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ON THE RELATION BETWEEN OIL PRICE AND U.S. DOLLAR: A REVIEW OF FINANCIAL POINT-OF-VIEW

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Abstract

If it studies the relationship between crude oil price and U.S. dollar, classical literature finds a positive sign for the correlation of these two variables, i.e. the oil price and the dollar grow up together or they fall together. Instead, researches which use the data of more recent years show a negative link, so that if one variable is rising, the second one is decreasing and vice versa. Besides, there are two possible directions of causality: the economic theory explains the influence of oil price towards U.S. dollar; while the financial perspective is coherent with the opposite way. This second thesis is confirmed by the empirical evidence. In this framework, the futures and other financial derivatives have changed the picture, modifying how crude oil is priced and valued by the market. In this paper, we review the literature about the above relationship, inspecting whether or not the empirical results validate the theory, under the financial point-of view, i.e. the second interpretation.

Keywords: Exchange Rates, Oil Price, Asset Price, Inflation, Granger's Causality, Currency

JEL Classification: C0, C1, E20, E31, F19, F32

1. Introduction

A large part of the existing research suggests that there is a relevant effect of energy supply disruptions on economic activity. Analyses of microeconomic data sets show significant correlation between oil price shocks and output, employment and so on. However, the thesis that oil price shocks contribute directly to economic downturns seems to be controversial. The same counts for macroeconomic variables. Over the past 40 years, oil has become the biggest commodity market in the world. Simultaneously, its price volatility and the consequent hedging implied and was triggered by the development of a financial sphere of derivative contracts, which now dominate the process of worldwide oil price formation. With "hedging" we mean not only the financial hedging activity of traders, investors and central banks against the oil price fluctuation, in terms those of oil-futures price fluctuations, but the hedging demand of producers too. It is an important channel through which trading in commodity futures market can affect spot prices. The debate about "whether speculative activity in oil futures market has been

responsible for the fluctuations in oil spot price" has had their response: changes in speculative positions modify the costs of hedging for producers which change inventory holdings and thus spot prices. We recall that the main producers of crude oil are U.S.A., Saudi Arabia, Russia and Iran; while the major consumers are U.S.A., Western Europe and China. Immediately, we can note that U.S.A. appear among both categories. That confirms the relevance of the States over the crude oil market. From here, two basic questions, which are behind and beyond the picture, arise: 1) which is the relation between crude oil and the U. S. economy? 2) And between crude oil price and the U. S. dollar value (considered via U. S. dollar exchange rates too)? Here, as "U. S. dollar exchange rates" we mean the value of the U.S. dollar in terms of the exchange rate with respect other currencies. Going deeply, among the two main scientific trends about the link between the crude oil price variations and the U. S. dollar value, the former empirical research find a positive relationship between both variables, i.e. an increase in the oil price coincides with and an appreciation of the dollar. Instead, the second school of thought supports a negative relationship between them. In particular, a negative sign of correlation is confirmed by empirical evidences in the last 20 years but causality lives in both directions. In other words, it is not only the oil price which increases [resp. decreases] cause a depreciation [resp. appreciation] of the dollar, but the opposite is true too. The reason of the first direction of causality is explainable by the economic theory, while the second one is supported by the financial theory with a key found in the traders' activity and the strategies of hedging against the fluctuations of the dollar. The most important aspects to be considered for studying the relation between the two market variables are: 1) whether the country is a net importer or a net exporter of crude oil; 2) if it is a net importer, what is its oil import dependence. Indeed, countries - as U.S.A. - usually considered commodity-dependent, are potential candidates for having "commodity currencies", i.e. an exchange rate driven by commodity prices.

