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# Journal of International Money and Finance

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## Nominal shocks and real exchange rates: Evidence from two centuries



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### ARTICLE INFO

*Article history:*

Available online 31 October 2014

*JEL Classification:*

F31

F41

N10

*Keywords:*

Vector autoregression

Monetary shocks

Exchange rate movements

Long-run identifying restrictions

### ABSTRACT

This paper employs structural vector autoregression methods to examine the contribution of real and nominal shocks to real exchange rate movements using two hundred and seventeen years of data from Britain and the United States. Shocks are identified with long-run restrictions. The long time series makes possible an investigation of how the role of nominal shocks has evolved over time due to changes in the shock processes or to structural changes in the economy which might alter how a shock is transmitted to the real exchange rate. The sample is split at 1913, which is the end of the classical gold standard period, the last of the monetary regimes of the 19th century. The earlier subsample (1795–1913) shows a much stronger role for nominal shocks in explaining real exchange rate movements than the later subsample (1914–2010). Counterfactual analysis shows that the difference between the two periods is mainly due to the size of the nominal shocks rather than structural changes in the economy. These findings are consistent with the view that the financial instability and frequent deflation of the 19th century had real economic effects.

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## 1. Introduction

Over the past two centuries, a number of institutional and structural changes have taken place that may have altered the behavior of real exchange rates. The 19th century<sup>1</sup> economy suffered considerable financial instability, with recurrent banking panics and alternating periods of inflation and deflation. The 20th century saw a shift to fiat money and modern central banking, as well as changes in labor market institutions and in the degree of nominal rigidity present in the economy. While a number of previous studies have examined the extent to which real exchange rate fluctuations are driven by nominal or real shocks, this paper adds to the understanding of this question by investigating how the role of nominal shocks has changed over time.

In particular, this study examines the US–UK real exchange rate over the period 1794–2010 using vector autoregressions (VARs) identified with long-run restrictions. Employing a data set that extends back to the late 18th century allows for an investigation of how changes in the shocks affecting the economy as well as in the structure of the economy may have influenced the role played by nominal shocks in real exchange rate behavior. Moreover, an improved understanding of the sources of movements in the US–UK real exchange rate may be of interest to scholars because this series has been widely utilized in exchange rate research, e.g. in studies of purchasing power parity by [Lothian and Taylor \(1996, 2008\)](#), among others.

The motivation of this study is thus twofold: (i) to examine how changes in economic institutions and structure might – or might not – have altered the determinants of real exchange rate behavior and (ii) to better understand how the properties of a long run data series that plays a significant role in the scholarly literature on real exchange rates have evolved over time.

While overall real exchange rate volatility increased in the 20th century, our estimation results indicate that nominal shocks accounted for a larger share of real exchange rate movements in the period before 1913 than since. Results from a counterfactual experiment indicate that this may primarily be attributable to a change in the relative size of nominal versus real shocks, though the 19th century also featured stronger transmission of nominal shocks to the real exchange rate.

As further described below, the 19th century saw recurrent banking crises in both the US and the UK. The US lacked a lender of last resort, and monetary standards shifted on several occasions. With such a high degree of monetary instability the finding that nominal shocks were larger in this period is not surprising. It is less clear what to expect regarding the effect of nominal shocks on real variables such as the real exchange rate. Explanations of how nominal shocks affect real variables often rely on nominal rigidities. Some studies have argued that nominal rigidities were less important in the 19th century – i.e., that the economy of this era more closely approximated that of a classical “flexible” economy. An examination the relationship between nominal and real exchange rates in our data based on [Mussa \(1986\)](#) presented below is consistent with this view that nominal rigidities have increased over time. However, financial crises have been shown to have real effects, even during the 19th century (e.g., [Grossman, 1993; Reinhart and Rogoff, 2014](#)). Debt contracts fixed in nominal terms provide another mechanism through which nominal shocks can affect real variables, with deflation, which was common in the 19th century, potentially making it much more potent. If nominal shocks affected relative demand, real exchange rates would show the impact on relative prices. Overall, the findings below suggest slightly stronger transmission of the nominal shocks to real variables in the 19th century.

This research builds on a number of previous studies that have investigated the relative importance of real and nominal factors in real exchange rate dynamics using VARs identified with the long-run restriction methodology of [Blanchard and Quah \(1989\)](#). Using a two-variable system of real and nominal exchange rates between the US and five countries for 1973–89, [Lastrapes \(1992\)](#) finds that real shocks are far more important than nominal shocks. [Clarida and Gali \(1994\)](#) examine the real exchange rates between the US and Britain, Canada, Germany and Japan using a three-variable system motivated by an open-economy IS-LM model. They find that nominal shocks account for a substantial proportion of the variance of the Germany–US and Japan–US real exchange rates, but relatively little for Britain–US and

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<sup>1</sup> In what follows, we use the phrase “19th century” to refer to the period through 1913, which was the last year of the “classical” gold standard era.

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