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Document de Travail

Working Paper

2013-29

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Current accounts and oil price fluctuations in oil-exporting countries: the role of financial development[♦]

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Abstract

Oil-exporting countries usually experience large current account improvements following a sharp increase in oil prices. In this paper, we investigate this oil price-current account relationship on a sample of 27 oil-exporting economies. Relying upon the estimation of panel smooth transition regression models over the 1980-2010 period, we provide evidence that refines the traditional interpretation of oil price effects on current accounts. While current accounts are positively affected by oil price variations, this effect is nonlinear and depends critically on the degree of financial development of oil-exporting economies. More specifically, oil price variations exert a positive impact on the current account position for less financially developed countries, while this influence tends to diminish when the degree of financial deepness augments.

Keywords: current account; oil price; financial development; panel smooth transition regression models.

JEL Classification: F32, C33.

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This research has been supported by the French Energy Council (Conseil Français de l'Energie), Paris, France.
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1. Introduction

With the sharp rise in oil prices since 2003, the issue of large current account surplus experienced by oil-exporting countries has become more prominent in policy discussions, especially their role in the widening of global imbalances (Blanchard and Milesi-Ferretti, 2009; Helbling et al., 2011; Arezki and Hasanov, 2013). As suggested by the IMF's Global Integrated Monetary and Fiscal model, the size of the impact of higher oil prices on current account imbalances depends on several factors and assumptions (Kumhof and Muir, 2012). Among these factors, the way in which revenue windfalls of oil exporters have outpaced their spending has been the subject of particular attention.

A first strand of the literature focuses on the sources of oil exporters' relatively high propensity to save. Intergenerational equity arguments and uncertainty due to oil price volatility broadly support the view of saving behaviors—and then current account patterns—mainly driven by consumption smoothing considerations and/or by precautionary motive (Bems and Carvalho, 2011). A second strand of the literature seeks to investigate why in those countries high savings have not turned into domestic investment but rather into foreign assets accumulation. Three channels are at play here. The first one is concerned with the depressive effect of investment inefficiencies and absorptive capacity constraints on capital accumulation in least developed oil countries (van der Ploeg and Venables, 2012; Araujo et al., 2013).[1] The second channel is related to the role played by the State in the allocation between savings and investment which can sharply differ from that of private sector's preferences (Basher and Fachin, 2011).[2] Finally, the last channel, which has received less attention in the literature on oil exporters, is the level of financial development and its potential impact on resources allocation. Countries with more developed financial systems, as they are relatively self-sufficient, are expected to invest a large portion of their savings in their domestic market. This issue is not a new one and was already being discussed in the literature related to the Feldstein-Horioka puzzle evidencing that countries with more developed financial systems should enjoy a high saving-investment correlation and then low external imbalances.

Our paper falls into this strand of the literature and aims at investigating the oil price-current account nexus in oil-exporting economies by paying special attention to the degree of financial development. Regarding previous literature, few papers have analyzed the impact of financial deepening on the current account in the case of oil exporters. Such lack of investigation is quite surprising given that theoretical and empirical literature suggests that financial development influences saving and investment behaviors. On the theoretical side, Bencivenga and Smith (1991) build a three-period-live overlapping-generations model in which savers are risk averse. They show that banks, by satisfying the liquidity preference of savers, can decrease the share of domestic savings held in the form of unproductive liquid assets. Indeed, risk averse savers hold liquid bank deposits lent to firms that can increase their

[1] For instance, Cherif and Hasanov (2012) show that if productivity of the tradable sector is low, oil producers would optimally accumulate important buffer stock savings and invest relatively little in order to protect against excessive revenue volatility.

[2] In oil economies, several political reasons can explain why resource revenues are not put to productive use (van der Ploeg and Venables, 2012). While those reasons should not be underestimated, they are however outside the scope of this paper.

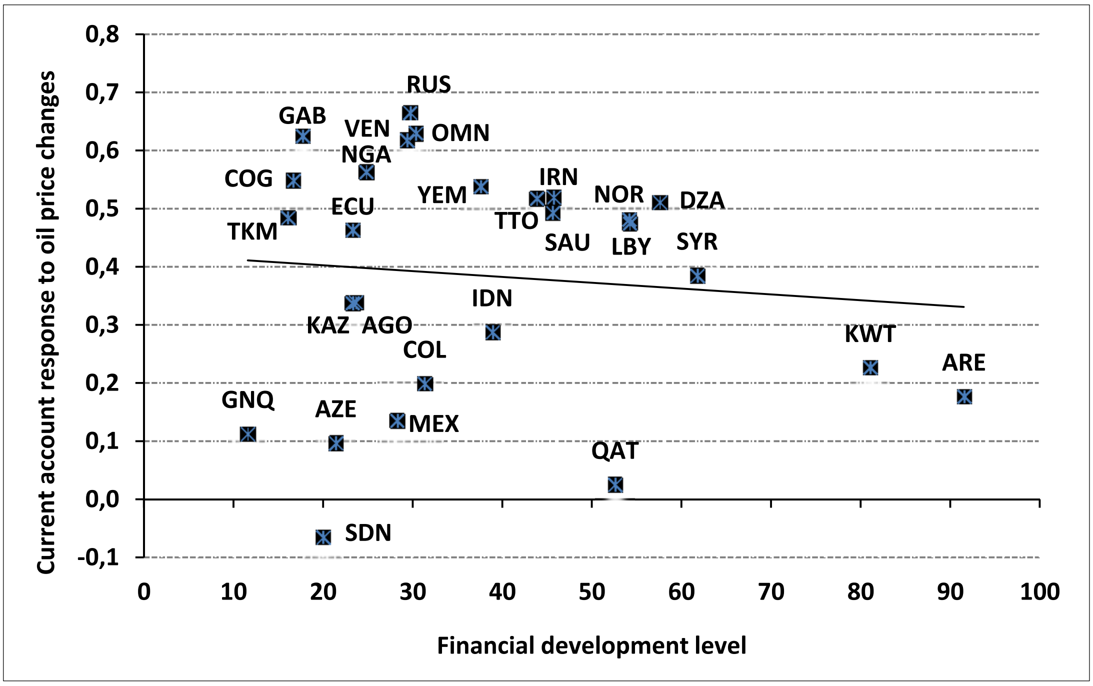
investment level. Using also an overlapping-generations framework, Acemoglu and Zilibotti (1997) evidence that financial intermediaries and financial markets permit to improve risk diversification. As diversification opportunities increase, less saving is invested in safe assets offering lower return. Thus, capital accumulation tends to increase with the level of financial development. Developing a neoclassical small open economy model with capital accumulation and frictions calibrated for natural resource-rich countries, Araujo et al. (2013) show that relaxing investment frictions implies that oil windfalls do not necessarily lead to an increase in current account surplus.

