Reassessing the empirical relationship between the oil price and the dollar

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HIGHLIGHTS

- We reassess the relationship between the real oil price and the dollar over the 1974–2015 period.
- Changes in the two variables are linked by a negative relationship over the whole period.
- The link between both variables is positive over the subsample ending in the mid-2000s.
- We estimate a nonlinear model in which the oil price-dollar nexus depends on the evolution the dollar.
- The relationship is negative most of the times, except when the dollar hits very high values.

ARTICLE INFO

ABSTRACT

This paper aims at reassessing the empirical relationship between the real price of oil and the U.S. dollar real effective exchange rate over the 1974–2015 period. We find that changes in both variables are now linked by a negative relationship, going from the dollar exchange rate to the real oil price. However, the same relationship is found positive when ending the sample in the mid-2000s, in line with the previous literature. To understand and investigate this evolution, we rely on a nonlinear, smooth transition regression model in which the oil price-dollar nexus depends on the dynamics followed by the U.S. currency. Our results show that the relationship is negative most of the times but turns positive when the dollar hits very high values, as in the early eighties.

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1. Introduction

A number of key economic variables exhibit large fluctuations that contribute to the global economic cycle. The two most important of them are certainly the oil price and the dollar stance. A decline in the oil price is able to boost domestic demand in all oil-consuming countries by cutting their energy bill, whereas depreciation of their currency against the dollar is likely to improve their external trade by enhancing export competitiveness. The combination of both factors is hence often considered as a good omen for global growth, although not always sufficient to sustain activity by its own.

Given the importance of oil in the global economy and since the U.S. dollar is the key currency on the oil market, the question of the potential links between the price of oil and the U.S. dollar exchange rate is crucial. From a theoretical viewpoint, various transmission channels could be at play in explaining the correlation between the oil price and the U. S. dollar exchange rate. Firstly, as oil trade is denominated in U.S. dollars, movements in the dollar exchange rate impact the price of oil as perceived by all countries outside the United States. Consequently, fluctuations in the dollar exchange rate are able to trigger changes in oil demand and supply, affecting the oil price itself. Secondly, the link between the oil price and U.S. dollar exchange rate can be apprehended through the lens of petrodollars recycling effects and portfolio

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models (Krugman, 1983a, 1983b; Golub, 1983), which were designed to account for trade and financial interactions between the United States, oil-producing countries and third countries (especially Europe). Thirdly, referring to the literature on equilibrium exchange rates (Clark and MacDonald, 1998; Faruqee, 1995), if a country accumulates foreign assets, its exchange rate appreciates. This movement occurs without impeding the country's current account balance because capital income takes over the loss in trade receipts induced by the deteriorated competitiveness. As a change in the price of oil affects all countries' external trade balances, the induced variations in international assets may impact the exchange rates. Fourthly, the growing financialization of commodity markets may play a role in explaining the link between our two variables of interest. As fund managers are more and more likely to arbitrage between commodities and financial assets, a fall in the price of U.S. assets through a USD depreciation can lead them to shift towards oil, increasing its price. Finally, the U.S. monetary policy may also feed an indirect transmission channel between the oil price and the U.S. exchange rate since a restrictive monetary policy may lead both to a dollar appreciation and a reduction in the price of oil.

This question of correlation between the oil price and the U.S. exchange rate has become even more acute with the recent sharp fluctuations observed on both the oil and U.S. forex markets. Indeed, the oil price has been falling since June 2014, while the U.S. currency has exhibited an appreciating trend. One key issue is then to determine if this evolution in opposite direction is a typical feature regarding historical records.

As a matter of fact, the real oil price and the U.S. dollar real effective exchange rate (REER) have regularly displayed large fluctuations since the seventies. However, these swings evolve over time, being sometimes parallel, and at other times in opposition, as shown in Fig. 1A. Hence if there exists a relationship between the oil price and the dollar, it is not a linear one. For instance, in the early 1980s, both variables upsurge, leading to a positive relationship. On the contrary, at the end of the period, since the mid-2000s, they exhibit a scissor-movement, typical of a negative relationship. The current situation characterized by an appreciating dollar and a decreasing oil price falls within this latter context. Besides, the correlation between the change in real oil price and the USD real exchange rate also exhibits strong evolution over the last decades (Fig. 1B). Whereas it was quite unstable from 1974 to 2005 but on average slightly positive at 0.11%, the correlation coefficient turned strongly negative, reaching −55.37% on average from January 2006 until August 2015 (the end of our period under study). This evolution towards high negative correlation is also evidenced on daily data by Fratzscher et al. (2014).