In this paper, we present a review of the current literature about above second question and the possible sign of the correlation between oil and U.S. dollar. In particular, we refer to more recent studies which show a negative sign for it, which is obtained under a financial point-of-view. In section 2, we recall the Krugman's models as a first analysis of the direction of causality for the relationship between crude oil price and U.S. dollar value. In section 3, after a short description of some existing references about a positive sign for the relationship between crude oil price and the U.S. dollar value (the economic point-of-view), we summarize the second trend of researches which point out, vice versa, the negative sign for this link. Moreover, in section 4, we present some situations of bi-directionality. In section 5, we recall some more recent results and, finally, in section 6, we report the conclusion.

2. Krugman's models

The most important steps for the direction of the causality between crude oil price variations and the U. S. dollar value were those developed by Krugman (1980, 1983). We have to clarify that not only the direction of causality, but also the sign of the correlation between the variables is still controversial. Indeed, the empirical evidence suggests that the initial effect and the long-run one are present in opposite directions: a crude oil price increase will initially lead to a U.S. dollar appreciation, but that eventually implies a U.S. dollar depreciation. Krugman (1980) gives a theoretical model for consequent analyses. The main questions are how the crude oil price and the U.S. dollar value are related (with the key point in which direction there is the link) and how a rise of the first variable affects the U.S. dollar exchange rates. Krugman (1980) considers a model with three countries or groups of countries: U.S.A., Germany and OPEC. OPEC and other countries buy manufactured goods by U.S.A. and Germany. Moreover, OPEC exports only crude oil, whose price is exogenous and fixed in U.S. dollars. The assumption is that there are only two assets, dollar and deutsche mark, each held by all three countries. U.S.A. holds a fixed U.S. dollar value of the marks in own portfolio and, similarly, Germany holds a fixed mark value of dollars (that means that each country has a zero marginal propensity to hold wealth in the other's currency). Germany's trade depends on the exchange rate, $E = E(M)$, where M is the price of the U.S. dollar in terms of marks and price levels are exogenous. Crude oil imports $\bar{O}_A$ and $\bar{O}_G$ are given and expressed in volume terms. Besides, $\bar{O} = \bar{O}_G + \bar{O}_A$ is the total crude oil

exports and OPEC spends its revenues in dollars and marks. The development of the model brings us to conclude that, initially, a crude oil price increase implies more cost of imports. However, even if U.S.A. and Germany current accounts deteriorate, the capital account improves, since OPEC invests its trade surplus in dollars and marks.[1] So, in order to establish if the effects on the dollar value are positive or negative, we have to consider whether OPEC investments in U.S. dollar are greater or lower than the current U.S.A. account gap, with respect to the import/export quantities. Summarizing, it can note that the consequences of an increase of the crude oil price passes through two channels: the asset market and the goods market. Even though the simplicity of the model, it brings out two basic considerations: a) an increase of crude oil price affects a country's currency, depending on whether the worsening of its current account is greater or less than the OPEC imports and investments; b) in the long-run, OPEC investments preferences become irrelevant, while OPEC's import preferences matter. Moreover, Krugman (1983) states some further consideration illustrating how the effect of an oil prices change on the value of the dollar can be controversial. Indeed, the U.S. dollar may either appreciate or depreciate when the crude oil price increases. In short, the differences between the dimensions of the financial markets and the fact that, during the 80's, OPEC invested its trade surplus into U.S. dollars[2] caused an initial increase of the U.S. dollar value. On one side, as a consequence of this effect, there was expectancy for a growing U.S. dollar. But, on the other side, due to long-run factors, there was an opposite anticipation too, even before the end of OPEC investment actions. In some case, though OPEC turned its earnings in dollars, the expectation of future dollar depreciation dominated from the start and produced a drop in the exchange rate.

3. The negative sign of causality

Before investing the second school of thought, which related to financial point-of-view and negative sign for causality, we simply recall some references about the first one, which is linked with economic point-of-view and positive sign for relationship between oil price and dollar. They are the following: Amano and van Norden (1998) Throop (1993) Dibooglu (1996) and Bénassy-Quéré *et al.* (2007).

