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# Explaining inflation in the period of quantitative easing in Japan: Relative-price changes, aggregate demand, and monetary policy☆

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ABSTRACT

Concentrating on the period of quantitative easing in Japan, this paper reexamines the correlation between the asymmetry of sectoral relative-price changes and the aggregate inflation rate. This correlation is widely interpreted as evidence that short-run inflation is determined by supply-side factors; however, we study whether, in addition to the inflation rate, monetary policy and aggregate demand explain it. Using producer price index data, we show, first, that the positive and significant effect of relative-price change asymmetries on inflation is not robust with respect to various indicators of asymmetry. Second, using a VAR framework, we find that aggregate demand robustly affects the measures of asymmetries, which raises doubt about whether they can be interpreted as pure supply-side indicators. Third, in addition to the indirect effect via measures of asymmetries, demand directly affects inflation. Thus, we reject the claim that the recent disinflation/deflation period in Japan can be understood as primarily a supply-side phenomenon and suggest that the main driving force was demand, whereas supply and monetary policy were of lesser importance.



## 1. Introduction

Japan has been in a long period of disinflation and deflation. As shown in Fig. 1, the rate of aggregate price change based on the producer price index declined during most of the Heisei recession (1990–2003). Moreover, pure deflation was the norm after 1999 until late 2004, except for a few hikes above zero. Such a long period of disinflation/deflation, lasting more than

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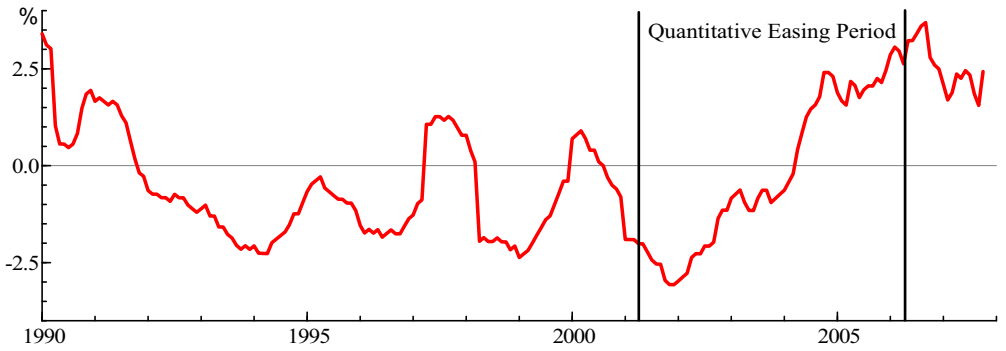


**Fig. 1.** Annualised monthly producer price inflation in Japan during 1999–2009 (in %).
*Source*: Bank of Japan.

15 years, is a rarity in history.[2] Measuring inflation using the consumer price index reveals an even more pronounced period of disinflation/deflation. It is no surprise, therefore, that a serious debate has arisen over the causes of and remedies for this situation. Although researchers point to various causes, the debate can be basically characterised as one over supply- versus demand-side factors. Some argue that this disinflation/deflation is mainly a supply-side phenomenon, as it was caused by such factors as lower energy prices or the influx of inexpensive imports. Others maintain that a lack of demand due to the weak economy is the main culprit. If the latter viewpoint is more relevant, government policy action can mitigate the situation, whereas such action is limited if the former view is more likely. This debate, vehement during the recession, seems to be growing even livelier as concerns for a 'deflation spiral' loom over the economy.

Of specific relevance in the context of explaining short-run inflation is a theory put forward by Ball and Mankiw (1995), which has attracted much attention since its publication. Assuming imperfect competition due to menu cost pricing and monopolistic competition, they show that large, but not small, positive (negative) sectoral shocks skew the distribution of relative-price changes across sectors to the right (left) and simultaneously push up (down) the mean of the updated prices. Empirically, this implies a positive correlation between the skewness of the distribution of relative-price changes and the rate of change of the aggregate price level. The authors provide empirical evidence for their theory using data from the United States.

Following Ball and Mankiw (1995), several papers investigate the validity of this hypothesis for various countries (see, e.g., Amano and Macklem (1997) for Canada; Demery and Duck (2008) for the United States; Döpke and Pierdzioch (2003) for Germany; Mendez-Carbajo and Thomakos (2004) for Spain). However, there are only a few studies that test this theory for Japan. Using monthly data on the consumer price index, Watanabe, Hosono, and Yokote (2003) detect a positive correlation between the inflation rate and asymmetry in relative-price changes over the period 1971–2002. Gerlach and Kugler (2007) confirm that finding for the period 1981–1986 using a random cross-section sample split to address the small sample issue pointed out by Bryan and Cecchetti (1999). Finally, Holly (1997) controls for the growth in money and rejects the Ball and Mankiw (1995) hypothesis, based on Japanese wholesale price data for 1976–1994.

Presumably because Ball and Mankiw (1995) themselves present it as chiefly a supply-side theory, many associate the success of this theory with that of the supply-side theory of short-run inflation. For instance, Ball and Mankiw (1995, p. 169) note, referring to a sectoral shock, that 'one can interpret the shock as a shift in the industry demand or cost function', but only mention a monetary shock as one such demand factor, without incorporating it into their regressions. Watanabe et al. (2003, p. 220) state that they measure the supply shock by examining how the distribution is skewed to the left and remark that the detected positive correlation may be a reflection of international transfers of technology and an influx of inexpensive imports from China.

Gerlach and Kugler (2007) assume from the start of their analyses that skewness reflects pure supply-side effects. Watanabe et al. (2003) approach the issue a little more cautiously; they observe the time profile of their asymmetry indicator over the business cycle. Noting that it is not pro-cyclical, they conclude that changes in the asymmetry are due to supply shocks. They also include the output gap as well as change in money supply in their regressions. They then show that the asymmetry survives after controlling for these effects, i.e., it still holds positive and significant. Further, they argue that the asymmetry indicator may be endogenous, as it could be affected by demand shocks, and show in an instrumental variable regression that the asymmetry indicator still positively and significantly affects the inflation rate. Although such evidence lends some support to the interpretation, these analyses do not directly address the issue and thus do not preclude the possibility that the demand factor is reflected in the asymmetry.

[2] Another notable example of a long disinflation period occurred in the United States from 1979 to the mid 1980s. However, this phase lasted for only about six years and the inflation rate never went below zero.