Empirical studies tend to confirm those previous theoretical results. For instance, in a seminal paper covering 80 countries from 1960 to 1989, King and Levine (1993a) find that the level of financial development is positively associated with capital accumulation. Xu (2000) shows that the degree of financial development exerts a positive influence on growth in both the short term and the long term. Investment being a significant channel through which financial development affects growth, Christopoulos and Tsionas (2004) suggest that financial development increases investment, and, in turn, economic growth. Interestingly, they detect no evidence of bi-directional causality. Arezki and Hasanov (2013) estimate current account dynamics for oil-exporting countries and the rest of the world. While they mainly focus on the role of fiscal balance, they find that financial development, proxied by the ratio of private credit to GDP, impacts significantly but negatively current accounts. According to them, this negative relationship tends to confirm that improving financial development in those countries may raise borrowing and investment opportunities, and then will tend to deteriorate their current accounts. Being part of those works, we study to what extent the level of financial development matters in the relationship between current account and oil price variations.

As a simple illustration, Figure 1 shows the response of current accounts (in % of GDP) to oil price variations (Y-axis) for a sample of oil exporters[3] at different levels of financial development, measured by M2 to GDP ratio (X-axis). There is a negative relationship between the sensitivity of current accounts to oil price variations and the level of financial development: the response of the current account to oil price changes decreases as the level of financial development increases. These simple results represent preliminary evidence that current account effects of oil price changes may vary with the level of financial development. The main purpose of this paper is to explore the robustness of this finding.

[3] See Section 4 for data sources. The codes used for the countries displayed in Figure 1 are the following: Algeria: DZA; Angola: AGO; Azerbaijan: AZE; Colombia: COL; Congo: COG; Ecuador: ECU; Equatorial Guinea: GNQ; Gabon: GAB; Indonesia: IDN; Iran: IRN; Kazakhstan: KAZ; Kuwait: KWT; Libya: LBY; Mexico: MEX; Nigeria: NGA; Norway: NOR; Oman: OMN; Qatar: QAT; Russia: RUS; Saudi Arabia: SAU; Sudan: SDN; Syrian Arab Republic: SYR. Trinidad and Tobago: TTO; Turkmenistan: TKM; United Arab Emirates: ARE; Venezuela: VEN and Yemen: YEM.

Figure 1. Current account response to oil price changes and the level of financial development (1980-2010)



Note: current account responses to oil price changes have been estimated by regressing a country's current account on the lagged growth rate of oil prices. Data sources are given in Section 4.

Accordingly, we investigate the potential effects exerted by the level of financial development in the relationship between the current account and oil price changes in the case of oil-exporting economies. We go further than the existing literature by testing for the presence of nonlinearities in this relationship. In this respect, our paper is part of a series of works highlighting the evidence of nonlinearities associated to oil prices[4] and current account patterns.[5] It is also related to the most recent literature on the role of financial development in the growing trend of global imbalances (Chinn and Ito, 2007; Gruber and Kamin, 2009).

The baseline idea is the following: as the current account depends on the relationship between investment and saving which are both connected to the financial development, one can expect that oil exporters may be distinguished depending on their level of financial deepness. In particular, we check if a high financially developed economy mitigates the response of the current account to oil price fluctuations. In order to test this hypothesis, our empirical analysis relies on a Panel Smooth Transition Regression (PSTR) specification for a sample of 27 oil

[4] Hamilton (2009) lists three main contributions in this area: Hamilton (2003) who finds a bigger effect exerted by oil price increases than oil price decreases, Kilian (2009) who shows that price increases caused by surging global demand may have less effect than those brought about losses in supply, and Blanchard and Galí (2010) who evidence a higher resilience to oil price shocks over time.

[5] Chinn and Ito (2007) have shown that the assumption of linearity between current accounts and their main determinants may be quite restrictive for Asian countries. In particular, they find that the relationship between net savings and financial development is nonlinear, depending on the financial openness and the development of the legal system.

exporters spanning the years 1980-2010. Indeed, a major strength of this approach is to derive coefficients of current account responses to oil price changes which may vary between countries and with time, depending on the level reached by a threshold variable defined here as the financial development.

Our main finding is that, while oil price movements can have a significant impact on current accounts of oil producers, their effect depends critically on the country's level of financial development: the latter indeed exerts a nonlinear effect on the transmission of oil price changes to current accounts. Moreover, this result is robust to alternative measures of financial development and when controlling for the role of the official sector.

The remaining part of the paper is organized as follows. Section 2 presents the literature survey. Section 3 details the empirical methodology used to estimate current accounts. Section 4 discusses data and results. Section 5 concludes the paper and draws some policy implications for oil exporters.

2. Current account's adjustment to oil revenue windfalls in oil-exporting countries: a brief literature survey

In recent years, higher oil prices have led to a significant redistribution of global income from oil importers to oil exporters. In particular, oil-exporting countries have seen their purchasing power increase, and the way they have allocated their revenue windfalls has become a key issue. Indeed, revenue windfalls allocation has, by definition, important implications for their current balances and then for the global pattern of current account imbalances.

From a theoretical standpoint, oil windfall effects on current accounts are not obvious. Indeed, conventional intergenerational equity considerations, justified by exhaustible resources endowment, suggest that income windfalls can be used to boost both savings and investment (Morsy, 2012).