Now, we present the second line of researches. Coudert *et al.* (2008) focused on the direction of the causality with an empirical analysis based on monthly data of the crude oil price and *U.S.* dollar exchange rates, from January 1974 to November 2004. Here, both the crude oil price and the exchange rate are expressed in real terms (and increase indicates an appreciation of the *U.S.* dollar). The fact that the causality exclusively moves from the oil price variations to the exchange rate does not seem obvious anymore. The empirical evidences show that a movements in the dollar exchange rate can trigger modifications in oil demand and supply, hence in the oil price. Nonetheless, whatever own opinion is, it cannot neglect that the exhaustive survey of theoretical interaction between the two variables keep the door opened for every possible link between oil price and exchange rate: either positive or negative and in both direction of causality. The main issue is that, if there are some theoretical reasons for every kind of link, one has to be stronger than the others. So, the idea is to get more indications by performing empirical analysis over the period 1974-2004. Coudert *et al.* (2008) analyze the impact of the U.S. dollar exchange rates on the oil demand and supply. The term of crude oil price is the U.S. dollar. Obviously, there is an effect only for countries with floating currency. On average, *ceteris paribus*, a U.S. dollar depreciation implies an initial decrease of the crude oil price and so in consumer countries real income and crude oil demand drive up, with a final effect of an augmentation of oil price. As regards, the impact on the crude oil supply, the relation passes through the inflation. Indeed, a depreciation of the U.S. dollar reduces the real income in crude oil export countries (most of them use a fixed-exchange rate regime with respect to dollar). The subsequent decrease in purchasing power reduces the real income available for oil production. And as conclusive result, there is a reduction in crude oil supply. But, since the

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[1] As well-known, in 1980, there did not still exist the Euro and the mark was the German currency.
[2] The arrival of the Euro on the foreign exchange market has changed the situation.

incisiveness in supply is less than in demand, as a whole, there is an evidence for the negativity of the correlation between the U.S. dollar exchange rate(s) and the oil price and *mutatis mutandis* a growing crude oil price should reduce the U.S. terms of trade and leads to a *U.S. dollar depreciation.* Obviously, given the existence of a co-integration relationship between the two variables, a further explanation of the relation between oil and dollar is given by the Granger causality (see Granger (1969)). The application of Granger test suggests that the direction of the causality moves from oil price variations to the dollar exchange rate. Benhmad (2010) uses a wavelet approach to study the linear and non-linear Granger causality between the real crude oil price and the real effective U.S. dollar exchange rates, by means of monthly data, from February 1970 to February 2010. He decomposes the two time series into various scales of resolution and progressively he studies the relationships between the decomposed series for each scale. The reason for using this kind of approach is the heterogeneity among traders in terms of beliefs, expectations, risk profiles, informational sets and so on. The author identifies two groups: "high frequency" traders (such as speculators and market makers) and "low frequency" ones (such as central banks and pension funds). He decomposes the series into a set of six orthogonal components for representing the original series. Every time scale identifies a time frequency that occurs in the same scale. The result is that the causal relationship varies depending on the time scale or frequency band. In connection with the high-frequency band, there is no evidence of causality from crude oil price to U.S. dollar exchange rates: crude oil price have no significant effect on U.S. dollar. But, instead, causality can be observed from the dollar to the oil. It is relevant pointing out that this conclusion is the opposite of the one of Bénassy-Quéré *et al.* (2007). The non-linear causality test gives different results in comparison with the Standard Granger causality test. In the short run, the behavior of traders and considerations about portfolio diversification constitute the major factors in the relationship between crude oil prices and U.S. dollar. Besides, the causality is mainly present from the former to the latter. Whereas, over the medium and long run, the causal relationship is strongly bidirectional. Habib and Kalamova (2007) investigate the existence of an "oil currency" taking the real crude oil price as a proxy of the terms of trade, in crude oil exporting countries, by using quarterly data from 1980Q1 to 2006Q2. Let us note that, as mentioned above, we are analyzing the relationship between crude oil price variations and U.S. dollar exchange rates, both in terms of the direction of causality and in terms of the sign of the correlation between the two variables. However, Habib and Kalamova (2007) investigate the relationship between real oil price and the currencies of three oil exporting countries. We need to keep in mind that speaking about the relationship of crude oil price and U.S. dollar is not similar to do about its relationship with the currency of an oil exporting country. We recall that United States are net importer of crude oil; hence, if we would find the sign of the correlation between crude oil price and U.S. dollar, we probably could obtain the opposite sign of the correlation with a currency of a net exporter of crude oil. The countries under specification are: Russia, Norway and Saudi Arabia, in which crude oil exports account for a large share of total exports, thus dominating movements in their terms of trade. By co-integration analysis, the authors conclude that it is possible only for Russia to establish a positive long-run relationship between the real oil price and the real exchange rate, since the Russian ruble can be defined as an "oil currency": indeed, given the co-integration evidence, the real effective exchange rate and the real crude oil price share a common stochastic trend. It becomes rather evident the thought about the positivity of the correlation between the oil price and the currency of a net oil-exporting country. But that is equivalent to standing up to a negative relation between the former and the currency of a net oil-importing country as U.S.A. Verleger (2008) focuses on the rise in crude oil prices in 2007/2008 and attributes this trend to two factors: a physical squeeze on the available light sweet crude oil on earth; and the financial crisis, which has forced the Federal Reserve to abandon its focus on price stability (at least temporarily). Indeed, the process of cutting rates in 2008 triggered the crude oil price increasing. Observing the FED's behavior, traders and investors chose crude oil as a hedge against inflation. At the same time, those who owned crude oil (overall in terms of net positions in oil-futures) applied the strategy of removing that commodity from the market. That mechanism generated an upward crude oil price spiral. The link between the falling dollar and rising crude oil prices was created by the FED's failure to

