



# Inflation volatility effects on the allocation of bank loans<sup>☆</sup>



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## ABSTRACT

This paper examines the distortionary effects of inflation volatility on the allocation of bank loans. We argue that inflation volatility would render bank managers to behave more conservatively in issuing new loans. In contrast, when inflation volatility is low, bank managers would have the latitude to lend more idiosyncratically. Using a large panel of commercial bank data gathered from 15 countries, we provide support for our hypothesis by demonstrating a strong negative relation between inflation volatility and the dispersion of loans-to-assets ratio. Similar results are obtained when we split the sample between EU and non-EU country groups. The robustness of our findings is confirmed by a battery of sensitivity checks.

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## 1. Introduction

Allocation of scarce resources to their most efficient use is a major problem for all societies. This is an important issue, as human wants are unlimited while resources are scarce and can have many alternative uses. In market-oriented economies, the price system is the primary mechanism through which resources are distributed across all potential alternatives. As long as firms and lenders can forecast the individual relative prices accurately, funds will continue to flow toward projects which are expected to yield the highest returns. However, under uncertainty, optimal allocation of resources fails.<sup>1</sup>

In this paper, we investigate the efficient allocation of banks' loans under inflation volatility.<sup>2</sup> Given we employ a large panel of commercial bank data collected from several countries and examine two different loan categories (net loans, and corporate and commercial loans), we provide broader evidence regarding the distortionary effects of inflation volatility on the allocation of banks' loans in comparison to a study that focuses on country-specific data only. Secondly, as we carry out the analysis for European Union (EU) and non-EU country panels separately, we compare and contrast the impact of volatility effects on the allocation of loans between these two groups. Thirdly, we investigate whether the volatility effects on the allocation of banks' loans have changed following the recent financial crisis.

In our analysis, we expect to find a negative association between inflation volatility and the cross-sectional dispersion of loans-to-total-assets ratio. That is (i) during periods of high volatility, the cross-sectional dispersion of loans-to-assets ratio should narrow; and (ii) during periods of tranquility, the dispersion of loans-to-assets ratio should widen. This association suggests that bank managers will behave similarly during periods of high inflation volatility and that they will have the latitude to behave more idiosyncratically when inflation volatility is low. The reasoning

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<sup>1</sup> Arrow (1962) argues that misallocation of resources can be an outcome of unwillingness to bear risks or equally could be due to a preference for risk, as risky enterprises will get less funding under uncertainty given the limitations of financial resources or markets.

<sup>2</sup> From here on, we use uncertainty and volatility interchangeably.

behind this prediction is that during periods of high inflation volatility, due to excessive noise in the price system, bank managers would behave more conservatively in issuing new loans, as they cannot accurately evaluate the expected returns from lending.<sup>3</sup> In contrast, better quality information will lead to a more unequal distribution of lending across banks as bank managers can take advantage of more precise prediction of different lending opportunities.

The mechanism that we discuss suggests that price stability will favor the efficient allocation of loanable funds.<sup>4</sup> This issue is important, as commercial banks, specializing in overcoming frictions in the credit market by acquiring costly information on borrowers, are considered to be an important source of intermediated credit. In particular, it has been recognized that constrained firms are likely to rely heavily on bank loans, given their inability or limited access to the public securities markets. To that end, several economists have discussed that reductions in loanable funds could have a major impact on bank-dependent borrowers (e.g. small businesses) and may cause substantial reductions in their fixed investment expenditures or even lead them to bankruptcy (e.g. [Gertler and Gilchrist, 1994](#); [Ferri et al., 2014](#)).

To test whether our predictions receive support from the data, we constructed a large panel of commercial banks collected from the Bankscope database. Our sample covers the period between 1999 and 2013 and contains bank-level data from 15 countries including Argentina, Austria, Brazil, China, Denmark, France, Germany, Hong Kong, Luxembourg, Mexico, Russia, Switzerland, Turkey, the UK, and the US. The cross-country approach that we follow allows us to capture a sufficient number of inflation volatility bursts over the span of our data, as in this period inflation was lower and less volatile in comparison to the 70s and 80s. Furthermore, by examining a cross-country panel we can gain a broader understanding of volatility effects on the allocation of banks' resources.