On the savings side, the permanent income hypothesis shows that open economies producing exhaustible natural resources should save most of their resource windfalls abroad in order to smooth their consumption, preserve resource wealth and ensure intergenerational equity. Such argument justifies the tendency for those countries to run current account surplus following an oil income windfall. Another potential savings channel operates through precautionary motive which may generate sizable additional savings. A common explanation is that oil exporters can consider oil price increase as temporary and have then to build up precautionary saving responding to this future uncertainty (Bems and Carvalho, 2011). A large literature related to the Harberger–Laursen–Metzler effect also shows that a temporary income windfall will largely be saved, while a permanent windfall will largely be consumed. This effect, initially examined by Harberger (1950) and Laursen and Metzler (1950) within a Keynesian framework, was justified by a marginal propensity to consume less than unity, inducing an increase in current consumption less than current income following a temporary improvement in a country's terms of trade. This effect has subsequently been reexamined within deterministic intertemporal specifications and more recently within dynamic general-equilibrium models (see Bouakez and Kano, 2008, and references therein).

On the investment side, oil revenue windfalls can be considered as helping relax borrowing constraints and expand financing sources for investment, inducing in this case current account deficits. This is in line with the view that thanks to resource windfalls, credit constraints can be relaxed, allowing oil exporters to take this opportunity to follow what Solow (1986) termed a "rule of thumb" for sustainability. This rule, known as the Hartwick rule[6] (Hartwick, 1977), consists in expanding the financing sources for investment projects necessary to ensure a consumption stream constant in time.[7]

While both saving and investment behaviors can be explained as the outcome of those specific determinants, they may also have been affected by financial development. Indeed, with the increasing integration of financial markets, this last factor has been identified as essential in explaining existing global current imbalances. From this perspective, the saving glut thesis (Bernanke, 2005) suggests that financial integration, by lowering transaction costs and facilitating risk management, has encouraged emerging countries with high saving and/or depressed levels of domestic capital investment to place a part of them in high quality assets that countries with deeper financial markets offer. In particular, in oil countries, such trend has been exacerbated by the sharp rise in oil prices. Indeed, looking at recent trends, spending of oil producers have increased by less than oil revenues, which has resulted in an improvement of their current accounts, an overall trend confirmed by several studies (Higgins et al., 2006; IMF, 2006a; Cheung et al., 2010; Arezki and Hasanov, 2013).

So, the way in which oil price variations have impacted current account patterns in oil countries may have interacted with the degree to which the financial system has developed, as suggested by the saving glut thesis. While being relatively scarce, empirical studies tend to show that, beyond usual determinants of current accounts, financial development seems indeed clearly matter in oil economies (Nili and Rastad, 2007; Basher and Fashin, 2011; Arezki and Hasanov, 2013). However, researches on this field have two major drawbacks. Firstly, they assume that oil economies deploy their oil revenues in a similar way and, especially, independently of their level of financial development. Such an assumption is obviously too restrictive, spending rates differing across oil exporters as notably underlined by IMF (2006a). Moreover, as financial development in oil-exporting countries can be affected by several factors—as the dependence degree on natural resources and/or on official sector, the development stage of the economy, the financial openness—it differs also between oil economies. We may then expect a nonlinear relationship between net savings and oil price, depending on the level of financial development. Secondly, studies assume that determinants of current accounts exert a constant impact over the period examined. This assumption can be also unrealistic if current accounts are examined over a large time dimension period. In

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[6] According to the Hartwick rule, a country should invest the rent from the exhaustible resource used at each time in the net accumulation of the produced capital good (Hartwick, 1977).

[7] Of course, without intergenerational altruism, revenue windfalls can be followed by new and even sometimes excessive borrowing as the generations will try to consume all the revenue (Mansoorian, 1991).

particular, the speed and/or the degree with which current accounts can adjust in relation to oil price fluctuations may be a critical factor for oil-exporting countries.

In order to circumvent these both issues, we study the pattern of oil exporters' current accounts by accounting for nonlinear effects. More specifically, we investigate the potential threshold effect exerted by the level of financial development in the relationship between the current account and oil price changes. This threshold effect is motivated by the conjecture that, if oil prices might lead to higher savings rates, this impact might be mitigated in cases of higher level of financial development.

3. Methodology

To investigate the potential nonlinear effect exerted by financial development on the oil price-current account relationship, two main avenues may be followed from a methodological viewpoint. The first one consists in accounting for nonlinearity by considering interaction variables in a regression model. This avenue has notably been followed by Chinn and Ito (2007) in the context of East Asian economies by introducing interactions between (i) financial development and financial openness variables, and (ii) financial development and legal variables. The second main avenue consists in modeling explicitly the nonlinearity that may be at play using nonlinear processes. In this paper, we follow this last way and rely on the PSTR methodology proposed by González et al. (2005). According to this specification, current-account regression coefficients are allowed to vary depending on the level of financial development. More specifically, the observations are divided in—say—two regimes, with estimated coefficients that vary depending on the considered regime. The change in the estimated value of coefficients is smooth and gradual, since PSTR models are regime-switching models in which the transition from one state to the other is smooth rather than discrete. Denoting the dependent variable by $CA_{i,t}$, the current account in percent of GDP, the PSTR model is given by:

$$CA_{i,t} = \alpha_i + \beta_0 \Delta OILP_{i,t} + \beta_1 \Delta OILP_{i,t} * F\left(S_{i,t}; \gamma; c\right) + \phi' X_{it} + \varepsilon_{i,t} \tag{1}$$

for $t = 1, \ldots, T$, and $i = 1, \ldots N$, N being the number of countries under study. α_i denotes the country fixed effects, $\Delta OILP_{i,t}$ is the oil price expressed in first logarithmic difference, F is a transition function, $S_{i,t}$ stands for the transition variable, $X_{i,t}$ is a vector of control variables that can include the transition variable, and $\varepsilon_{i,t}$ is an independent and identically distributed error term. Note that since our focus is on the impact of the degree of financial deepening on the oil price growth - current account relationship, we consider that only the oil price coefficient varies depending on the financial development degree. The transition function F is normalized and bounded between 0 and 1, and is given by (González et al., 2005):

$$F\left(S_{i,t}; \gamma; c\right) = \left[1 + exp\left(-\gamma \prod_{j=1}^{m} \left(S_{i,t} - c_j\right)\right)\right]^{-1} \tag{2}$$

γ stands for the slope parameter and c_j, $j = 1, \ldots, m$, are the threshold parameters ($c_1 \leq c_2 \leq \cdots \leq c_m$). The two most common cases in practice correspond to m = 1 (logistic) and m = 2 (logistic quadratic). In the case of a logistic function, the dynamics is asymmetric and the two regimes are associated with small and large values of the transition variable relative to the threshold. In the case of a logistic quadratic function, the dynamics is symmetric across the two regimes, but the intermediate regime follows a different dynamic compared to that in the extremes.

