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# Labor market structures and the sacrifice ratio ☆

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ABSTRACT

Using OECD panel data for 1961–2000 we provide evidence that the output cost associated with disinflation (the sacrifice ratio) decreases with coordination between wage-setters in the labor market. The relationship holds for alternative measures of labor market coordination and after controlling for standard sacrifice ratio determinants. The sign of the relationship is robust across alternative definitions of the sacrifice ratio, but its statistical significance varies. Our results also indicate that more stringent employment protection laws increase sacrifice ratios, but the effect is not significant at conventional levels. We provide explanations for our findings based on the speed of nominal wage adjustment in New Keynesian models.



## 1. Introduction

International differences in the output cost of disinflation (the sacrifice ratio) have been the focus of renewed interest in monetary economics since the study by Ball (1994). Recent empirical contributions have investigated a wide range of potential sacrifice ratio determinants. The impact of trade openness is examined by Temple (2002), Daniels et al. (2005) and Bowdler (2009), and the effect of current account and capital account restrictions is investigated by Razin and Loungani (2005). Other studies focus on the credibility of macroeconomic policy during disinflation. In particular, the sacrifice ratio has been shown to decrease with the probability agents assign to successful inflation reduction (Boschen and Weise, 2001), the presence of governments from the political right (Caporale and Caporale, 2008) and the existence of an inflation targeting regime (Goncalves and Carvalho, 2009). On the other hand, Jordan (1997) finds that central bank independence increases the sacrifice ratio and this result is confirmed by Daniels et al. (2005). A related line of research has provided new procedures for measuring sacrifice ratios and evidence concerning the dependence of those sacrifice ratios on a range of factors, including the inflation regime prior to disinflation, see Zhang (2005), Hofstetter (2008) and Senda and Smith (2008). In this paper we provide evidence that labor market structures influence international differences in sacrifice ratios, building on ideas that have often been discussed in the literature but which have rarely been tested.

Disinflation episodes are often initiated by periods of tight fiscal and monetary policy. Ultimately, the success of such policies depends on a decrease in the inflation expectations of price- and wage-setters. Lower inflation expectations provide a basis for lower nominal wage growth, which helps to lock in inflation reductions. The importance of wage-setting to inflation

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dynamics is recognized in both macroeconomic policy-making and research. During the 1960s and 1970s many governments employed direct wage controls as a tool of anti-inflation policy, see for example Nelson (2005). In recent research Olivei and Tenreyro (2007) utilize information on the timing of wage negotiations to explain within year variation in the trade-off between inflation and output.

The idea that we emphasize is that labor market structures can affect the speed at which nominal wage growth moderates during disinflation episodes and thereby play a role in determining the sacrifice ratio. The starting point is that labor markets are imperfectly competitive, such that wage-setters decide the precise timing of wage moderation after disinflation policies are initiated. This behavior is a feature of New Keynesian models in which price- and wage-setting is staggered and agents are averse to relative price and wage changes, see Ball and Romer (1991) for a model that captures these effects and Taylor (1983) for discussion in the context of labor markets. The factors that determine the length of time until wage moderation will be critical in setting disinflation costs – delays will thwart disinflation, prompting larger output losses. When labor market laws afford considerable protection to those in employment, e.g. through restrictions on firing by firms, wage-setters may choose to delay wage moderation because the chances of job losses are limited, and dominated by the benefit from higher real wages. We therefore hypothesize a positive relationship between the sacrifice ratio and the strictness of employment protection arrangements.

In contrast, when labor markets are centralized and interactions between firms and wage-setters highly coordinated, for example in Scandinavian countries, wage moderation can be implemented more rapidly. The reason is that when unions negotiate from an aggregate perspective they are more likely aware that wage moderation for one set of workers is occurring alongside economy wide moderation, leaving relative wages unaffected. As a result the relative wage concerns that can frustrate nominal adjustment are absent and disinflation can proceed at lower output cost.[1]

Our contribution is to investigate the relationship between labor market structures and sacrifice ratios using a detailed panel dataset on differences in employment protection laws, unionization rates and the degree of labor market coordination in 18 OECD countries, and a baseline sample of 76 disinflation episodes obtained from Ball (1994) and Bowdler (2009). The results show that higher levels of coordination in wage bargaining are associated with statistically significant reductions in the sacrifice ratio. More stringent employment protection laws are associated with larger sacrifice ratios, though the statistical significance of that relationship is weaker than that based on labor market coordination. Building on previous work on the effects of labor market coordination on macroeconomic outcomes (Calmfors and Driffill, 1988; Daniels et al., 2006) we investigate an inverse U-shape relationship between coordination and the sacrifice ratio, and find weak evidence for a non-linearity of that kind. In an important extension of our baseline results, we examine sacrifice ratios from Senda and Smith (2008), calculated using the assumptions regarding trend output during disinflations proposed by Zhang (2005) and Hofstetter (2008), which are different to those employed by Ball (1994) and Bowdler (2009). The effects of labor market coordination and employment protection are qualitatively similar to those in our baseline results, but significant at confidence levels of just 10%, 15% or lower. On the other hand, our results are generally robust to alternative extensions of our methodology such as the use of different measures of coordination and employment protection, the use of fixed effects and time dummies and the exclusion of outlier observations.

Our paper contributes to a substantial literature on labor market structures and macroeconomic outcomes. Bruno and Sachs (1985) and Calmfors and Driffill (1988) represent important early contributions. More recently, Thomas (2002) shows that nominal wage growth is more responsive to unemployment under highly centralized wage bargaining systems (though it is not necessarily more responsive to productivity growth, or input price shocks) and Nunziata (2005) shows that real wages are more responsive to unemployment under coordinated bargaining systems. In his original study of sacrifice ratios, Ball (1994) found a negative and marginally significant effect from the Bruno and Sachs (1985) indicator of wage flexibility. This index pools discrete measures of the duration of wage contracts, the synchronization of wage negotiations and the degree of indexation of wage contracts.[2] In Section 3 we discuss how our results relate to this evidence. Finally, in investigating the effect of central bank transparency on the slope of the Phillips curve (which is related to the sacrifice ratio), Chortareas et al. (2003) use labor market coordination as a control. The coordination index is positively correlated with the speed of inflation adjustment, consistent with the argument that we have described. However, the Phillips curve proxies are available for a sample of just 21 countries, precluding systematic investigation of the effects of other labor market institutions.

The structure of the paper is as follows. In Section 2 the measurement of the sacrifice ratio, labor market structures and other variables is discussed, and the basic form of the regression models is presented. In Section 3 the results from a range of regression specifications are interpreted in terms of the main hypotheses proposed in this introduction. Tests for non-linear relationships are presented, and various robustness exercises are discussed. Section 4 concludes with a summary of the paper.

## 2. Data and methodology

The sacrifice ratio is defined by Ball (1994) as the ratio between total annual output losses and the change in trend annual inflation over the course of a disinflation (a disinflation is a period during which trend inflation falls by more than 1.5% points

[1] A review of the channels linking labor market structures and the speed of nominal wage moderation is provided in Calmfors (2004). The other channels discussed include the idea that coordinated structures reduce the average duration of wage contracts, relative to decentralized structures, because an externality (greater aggregate nominal rigidity) is neglected in the latter case, leading to inefficient contracts, see Ball (1987).

[2] Ball obtained a similar result using a measure of the speed of wage adjustment estimated from time series regressions.