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Democratization and real exchange rates

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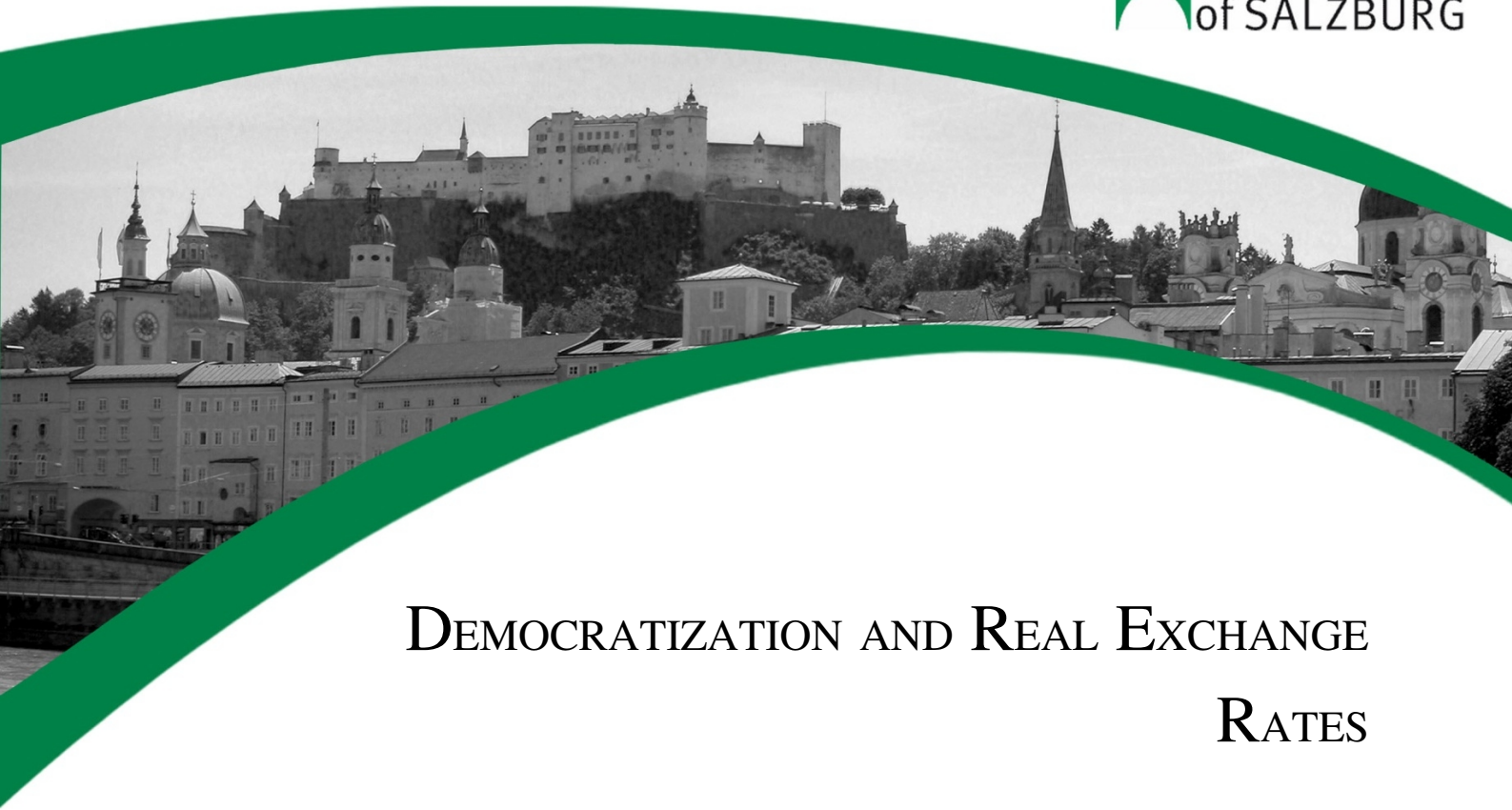
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DEMOCRATIZATION AND REAL EXCHANGE RATES

BENJAMIN FURLAN, MARTIN GÄCHTER, BOB KREBS AND HARALD OBERHOFER

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WORKING PAPERS IN
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Democratization and real exchange rates

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Abstract

This paper empirically assesses how democratization affects real exchange rates. Specifically, in line with the democratic peace theory we argue that democratization reduces currency undervaluation, and thus, might bring misalignments in foreign exchange markets to an end. We test this hypothesis for a sample of countries observed from 1980 to 2007. Econometrically, we combine a difference-in-difference (DID) approach with propensity score matching estimators. Our estimation results reveal that democratization causes real exchange rates to appreciate, lending empirical support to the democratic peace theory in this specific economic context.