In our case, the transition variable is the degree of financial development. Depending on the realization of this variable, the link between the current account position and its determinants is specified by a continuum of parameters, namely β_0 in the first regime (when $F(.) = 0$), and $\beta_0 + \beta_1$ in the second regime (when $F(.) = 1$). If we focus on the impact of oil price variation on the current account, this means that depending on the degree of financial development, an oil price variation has a different effect on the dynamics of the current account. This effect varies between countries and time according to the value taken by the transition function as follows:

$$\frac{\partial CA_{it}}{\partial \Delta OILP_{i,t}} = \beta_0 + \beta_1 F\left(S_{i,t}; \gamma; c\right) \quad (3)$$

We can generalize the PSTR model to the case of $(r + 1)$ extreme regimes as follows:

$$CA_{i,t} = \alpha_i + \beta_0 \Delta OILP_{i,t} + \sum_{j=1}^{r} \beta_j \, \Delta OILP_{i,t} * F\left(S_{i,t}; \gamma_j; c_j\right) + \phi' X_{it} + \varepsilon_{i,t} \quad (4)$$

In this generalization, the impact of an oil price change on the current account position in function of the transition variable is given by:

$$\frac{\partial CA_{it}}{\partial \Delta OILP_{i,t}} = \beta_0 + \sum_{j=1}^{r} \beta_j * F\left(S_{i,t}; \gamma_j; c_j\right) \quad (5)$$

We rely on the methodology proposed by González et al. (2005) consisting in three steps.[8] The first, identification step aims at testing for homogeneity against the PSTR alternative, and at selecting (i) between the logistic and logistic quadratic specification for the transition function, and (ii) the transition variable. The second, estimation step relies on the use of nonlinear least squares to obtain the parameter estimates, once the data have been demeaned (Hansen, 1999; González et al., 2005). In the third, evaluation step, various misspecification tests are applied to check the validity of the estimated PSTR model and determine the number of regimes $(r + 1)$.

4. Data and estimation results

4.1. Data

We rely on annual data over the 1980-2010 period. The dependent variable is the current account to GDP ratio, extracted from WDI (World Development Indicators, World Bank) and WEO (World Economic Outlook, IMF). Turning to the other variables, the crude oil price

[8] For details regarding the methodology, the reader is referred to the original contributions by Hansen (1999) and González et al. (2005), and to Colletaz and Hurlin (2006).

(Brent) series, expressed in logarithmic terms, is extracted from the BP Statistical Review of World Energy. We use a standard indicator of financial depth, liabilities of financial system measured by the ratio of M2 to GDP (King and Levine, 1993b; Levine et al., 2000), and taken from WDI.[9] They include currency plus demand and interest bearing liabilities of banks and nonfinancial intermediaries divided by GDP. This indicator is the broadest measure of financial intermediation and includes three types of financial institutions: the central bank, deposit money banks, and other financial institutions.[10]

Following the previous literature[11], we consider other current-account determinants that are all taken from WDI database: the stock of net foreign assets (NFA), expressed as percentage of GDP; an openness indicator defined as the ratio of exports plus imports of goods and nonfactor services to GDP; terms of trade given by the ratio of export prices to import prices, expressed in logarithm; population growth rate; dependency ratio defined as the ratio of dependent population (below 15 and above 65) to the working age population (between 15 and 64); GDP per capita, adjusted by PPP exchange rates, relative to the US; and the GDP growth rate.[12]

Our sample of countries is constituted by a panel of 27 oil-exporting economies, namely Algeria, Angola, Azerbaijan, Colombia, Congo, Ecuador, Equatorial Guinea, Gabon, Indonesia, Iran, Kazakhstan, Kuwait, Libya, Mexico, Nigeria, Norway, Oman, Qatar, Russia, Saudi Arabia, Sudan, Syrian Arab Republic, Trinidad and Tobago, Turkmenistan, United Arab Emirates, Venezuela, and Yemen.[13]

4.2. Results

We start by testing the null hypothesis of linearity in Equation (1) using the González et al. (2005) test with financial deepening—proxied here by M2 to GDP ratio—as the transition variable.[14] Results are reported in Table 1 and indicate that the null of linearity is rejected in favor of the alternative of logistic PSTR specification. This finding indicates that financial deepening impacts the current account (in percentage of GDP) differently, depending on the

[9] Other financial development measures will be considered as robustness checks, see Section 4.3.

[10] It should be noticed that dealing with oil-exporting countries, we have accounted for other specific determinants. In particular, we have considered (i) the exhaustibility of the resource through the oil proved reserves, (ii) oil trade balance to GDP ratio, and (iii) the fiscal balance to GDP ratio. Corresponding results are discussed in Section 4.3.

[11] See Calderon et al. (2002), Chinn and Prasad (2003), Gruber and Kamin (2007), Calderon et al. (2007), Chinn and Ito (2007, 2008), Cheung et al. (2010), Brissimis et al. (2012), and references given in Section 2.

[12] According to the results of a battery of panel unit root tests (available upon request to the authors), all series but oil price and terms of trade reject the unit root null hypothesis. Those two series have thus been considered in their first logarithmic differences.

[13] In addition to data availability considerations, these countries have been retained because they are—with the exception of Congo, Trinidad and Tobago, and Turkmenistan—amongst the 39 major oil producers according to the Energy Information Administration. They also represent more than 60% of the total world oil production over the period under study, and the average ratio between oil exports and total exports amounts to 67% for our panel of countries—Equatorial Guinea having the lowest ratio (10.7%) and Algeria the highest (96.8%).

[14] The choice of this variable has obviously been guided by the purpose of our paper, but has also been confirmed by linearity tests: the null of linearity is the most strongly rejected when using financial development as the transition variable. Results are available upon request from the authors.

degree of financial development. We thus now proceed to the estimation of the PSTR model to investigate this property more deeply.