control the inflation expectation. Its cuts in interest rates have induced investors to divest from the U.S. dollar and to invest in hedging assets. Thus, it is not surprising that the crude oil price rises and the U.S. dollar falls. In this context, Schmidbauer and Rosch (2008) state the hypothesis that the link between crude oil prices and U.S. dollar exchange rates is explainable by volatility spillovers rather than by co-movements. Precisely, the USD/EUR exchange rate fluctuations impact on Western Texas Intermediate (WTI) prices in terms of volatility spillovers. Moreover, this impact is asymmetric, because the effect is more pronounced for "bad news" (*e.g.* "the USD is weakening"). These authors used daily crude oil price series as well as daily USD/EUR exchange rate series of the sample period beginning in January 1995 and ending in May 2008 (using mark as a proxy of Euro for the period of time prior to January 1999). Schmidbauer and Rosch (2008) attribute to emerging market countries the responsibility of the current account imbalances. As they say, emerging countries have "the key to oil and dollar moves". Indeed, large surpluses in current accounts and foreign exchange reserves have pumped up the liquidity, from 1999, that is the main source of oil demand growth and crude oil appreciation. Since 2007, the U.S. financial crisis and aggressive U. S. interest rate cut have led to a weakening of the U.S. dollar also because, as argued by Verleger (2008), the FED temporarily abandoned the price stability policy. Then, OPEC restates that the record price were related to a speculative oil trading, to the weakness of the dollar and to the U. S. subprime mortgage market turmoil: as it said, "crude oil prices are higher than in the past partially to compensate for a weaker dollar". Moreover, the investors move their money into commodities following a deepening fear about the weakness of this currency. The fundamental brick of their research is a *GARCH* model. They assume that the conditional variance is not constant over time but it depends on the data series. So we are in the presence of autocorrelation. They found evidence for volatility spillovers for daily as well as for weekly price series. With respect to weekly data, in the daily time spacing, the effect of U.S. dollar news on the crude oil price appears less pronounced: this phenomenon can be explained by the short-term occurrence of hysteria in speculative activity