A key issue concerns the direction of the relationship between the two variables. As highlighted by Coudert et al. (2007) among others, this is not clear cut and if a causality exists, its direction is not unequivocal. Indeed, the theoretical considerations point to various transmission channels between the oil price and the dollar, that lead to different signs and directions of the relationship (see Section 2). This issue is particularly relevant in the recent context in which the appreciating dollar resulting from the anticipated exit from the quantitative easing policy in the U.S. tends to put prices under pressure, making oil investments less attractive for investors. The main question remains to know whether this conjunction of factors—strong dollar and low oil price—is a mere coincidence. Investigating the interactions between the oil price and the dollar is thus a key concern, which is precisely the aim of the present paper.

To disentangle the alternative theoretical explanations, we rely on an empirical analysis over the January 1974-August 2015
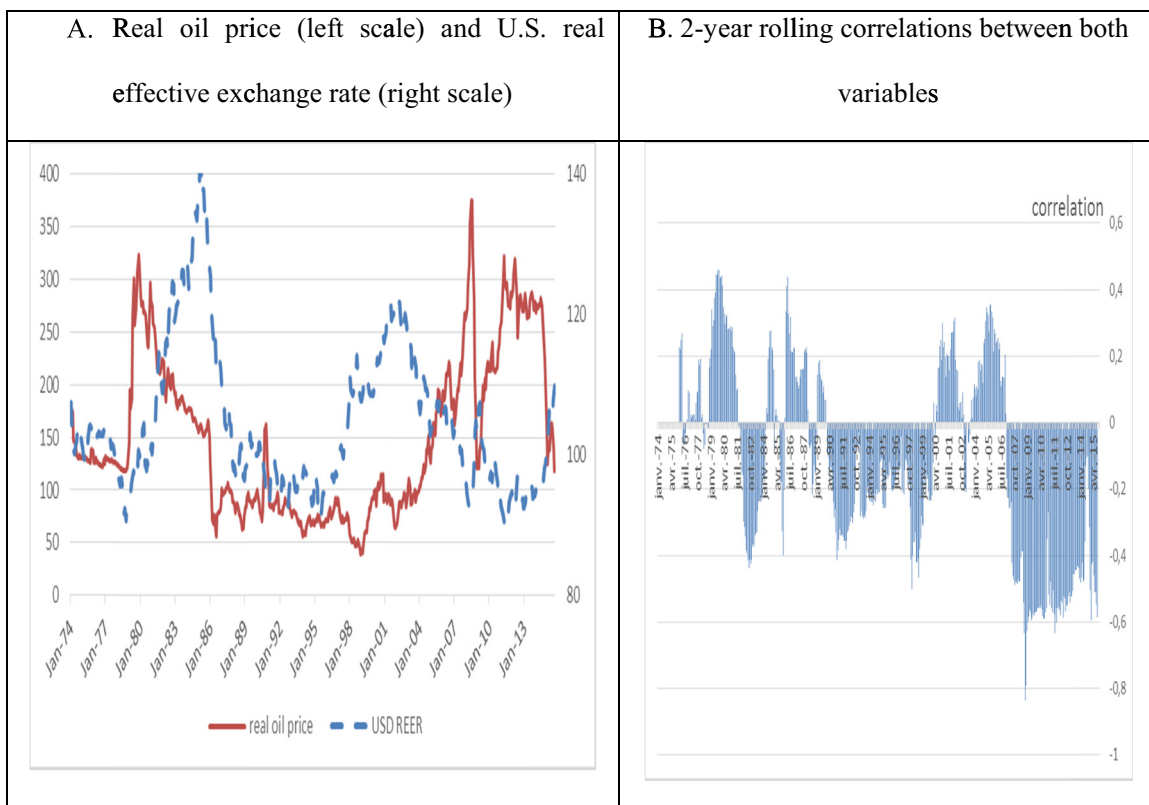

Fig. 1. Real oil price and U. S. real effective exchange rate. A. Real oil price (left scale) and U.S. real effective exchange rate (right scale). B. 2-year rolling correlations between both variables. Note: data are monthly and expressed as indexes based 100 in 1990. Correlations are calculated on the monthly change in the logarithm of the two variables. See Section 3 for data sources.