Table 1. Results of linearity tests (p-values)

	$r = 0$	$r = 1$
LM	0.012	0.549
F	0.016	0.562

Note: LM and F denote Lagrange Multiplier and F tests for linearity. $r = 0$ refers to the null hypothesis of linearity against the alternative of a PSTR model with two regimes. $r = 1$ refers to the null hypothesis of PSTR model with two regimes against the alternative of a PSTR model with three regimes.

Table 2. Estimation of the PSTR model

Variable	*Coefficient*	*t-statistic*
Oil (first log. diff)	0.1997	2.1821
Oil (first log. diff) × F	-0.1580	-1.8144
M2/GDP	-0.1371	-2.8119
NFA/GDP	0.1168	3.0381
Openness	-0.1909	-2.6246
Terms of trade (first log. diff)	0.0978	4.2167
Population growth	0.8657	2.1182
Dependency ratio	-0.3390	-5.4720
GDP PPP/GDP PPP US	0.0000	0.4719
GDP growth	0.1294	1.2486
Threshold $\hat{c}$	24.9050	
Slope coefficient $\hat{\gamma}$	417.6038	

Table 2 reports the results of the estimation of our PSTR model using financial deepening (M2/GDP) as the transition variable. Let us first comment the results concerning the control variables. As emphasized in Section 2, the effect of financial deepening on current account imbalances is expected to be negative. Indeed, financial development may be seen as reducing excessive saving given that a high level of financial deepness may induce more sophisticated savings instruments which may, in turn, be more easily transformed into spending. This effect on spending might also be magnified by higher investment rates if a deeper financial system improves credit conditions and financial intermediation (Arezki and Hasanov, 2013). In line with those expectations, our results evidence a negative financial deepening effect on the current account for our panel of oil-exporting countries; a conclusion which is consistent with the findings of Kennedy and Slok (2005), Gruber and Kamin (2007), Cheung et al. (2010) and Arezki and Hasanov (2013).

Turning to the NFA to GDP ratio, its effect on the current account is positive. This result is not surprising given that countries with large net foreign asset positions are also generally characterized by important current account surpluses. Indeed, a rise in the net foreign asset position tends to increase income issued from foreign direct investment, thus improving the current account.[15]

The relationship between the openness ratio—measured as the ratio of the sum of exports and imports to GDP—and current account is found to be negative. This result is frequently obtained in the literature dealing with developing economies (see Chinn and Prasad, 2003; Arezki and Hasanov, 2013, among others). The main explanation relies on the idea that openness accounts for some characteristics relating to trade liberalization, such as the existence of trade barriers. The latter obviously impedes flows of goods and services, as well as foreign direct investment, rendering countries less attractive to foreign capital and reducing investment opportunities. As a consequence, the effect of openness on the current account is negative.

Regarding now terms of trade, we find a positive effect on the current account. This result, consistent with the findings of the literature on the Harberger–Laursen–Metzler effect[16], is not surprising. Indeed, if one considers that an improvement in terms of trade raises income and that spending increases less than income, as in oil exporters, saving will necessarily increase.

Considering demographic variables, we show that population exerts a positive effect on the current account, while the dependency ratio impacts it negatively. This result may be interpreted with regard to the life-cycle hypothesis: an increase in the dependency ratio leads to a decrease in aggregate domestic saving.[17] Through this saving channel[18], higher dependency ratios affect negatively current account positions. This finding is consistent with the conclusions obtained—especially for developing countries—by Masson et al. (1998), Chinn and Prasad (2003), Gruber and Kamin (2007) or Chinn and Ito (2008) among others.

As it is standard in the literature (see Chinn and Prasad, 2003; Ju and Wei, 2006; Prasad et al, 2007; Cheung et al., 2010; and references in Section 2), the variable GDP per capita, adjusted by PPP exchange rates, relative to the US aims at capturing the stage of economic development of countries relative to the US. The underlying idea is the following: when countries are at the beginning of their development process, they run current account deficits due to important capital imports. Once they reach a higher stage of development, they undergo current account surpluses to repay accumulated debt and export capital. In our case, we find that the coefficient associated with the ratio of domestic GDP per capita to US GDP per capita is not significant. This result, also obtained by Chinn and Prasad (2003) for developing countries and Cheung et al. (2010) for a wide sample of economies, can be explained by the fact that while some countries are indeed at early stages of development with

[15] To be complete, it should be noticed that a second, contradictory effect may also be at play. Indeed, countries with large NFA positions are able to run long-lasting trade deficits while remaining solvent; a situation that may lead to a negative relationship between NFA and current account positions. Note however that this effect is considered to be weaker by the standard open economy macroeconomic theory than the positive effect previously described.

[16] See references in Section 2.

[17] To be more precise, according to the life-cycle hypothesis, the saving behavior of individuals varies with age and is hump-shaped.

[18] Note that there is no consensus in the literature regarding the theoretical effect of demographics on investment (see e.g. Higgins, 1998).

a corresponding negative impact on the current account, others have clearly reached high levels of development with a corresponding positive effect on the current account position. Negative and positive effects may thus be compensated, explaining the non-significant coefficient.

Finally, the GDP growth rate effect on the current account position is also non-significant. Note that from a theoretical viewpoint, the current account economic growth impact is not clear-cut and depends on whether high growth rates are perceived as transitory or long-lasting by the individuals.

Let us now turn to our main variable of interest, namely the oil price variation. Its effect appears to be clearly nonlinear, depending on the degree of financial deepening. As shown in Table 2, the estimated threshold value for the financial deepening is around 25%. In the first regime, the current account effect of oil price variation is positive for oil-exporting countries characterized by a degree of financial development below 25%. This effect strongly differs in the second regime. Indeed, in this regime encompassing oil-exporting countries characterized by a level of financial deepening higher than 25%, the oil price effect on the current account is highly diminished and tends to zero (in the extreme case, the coefficient is equal to 0.042). In other words, the more the oil-exporting countries tend to have developed financial systems, the more the oil price impact on the current account position is decreasing.