Breitenfellner and Cuaresma (2008) identify five possible channels for the relation between U.S. dollar and crude oil price, from a theoretical point of view: purchasing power, local price, investment, monetary policy, and currency market. As regards to purchasing power, following up on the role of the U.S. dollar as a *numéraire* of standard commodities (U.S. dollar commodities, as crude oil), a change in U.S. dollar exchange rates alters the terms of trade between any pair of countries. Hence, its variations involve crude oil exporters' pricing behavior. In particular, they have an incentive to react to U.S. dollar depreciation by increasing export prices. For example, OPEC countries do not try to set price directly, but following a quantity-based strategy which indirectly influences the market clearing price. The plausibility of the purchasing power channel is confirmed by the fact that oil-exporting countries have a certain degree of price-setting capacity and that oil invoicing is conducted in U. S. dollars. As regards to local price, fluctuations in the exchange rate of the U.S. dollar create disequilibria in the market for crude oil. The depreciation of this currency makes crude oil less expensive for consumers in non-U.S. dollar regions (in local currency), increasing their commodity demand, which eventually causes a following adjustments for the price of the this dollars-denominated commodity. About investment, as a falling dollar value reduces the returns on *U.S.* dollar-denominated assets in foreign currencies, an asset channel is put in motion by increasing the attractiveness of crude oil and other commodities as a class of alternative assets to foreign investors. Furthermore, since the U.S. dollar's depreciation means "risk of inflationary pressure" in U.S.A., their usefulness as a hedge against the inflation rises too. This channel is evidenced by the fact that, in recent years, most of the growth in global crude oil demand comes from China and the Middle East, both known for having their currencies pegged to the U.S. dollar, in that period. As regards to monetary policy, lower interest rates increase liquidity, thereby stimulating the demand, together with the demand for oil. Considering these first four channels, from a theoretical point of view, it is the U.S. dollar fluctuations that imply the crude oil price variations. Stating that mechanisms the correlation would be negative given that a depreciating dollar implies an appreciation of the crude oil price. The direction of causality, instead, is unclear as regards to the fifth channel, related directly to the currency. Foreign exchange markets are

possibly more efficient than that of crude oil in order to anticipate developments in the real economy. If the Krugman (1980)'s considerations hold, the direction of the causality may be controversial, depending on whether the long-run effects dominate from the beginning or not. Hence, we have to well distinguish the impact of the crude oil price variations on an oil-exporting country's currency from an oil-importing country's one. An up-movement of the crude oil price puts upward pressure of an oil-exporting country; then the correlation is positive. The contrary holds in the case of an oil-importing country. The fundamental (negative) relationship between oil price and U.S. dollar is theoretically given by the fact that, for a long time, the U.S.A. has been a net importer of crude oil. Since the demand for crude oil is very inelastic, an increase in the crude oil price implies an equivalent change in the value of import into the U.S.A. Due to the term of trade effect, higher crude oil price causes an increase in the value of U.S. imports, putting a downward pressure on the U.S. dollar, especially regarding the other currencies less dependent on crude oil imports. There is a strong negative association between these two variables, but it is necessary to emphasize too that the causality constitutes the reverse of the fundamental economic relationship. In particular, three mechanisms are identified as generated by as many different sources: demand, supply, and the trader's activity. Demand states that the price of *US*-oil is actually lower than that one in another country, when the U. S. dollar falls relatively to the other currency. It can be expected that it purchases slightly more crude oil, because the domestic price is lower. But if each country demands a higher quantity of crude oil as a response to the weakness of U. S. dollar, then there will be an upward pressure on crude oil price. Supply is also important because we need to keep in mind that the OPEC countries have a significant control over the supply. Then, if the U. S. dollar price of crude oil falls, they will collect less U. S. dollars for their export of crude oil. Of course, that constitutes a particular problem for OPEC countries that rely heavily on imports from countries other than the U.S.A. Therefore, they are influenced for cutting the supply of their crude oil to market, in order to drive the price up, for re-establishing their crude oil export earnings in U.S. dollars. The traders' activity, in financial terms, generates the most relevant effect of correlation between U. S. dollar and crude oil price. Indeed, the crude oil price represents an attractive hedge against the U. S. dollar fluctuations. When this currency is weak for whatever reason, derivatives traders will purchase oil contracts as futures for hedging, given the predictable negative relationship between U. S. dollar and crude oil price. This trading activity, which is in response to this weakness of U.S.A. currency, will put upward pressure on the price of oil. According to these reasons, we would expect a combination of economic and financial factors that leads to a self-reinforcing mechanism. Indeed, keeping in mind the newly profiled theories useful for explaining how a weaker U. S. dollar causes an upward pressure on oil price, we can obtain interesting further consequences. Assuming that the U. S. dollar falls relatively to major currencies, its initial lower valued will cause an increase of the demand for crude oil by many countries, as a response. Then, OPEC will drive up the crude oil price further, as a hedge against this picture. In short, U.S. dollar weakness has caused an increase in the crude oil price. However, given the fundamental terms of trade between the two variables, the higher crude oil price will cause further downward pressure on the U.S. dollar. We have again the above mechanism and so on. Thus, a cycle in which the U.S. dollar falls, causing a higher crude oil price, in its turn, that implies a U.S. dollar fall, even further at the end.