We carry out our empirical analysis by employing both fixed effects and an instrumental variables estimator based on the Generalized Method of Moments approach (IV-GMM), which allows us to guard against the endogeneity problem. Both methodologies provide us with similar findings, which can be summarized as follows. Firstly, examining the full sample, we show that inflation volatility exerts a negative impact on the dispersion of both net loans-to-assets ratio, and corporate and commercial loans-to-assets ratio, providing support for our hypotheses. When we split the data between EU and non-EU countries, we observe that the same observation is valid for both country groups and for both loan categories. Lastly, we show that volatility effects for the EU-group have changed since the recent financial crisis. In particular, we find that while the adverse impact of inflation uncertainty on the allocation of commercial loans got stronger, this effect has weakened for net loans. In contrast, we find no significant change for the non-European countries for neither loan categories. Although the difference may be related to how quickly countries in each group recovered from the recessionary pressures induced by the financial crisis as well as various other macroeconomic shocks, further scrutiny would be useful to understand the underlying reasons.

To examine the robustness of our findings, we estimated our models for two different measures of inflation volatility. We also checked if the results are driven by countries which contribute the most or the least numbers of observations (US for the most; and Denmark, Germany, Hong Kong, and Turkey for the least). Separately, we dropped Germany and Switzerland from the analysis

<sup>3</sup> In this context, inflation volatility captures the noise in the price system.

<sup>4</sup> [Beaudry et al. \(2001\)](#) provide an analytical framework to examine the view that price stability allows an efficient allocation of fixed capital investment expenditures. They provide support for their claims using a panel of manufacturing UK firms.

because the average commercial loan-to-asset ratios for these two countries were lower than the others. These exercises provided us with findings similar to our earlier observations. Furthermore, to overcome the missing variables problem, we used several control variables in our models. These control variables capture the level of inflation, growth rate of GDP, financial crisis effects, stock market volatility, oil price volatility, aggregate bank risk and return relationship, and year dummies. All models led to similar findings that inflation volatility has a negative impact on the allocation of scarce bank resources.

The paper is organized as follows. Section 2 discusses the related literature. Section 3 provides visual evidence on the link between inflation volatility and the cross-sectional distribution of bank loans, followed by our empirical models and the methodology. Section 4 presents the data and the uncertainty measures. Section 5 reports the results as well as the sensitivity checks. Section 6 concludes the paper.

## 2. Related literature

One of the major issues in economics is the allocation of scarce resources to their most efficient use. Although the price system leads to an efficient allocation of resources, under uncertainty, this fails to materialize. To that end, theoretical researchers have expended considerable effort to show that uncertainty will affect fixed investment expenditures of firms. For instance, under (full or partial) irreversibility, several researchers have shown that an increase in the variance of the distribution of future rates of return from an investment project would raise the option value of waiting and cause delays in fixed investment expenditures (see for instance, [Bernanke, 1983](#)).<sup>5</sup> [Hartman \(1972\)](#) and [Abel \(1983\)](#) predicted a positive relationship between uncertainty and investment, where an increase in uncertainty about future prices raises the expected future return on a marginal unit of capital, and therefore raises the attractiveness of investment.

Several empirical researchers have shown that uncertainty has a negative impact on the level of a firm's fixed investment expenditures,<sup>6</sup> while a number of other studies have noted a positive or a non-linear relation between uncertainty and investment.<sup>7</sup> In contrast to other researchers, [Beaudry et al. \(2001\)](#), building on the framework suggested by [Lucas \(1973\)](#), emphasized the implications of uncertainty on firms' fixed investment expenditures rather than employment. Based on their analytical model they argued that variations in inflation uncertainty will distort the efficient allocation of firms' scarce resources. In particular, their model implied that high (low) uncertainty will lead to a narrower (wider) cross-sectional distribution of firms' fixed investment rate as firm managers use less (more) precise knowledge on different investment opportunities. They provided support for their claims by scrutinizing a panel of UK manufacturing firms that covered the period between 1970 and 1990. [Caglayan and Xu \(2014\)](#) is the only other example in the literature that has focused on the association between volatility and the cross-sectional dispersion of firms' fixed investment expenditures. Using a panel of Japanese manufacturing firms, they also concluded that uncertainty distorts the efficient allocation of firms' fixed investment expenditures.

<sup>5</sup> Capital asset pricing models also suggest a negative relationship between investment and uncertainty. See for instance, [Craine \(1989\)](#).

<sup>6</sup> Among others see, for example, [Leahy and Whited \(1996\)](#), [Bulan \(2005\)](#) and [Bloom et al. \(2007\)](#).

<sup>7</sup> [Sarkar \(2000\)](#) found a U-shaped relationship between volatility and fixed investment. [Mohn and Misund \(2009\)](#) showed that oil price volatility has a positive effect on investment of international oil and gas firms. [Czarnitzki and Toole \(2011\)](#) showed that firm-level R&D investment falls in response to higher levels of uncertainty, but that patent protection partially mitigates the influence of uncertainty.

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