At a more disaggregated level, Table A1 and Figure 2 in Appendix display, for each country, the average (over the period under consideration) estimated impact of an oil price change against the average level of financial development (M2/GDP). These results confirm that the average estimated impacts of an oil price variation on the current account vary from one country to another and depend negatively on the level of financial development, corroborating our primary intuition given by Figure 1. Figures 3a to 3c in Appendix also illustrate such finding by exhibiting the relationship between our financial development indicator (M2 to GDP ratio), the current account balance in percentage of GDP, and the oil price for three groups of countries.[19] In the first group (Figure 3a), the ratio M2/GDP is consistently below our threshold value (25%). The main striking feature here is the strong sensitivity of the current account balance to changes in oil prices. Figure 3b considers countries with intermediate values of financial development levels (from 23.3% for Kazakhstan to 28.3% for Mexico). The figure suggests a weaker response of current account balance to oil price shocks. For countries characterized by a level of financial development higher than the threshold—from 43.8% for Trinidad and Tobago to 91.5% for United Arab Emirates (Figure 3c)—changes in oil prices have a more limited influence on current account positions.

To sum up, our results show that in the case of less financially developed oil-exporting countries—i.e., oil-exporting countries with a level of financial development below 25%—the gap between their revenue windfalls and their spending tends to be accentuated, following an increase in oil prices. Indeed, we can expect that such countries are less prone to develop hedging strategies and/or set up stabilization funds that could efficiently insulate their

[19] This decomposition in three groups has been done by comparing each country's average level of financial development over the period under study (see Table A1 in Appendix) to the estimated threshold value (25%).

domestic economy from oil price movements. Moreover, as they usually face borrowing constraints, frictions in investment dynamics and/or absorptive capacity constraints, they will fail to transform their revenue windfalls into domestic investment, restraining then their capital accumulation. This finding is in line with the evidence of a more pronounced resource curse in oil-exporting countries with poorly developed financial systems (van der Ploeg and Poelhekke, 2009). For higher financially developed oil-exporting countries, the effect of oil prices on current accounts is less pronounced and tends to decrease to reach zero, which is consistent with the fact that the corresponding economies are more able to set up stabilization funds in combination with sophisticated financial instruments. They are then more likely to smooth the effects of oil price fluctuations on their economy by transforming their revenue windfalls into a permanent increase in public and private consumption.

4.3. Robustness checks

As robustness checks, we have estimated various alternative PSTR specifications.[20] Considering first methodological issues, we have replaced explanatory variables that could be potentially endogenous (NFA to GDP ratio, openness, GDP growth rate, and relative GDP per capita) by their lagged values. Results remain unchanged, whatever the proxy retained for financial development, putting forward the robustness of our results to endogeneity issues. Second, given the key role played by financial deepness in our analysis, we have considered alternative proxies for this variable. Finally, we have added other potential current-account determinants to our baseline model (Table 2). Among those additional variables and given that we are dealing with oil-exporting countries, we have considered oil proved reserves (source: BP Statistical Review of World Energy), oil trade balance to GDP ratio (source: WEO), and the fiscal balance to GDP ratio (source: WEO). While the first two variables appeared non-significant in our regressions, we evidence a significant positive relationship between the fiscal balance and the current account position. Let us now present the results of some of those robustness checks.

Choice of the financial development variable

As noticed by Cheung et al. (2010) among others, empirical results regarding the impact of the level of financial development on the current account are rather mixed, depending notably on the set of countries under investigation, as well as the measure used to proxy financial deepness. Financial development refers to a set of phenomena acting on the financial system[21] and may indeed be proxied by various indicators[22], among which private credit to GDP ratio, stock market capitalization to GDP ratio, stock market turnover as share of GDP, growth rate of stock market capitalization as share of GDP, private bond market capitalization to GDP

[20] To save space, we do not report here all the estimations, but complete results are available upon request to the authors.

[21] For instance, IMF (2006b) has constructed a financial development index which encompasses the degree of traditional bank intermediation, the degree to which new financial intermediation has developed and the role played by financial markets.

[22] See Demirgüç-Kunt and Levine (1996, 1999) and the recent contribution by Čihák et al. (2013).

ratio, *etc*. (see King and Levine, 1993b; Levine, 1997; Levine et al., 2000; Demirgüç-Kunt and Levine, 2008; Cheung et al., 2010; Čihák et al., 2013). Unfortunately, working on a large sample of oil-exporting countries obviously reduces the potential measures due to data availability issues. To investigate the robustness of our results to the choice of the financial development proxy, we thus retain the indicators for which data are available for most of the countries of our sample, namely private credit to GDP ratio and bank deposits to GDP ratio. The first indicator is a financial depth measure defined as the credit issued to the private sector by banks and other financial intermediaries divided by GDP, and constitutes a measure of general financial intermediary activities provided to the private sector. The second indicator is the ratio of deposits in banks to economic activity, and is a measure of deposit resources available to the financial sector for its lending activities. Thus these two indicators allow us to focus on another channel of financial development through the role played by traditional bank intermediation, while the M2/GDP ratio reflects instead the effect of depth and liquidity of financial markets. Series are extracted from Beck and Demirgüç-Kunt (2009)'s database and are available for all countries of our sample but three, namely Qatar, Turkmenistan, and United Arab Emirates. Results of the PSTR estimation using these two measures are given in Table 3.

Table 3. Estimation of the PSTR model, robustness to the financial development variable

	Private credit/GDP		*Bank deposits/GDP*	
Variable	*Coefficient*	*t-statistic*	*Coefficient*	*t-statistic*
Oil (first log. diff)	0.1161	3.5312	0.1546	3.4420
Oil (first log. diff) × F	-0.0707	-1.9867	-0.1245	-2.8208
Financial deepness	-0.0111	-0.2857	-0.2463	-3.9263
NFA/GDP	-0.2173	-3.0095	0.0945	2.5069
Openness	0.0517	1.4064	-0.2302	-3.2020
Terms of trade (first log. diff)	0.0950	4.0480	0.1027	4.3990
Population growth	1.4495	1.5456	1.8649	2.0106
Dependency ratio	-0.4511	-6.3275	-0.4947	-6.4536
GDP PPP/GDP PPP US	0.1814	2.2445	0.1283	1.6031
GDP growth	0.1311	1.2965	0.1372	1.3843
Threshold $\hat{c}$	17.6816		14.6673	
Slope coefficient $\hat{\gamma}$	785.6743		766.9978	

Results in Table 3 show that our findings are robust to the choice of the proxy retained for financial development. Indeed, in addition to the fact that the control variables generally have a similar impact whatever the considered financial development indicator, our main result concerning the oil price – current account relationship is also highlighted for all retained proxies: oil price variations exert a positive impact on the current account position for less financially developed countries, while this influence tends to diminish when the degree of financial deepness augments.