JEL-Codes: C21, C23, F02, F31, F59, N20.

Keywords: Real exchange rates, democratization, democratic peace theory, difference-in-differences-estimator, matching estimators.

1. Introduction

During the last years, one important aspect of trade policy discussions centered around the issue of strategic manipulation of exchange rates. WTO trade negotiations, for instance, were recently accompanied by a lively discussion on whether China systematically undervalues its currency in order to establish favorable exchange rates. These so-called ‘unfair’ exchange rates have a direct impact on trade, as it can be seen as an export subsidy or import tariff that provides trade advantages in contrast to countries with ‘fair’ exchange rates.¹ Previous studies on this issue primarily focused on economic variables influencing the real exchange rate, such as terms of trade, net foreign assets or real interest rates of countries. Interestingly, although political decision-makers are able to systematically undervalue the currency of a country by, for instance, following an expansionary monetary policy, political variables only played a minor role in explaining real exchange rate movements across countries.

This paper, therefore, investigates whether democratization exerts an impact on a country’s real exchange rate. In particular, in line with the democratic peace theory we hypothesize that democracies are less engaged in ‘trade wars’.² More precisely, democratic norms and culture might make it less likely for a democratic country to keep an unfair low exchange rate to boost its exports, whereas an autocratic regime might rather choose to do so.³

Typically, politicians in less democratic countries need less public support, as they are able to manipulate elections or to ban the opposition. Based on this reasoning, we also argue that autocratic (less democratic) states rather tend to undervalue their currency to boost exports because the leaders do not depend on voters’ preferences. On the contrary, the voters in democratic states would probably punish the leaders for a weak currency, as consumers can afford less imports from abroad. Moreover, an undervaluation of a currency goes hand in hand with a loose monetary policy, which increases the risk of inflation. Thus, the assumption that autocracies more frequently conduct wars than democracies is probably even more convincing in the economic context of ‘currency wars’, because the voters are directly affected in terms of their real income.⁴

¹The literature usually refers to ‘fair’ exchange rates if the nominal equals the real exchange rate. In other words, the exchange rate is assumed to be fair if it is neither under- nor overvalued.

²Note, that to our knowledge the democratic peace theory has so far only been applied in order to explain military conflicts. In this sense, this paper is also a first attempt to extend the scope of the democratic peace theory beyond its traditional field of application.

³While previous studies lack in providing a link between democracy and fair exchange rates, earlier work does consider the role of democracy in promoting free trade. [Kono \(2006\)](#) argues that the spread of democracy supports economic development, which in turn promotes economic interdependence ([Frankel and Romer 1999](#)) and reduces the likelihood of war ([Polachek 1980](#)). Indeed, studies show that democracies trade more than autocracies ([Bliss and Russett 1998](#)), and are more likely to conclude liberalizing trade agreements ([Mansfield, Milner, and Rosendorff 2002](#)). Interestingly, the result that democracy promotes trade openness is among the most robust in the field of international political economy.

⁴Moreover, [Bagheri and Habibi \(1998\)](#) show that central banks tend to be less independent in autocracies. As the government has to be able to influence the central bank’s decisions for a currency devaluation, the dependence of the central bank from the government is a necessary condition for stirring up ‘currency wars’. Thus, as central bank independence has been shown to be positively related to democracy, we would again expect a higher probability for an undervalued currency in autocratic (less democratic) states.

In our econometric analysis we combine a difference-in-difference (DID) approach with propensity score matching estimators. Thereby, the latter allows to overcome both the unobserved counterfactual problem and non-random selection into democratization while the DID estimator additionally controls for unobserved heterogeneity across democratizing and non-democratizing countries. Empirically, we employ a sample of countries observed from 1980 to 2007.