4. The bi-directionality in some sub-period

The mechanism just explained in section 3 does not seem to be stable over time and so different results and dynamics of the relationship are found in different sub-periods. A further explanation of the bi-directionality of the relationship is provided by Grisse (2010), who develops a short overview of potential transmission channels - that essentially follows that discussed in the previous section - which could generate co-movements between the crude oil price and the U.S. dollar. Changes in the U.S. dollar exchange rates could have an effect on the crude oil price because of different causes. First of all, for their influence on the global demand for crude oil: since its price is denominated in U.S. dollars, when this currency depreciates, crude oil becomes less expensive in terms of domestic currency for consumers in non-dollar countries.

This could increase their demand for crude oil which - in turn - could lead to higher crude oil price. This point provides an intuitive explanation of the negative sign of the correlation between the two variables; Besides, there is an effect on crude oil producers' price setting: since the export revenues of crude oil producing countries is predominantly denominated in U.S. dollars, a depreciation of the U. S. dollar could lead crude oil producers to counterbalance this aspect by raising the crude oil price. Relatively to the empirical analysis, but in contrast with the previous literature, Grisse (2010) identifies the short-run co-movements of oil prices and exchange rates, by including measures of the surprise component of released economic news. The analysis is computed for weekly data on crude oil price WTI spot price (Cushing - Oklahoma), the U.S. dollar exchange rate and short-term U.S. interest rate (3-month Treasury Bill) over the sample period 2003-2010. As a valuation of the U.S. dollar exchange value, Grisse (2010) uses the trade-weighted U.S. dollar exchange rate against major currencies, which is an index computed by Federal Reserve Board. The results indicate that higher oil prices lead to a depreciation of the U. S. dollar both in the short-run and during longer horizons. Grisse (2010) also finds that a dollar depreciation is associated with a higher crude oil price, within the same week. In the long-run, interest rates fluctuations explain most of the variations of the crude oil prices and exchange rates. The existence of co-integration, by the way a negative correlation, is confirmed also by Mukhriz and Norãznin (2011), Novotny (2012) (who uses Brent, the North Sea crude oil, but that does not influence the objective of the analysis) and the most literature stating the negative correlation between crude oil price and *U.S.* dollar exchange rates. Buetzer *et al.* (2012) investigate about whether crude oil shocks may be absorbed by the accumulation of foreign exchange reserves and under different exchange rates regime. They considered 44 countries - 12 advanced and 32 emerging economies - on a sample period of quarterly data from 1986 to 2001. Basing on the crude oil trade balance as a share of GDP, the sample includes 14 crude oil-exporting countries. Furthermore, these authors distinguished countries according to whether they are generally considered commodity-dependent, so potential candidates for having "commodity-currencies", i.e. a real exchange rate driven by real commodity prices. The main finding is that there is no evidence that the currencies of crude oil-exporting countries systematically appreciate after crude oil shocks. In part, this is determined by the fact that crude oil-exporters actively counter appreciation pressures, by accumulating foreign reserves. Moreover, there is a significant appreciation thrust in crude oil-exporting economies, after a crude oil demand shocks, whereas no such differential pressure is detected for crude oil supply ones. Benhmad (2012) studies the relationship through a wavelet approach to the relationship between oil price and dollar exchange rate, both in terms of linearity and non-linearity in the sense of Granger, through some tests introduced by Péguin-Feissolle and Terãd'svirta (1999) and Péguin-Feissolle *et al.* (2008). In details, it divides the analysis according to different time scales by finding that a) on a horizon within 3 months (typical of high speculation investors) is the real price of oil that causes that of the actual real dollar exchange rate; b) there is no relationship over 6 months; c) on a horizon of more than 6 months (and up to 128 months), typical of institutional investors (pension funds, etc.), there would be bi-directionality.