Inclusion of fiscal balance to GDP ratio

The fiscal balance to GDP ratio is a standard current account determinant[23] that exerts a particularly high impact in oil-exporting countries because of the larger role played by the government which typically exclusively holds oil export revenues (Basher and Fachin 2011; Arezki and Hasanov, 2013). While increasing public savings is usually associated with larger current surplus, two additional effects may be at play in the case of oil exporters. On the one hand, this positive relationship can be mitigated by the possibility that consumers follow a Ricardian behavior. In particular, if they fully anticipate a rise in oil revenues, they can boost their private consumption by increasing their private borrowing, as has happened in Kazakhstan where private borrowing has offset public saving. On the other hand, this positive relationship may be magnified by the fact that, in the most indebted countries, some of the revenue saved by the government—giving the limiting tax raising capacity—will be invested in debt reduction (van der Ploeg and Venables, 2011). The Ricardian equivalence hypothesis is rejected by our estimations (reported in Table 4) since we obtain a positive and significant coefficient associated with the fiscal balance variable. In addition, and this is a key finding, introducing this variable in our model does not change the obtained results: we get similar global effects of the other control variables on the current account position and, more importantly, we find the same result regarding the nonlinear impact of financial deepening on the oil price - current account relationship. The main difference with our baseline specification lies in the threshold value that decreased from 25% to 9%, meaning that the current account effect of oil price variation is positive for oil-exporting countries characterized by a degree of financial development below 9%. This finding supports the dominant role played by the official sector in both petrodollar recycling and its significant bearing on saving and investment choices (Higgins et al., 2006; Basher and Fachin 2011). As a result, taking into account the fiscal balance in the analysis tends to weaken the relationship between the level of financial development and the current account. Nevertheless, even controlling for the role of the official sector, the nonlinear effect of financial development is still significant, illustrating thus the robustness of our findings.[24]

[23] See Debelle and Faruquee (1996) for a survey.

[24] Note that we have chosen to report as our baseline specification the model without the fiscal balance variable (Table 2) since this series is highly correlated with oil price in the case of oil-exporting countries, thus leading to collinearity issues.

Table 4. Estimation of the PSTR model, including the fiscal balance to GDP ratio

Variable	*Coefficient*	*t-statistic*
Oil (first log. diff)	0.5286	3.7813
Oil (first log. diff) × F	-0.5384	-3.8341
M2/GDP	-0.0367	-0.6986
NFA/GDP	0.1087	3.0178
Openness	-0.1921	-2.8525
Terms of trade (first log. diff)	0.1314	4.8298
Population growth	0.3380	0.9755
Dependency ratio	-0.2364	-4.0581
GDP PPP/GDP PPP US	0.2140	2.3512
GDP growth	0.0703	0.7034
Fiscal balance/GDP	0.6630	7.0677
Threshold $\hat{c}$	8.9603	
Slope coefficient $\hat{\gamma}$	398.0092	

5. Conclusion

In this paper, we reexamine the role played by oil price fluctuations in current imbalances on a sample of 27 oil-exporting countries over the 1980-2010 period. Relying upon the estimation of nonlinear, panel smooth transition regression models, our findings show that oil price variations nonlinearly impact the current account position, depending on countries' degree of financial development. More specifically, there exists a threshold of financial deepness—estimated at 25%—below which an increase in oil price improves the current account position and beyond which the intensity of this positive effect declines. In other words, oil price variations exert a positive impact on the current account position for less financially developed oil-exporting countries, while this influence is less pronounced when the degree of financial deepness augments. Using various measures for financial development and controlling for the role of fiscal balances make no qualitative differences, putting forward the robustness of our findings.

Possible implications of our results are important. Rising oil prices are not the main driver of current surplus in high-developed financial oil exporters, their role being only significant in less developed financial economies. What seems to be rather at stake is the role played by the financial development process in the allocation of accumulated oil revenues and in the ability of these countries to isolate their economy from oil price fluctuations. On the whole, our findings suggest that the most salient issue in improving external adjustment of oil-exporting countries and, more generally, in addressing global economic imbalances, may not be a reversal in oil price dynamics but rather the institutional capacity of these economies to set up an efficient financial system. This role of financial deepening is particularly acute in oil-exporting countries since their high dependence on natural resources tends to slow down the development of financial institutions (Gylfason and Zoega, 2006; Nili and Rastad, 2007; Beck, 2012).

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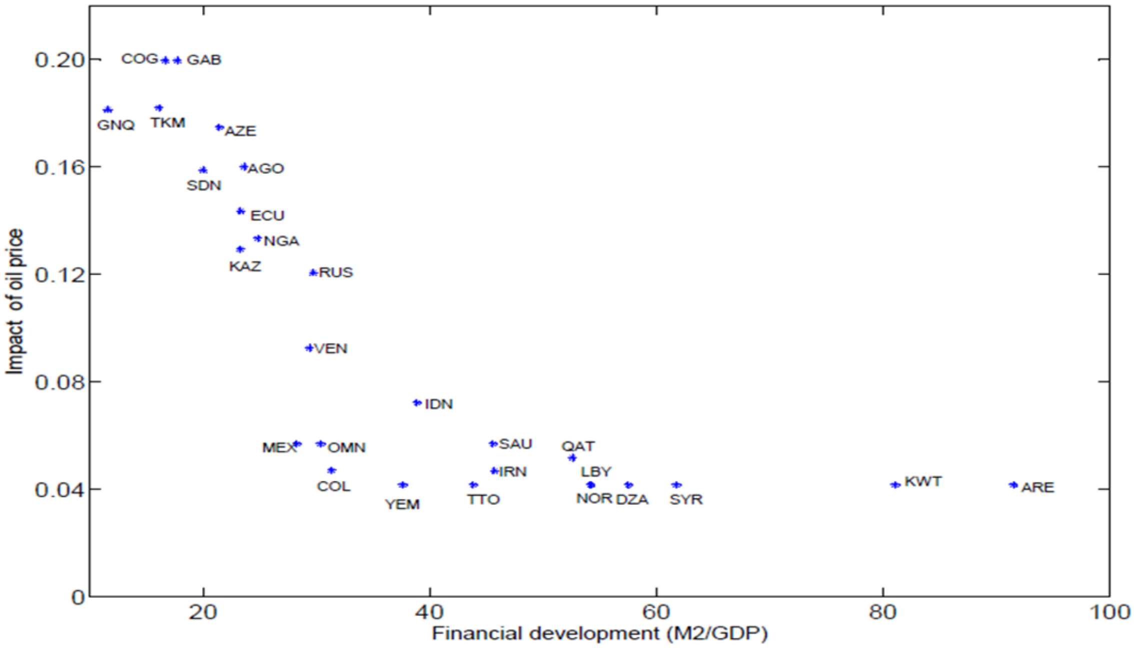
Appendix

