary impulses in countries other than the United States. Overall, the findings complement and reinforce their conclusion that wage rigidities can play an important role in the transmission of monetary policy.

The remainder of the paper is organized as follows. Section 2 briefly describes various pieces of evidence on wage-setting patterns and the policy strategies used by the countries' central banks. Section 3 presents the empirical method and introduces the data. Section 4 describes the dynamic effects of monetary policy on different macroeconomic aggregates. Section 5 discusses the robustness of our findings, and Section 6 provides concluding remarks.

## 2. Wage-setting practices and monetary policy instruments in large developed countries

This Section begins by describing the wage-setting practices in the countries analyzed, and then discusses the monetary policy instruments that prevailed as well as the objectives pursued by the central banks in each country throughout the estimation period.

### 2.1. Wage setting practices

The Japanese Shunto is the quintessential example of synchronization in wage-setting decisions (see for example, Grossman and Haraf, 1989; Taylor, 1999; Du Caju et al., 2008). Since 1955, it has become customary for the main unions in Japan to conduct annual negotiations for wage increases on a national scale; the negotiations with large companies start in February and about half of the contracts are stipulated by the end of March, coinciding with the beginning of the fiscal year. Taking the annual wage increase set by the top firms in major industries as the benchmark, smaller companies, government agencies, and nonunionized employees negotiate their wages during April and May (Sako, 1997; Taniuchi, 1982). All wage settlements last for one year (Du Caju et al., 2008). Despite a fall in unionization rates since the early 1970s, the Shunto system of yearly wage negotiations has not been altered and the practice of setting wages in the spring has also been followed by the growing nonunionized sector

<sup>3</sup> Smaller and (or) less developed economies are less suitable for a quarter-dependent VAR representation. These countries are more likely to have changed their economic structure and the conduct of monetary policy over time. This higher propensity to monetary and to real intrinsic instability would require the inclusion of structural-change parameters. Given the extent of data availability, the empirical analysis would be impaired by the lack of sufficient degrees of freedom at the estimation stage.

<sup>4</sup> Note that direct cross-country comparisons are impaired by a large range of country-specific characteristics (including variation in labor market institutions and in the conduct of monetary policy).

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