5. Other results

De Schryder and Peersmann (2015) analyze the exchange rate of the dollar (compared to 65 countries that do not use that money as internal) on oil consumption (taking into account the influence of the proxy pill on what has been verified), precisely by means of these exchange rates as the primary conductors with regard to oil consumption. In addition, they use estimation techniques with data panels. In particular, they note that the elasticity of short-term fluctuations in the exchange rate on oil demand is much greater than the elasticity of oil demand versus fluctuations in the global oil price expressed in dollars and that the exchange rate influences much volatility of the price of oil. De Trukis and Keddad (2016) study the dependence on volatility between the oil market and for U.S. exchange rates with Canada, Japan, Euro-zone and Great Britain, using two techniques: fractional co-integration and coins. The first analyzes the behavior for the long-term memory of volatility, in order to verify their membership along a

long-term equilibrium path. This also takes into account the objectives of the Central Banks to preserve price stability. This methodology shows the independence of U.S., Canadian and Japanese exchange rates and a low dependency on the Euro zone and Great Britain. The second technique (partly complementary to the first one) also analyzes short-term behavior and shows a weak dependence on the considered variables (in the case of static coupling) and a relation to market conditions (in the case of dynamic coupling). Chen *et al.* (2016) analyze how oil shocks affect U.S*.* exchange rates with 16 OECD countries. They find that the consequent effects are very different, depending on the times when shocks are influenced by supply or aggregate demand. However, these shocks account for between 10 % and 20 % of changes in, but on the long run. Besides, by using parametric tests (as Wald's one) and not (as randomness ones), they show a nonlinear relationship between oil price and exchange rates. However, the non-linearity of the oil price to the exchange rate (direct and not shock) is low. Indeed, their primary purpose was to verify whether the searched relationship was linear or not, even for the correctness of analysis using instruments such as the *VAR* econometric models.

6. Conclusion

In this study, we have reviewed the existing literature on the relationship between crude oil price and U.S. Dollar quotations, by using a financial framework (there is in fact a second picture which uses the economic considerations). Under the chosen school of thought, it can be justified a negative correlation between them, with a causality running from U.S. dollar to oil (even though some paper showed the presence of possible bi-directionality for the causality). If it deeply analyzes the last twenty years, this kind of influence is showed by empirical considerations. In more details, by studying the data, it is also possible to emphasize the aspect of management for the portfolios of the agents, who has two lighthouses: the hedging target or the speculative goal (or both of them). So that, it can attribute the effects of the link between the cited two variables to the necessity of facing their movements, using the exchange rate markets too (of the U.S. dollar versus other principle currencies). As a consequence, for example, in the case of a decreasing path of the oil price, it is possible to balance the possible negative consequences, if there is a rise of the U.S. dollar (or vice versa). In this framework, both the characteristic to be importer or exporter oil country and the inflation play a role too, with last point linked with central banks policies. This is the reason for which more recent researches have considered and separated the short-term effects and long-term ones.

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