Table A1. Individual estimated impact of an oil price change on the current account

Country	Code	Financial development (M2/GDP)	Impact of oil price
Algeria	DZA	57.53	0.0417
Angola	AGO	23.60	0.1602
Azerbaijan	AZE	21.41	0.1748
Colombia	COL	31.31	0.0471
Congo	COG	16.66	0.1997
Ecuador	ECU	23.31	0.1436
Equatorial Guinea	GNQ	11.58	0.1815
Gabon	GAB	17.71	0.1997
Indonesia	IDN	38.86	0.0723
Iran	IRN	45.70	0.0470
Kazakhstan	KAZ	23.27	0.1295
Kuwait	KWT	81.07	0.0417
Libya	LBY	54.21	0.0417
Mexico	MEX	28.26	0.0570
Nigeria	NGA	24.80	0.1334
Norway	NOR	54.17	0.0417
Oman	OMN	30.34	0.0570
Qatar	QAT	52.58	0.0519
Russia	RUS	29.70	0.1207
Saudi Arabia	SAU	45.59	0.0570
Sudan	SDN	19.99	0.1589
Syrian Arab Republic	SYR	61.75	0.0417
Trinidad and Tobago	TTO	43.84	0.0417
Turkmenistan	TKM	16.08	0.1821
United Arab Emirates	ARE	91.52	0.0417
Venezuela	VEN	29.35	0.0927
Yemen	YEM	37.61	0.0417
All countries		37.47	0.1000

Note: For each country, the average level of financial development (proxied by M2/GDP) and the average estimated impact are computed over the total period under consideration. For the line “All countries” figures are the average across countries.

Figure 2. Average estimated impact of an oil price change on the current account (1980-2010)



Note: For each country, the observation represents the average estimated impact over the total period under consideration against the corresponding average level of financial development.

Figures 3. Relationship between oil prices and current accounts in oil exporters: the role of the level of financial development

Figure 3a. Oil exporters with a low level of financial development

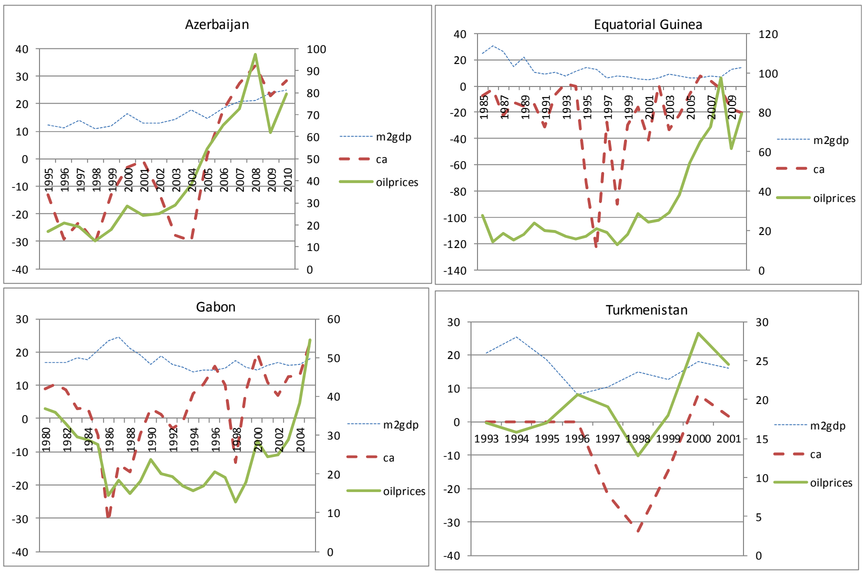


Figure 3b. Oil exporters with an intermediate level of financial development

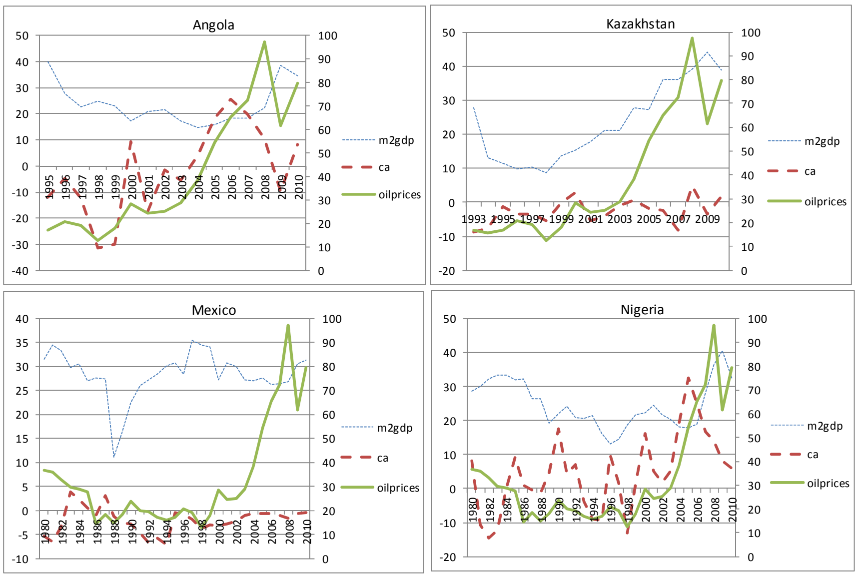


Figure 3c. Oil exporters with a high level of financial development