In line with the democratic peace theory, our empirical results suggest that the process of democratization leads to an appreciation of the real exchange rate, and thus, reduces misalignments in foreign exchange markets. This effect, however, is most pronounced for countries which consecutively promote changes towards full democracy. Consequently, the recent democratization tendencies initiated by the Arab spring in 2011 might change international trade by reducing the number of countries which strategically undervalue their currencies in order to promote their exports. This, of course, will only be a mid- to long-run effect which crucially depends on the success of democratization efforts in the middle east.

The remainder of the paper is organized as follows. Section 2 reviews the related economics literature and briefly presents the democratic peace theory while Section 3 explains the data set and the methodology of our study. Section 4 discusses the empirical results. Finally, section 5 draws some conclusions.

2. Related literature

There is a broad literature on the determinants of real exchange rates in economics. The most common theory in this field of research is based on the idea of ‘purchasing power parity’ (PPP) which has been tested quite frequently during the last decades. In short, PPP states that the bilateral nominal exchange rate between two countries should be equal to their ratio of aggregate price levels, implying that a unit of one country’s currency should have the same purchasing power in the other one. Consequently, the real exchange rate should be constant over time, leaving currencies neither over- nor undervalued. The PPP theory dates back several centuries and became widely recognized after the first world war (see [Cassel 1918](#)).

[Taylor and Taylor \(2004\)](#) provide a comprehensive overview of the current debate on PPP. Accordingly, short-run PPP does not hold but long-run PPP may hold in the sense that most studies find significant mean reversion in real exchange rates. More recent papers focus on non-linear adjustments (see [Sarno and Taylor 2002](#)) and consider the fact that the equilibrium real exchange rate itself may move over time. This might be due to wealth effects or the widely recognized Harrod-Balassa-Samuelson effect ([Balassa 1964](#); [Samuelson 1964](#)). This latter effect can be explained by increased demand for non-traded services in relation to traded commodities in countries with higher GDP per capita and, empirically, is confirmed by [Bergstrand \(1991\)](#) who finds a positive impact of GDP per capita on real exchange rates.

Other studies primarily focus on trade-related variables, such as the balance of payments, etc. Thereby, [MacDonald \(1998\)](#) examines the determinants of real exchange rates by using multivariate cointegration methods in a long run model of the equilibrium exchange rate in-

cluding the terms of trade, net foreign assets, fiscal balances and real interest rates as main explanatory variables. His findings suggest that factors such as productivity growth or the real price of oil determine the real exchange rate. In particular during the oil price shocks in the 1970s and 1980s, countries with oil resources experienced their currencies appreciating relative to countries importing all their demanded oil.

Furthermore, a country's trade balance, tourism and minerals' share of GDP (see, e.g., [Clague 1986](#)) add additional information on the structural determinants of real exchange rates. This is also confirmed by [Lane and Milesi-Ferretti \(2002\)](#) who establish a negative long-run association between the trade balance and the real exchange rate. Moreover, [Faruquee \(1995\)](#) finds that net foreign assets and productivity differentials jointly determine most of the variation in real exchange rates. The relationship between productivity levels and the corresponding real exchange rate levels is also confirmed by [Candelon, Kool, Raabe, and van Veen \(2007\)](#). They estimate bilateral equilibrium real exchange rates for a group of eight new EU member states against the Euro and find a negative relation between openness and the real exchange rate.

As can be inferred from the discussion above, previous research has rarely focused on political variables, such as democracy or institutional quality when examining the determinants of real exchange rates.⁵ This is insofar astonishing, as the degree of democracy seems to influence policies in similar areas, e.g., liberal trade policies (see, e.g., [Bliss and Russett 1998](#)).

On the contrary, the democratic peace theory put forward by e.g., [Doyle \(1983\)](#) could provide additional insights on the determination of exchange rates. In particular, proponents of this theory argue that (military) 'wars between democracies are at most extremely rare events' ([Russett, Layne, Spiro, and Doyle 1995](#), p. 169).⁶ Thereby, the democratic peace theory is based on two proposed causal explanations, namely (i) institutional constraints, and (ii) democratic norms and culture.

The first explanation basically follows a structuralist approach, arguing that democratic leaders are reluctant to risk wars, as they require a broad base of support for risky policies. Moreover, the process and time required to prepare a war is much longer than for non-democracies, which makes a peaceful settlement more likely in the case of democracies. In short, the institutional structure of democracies makes it more difficult for the leadership to bring the nation to war.

With respect to the second main argument, [Doyle \(1986\)](#) argues that there is a moral foundation which comes from an understanding of the legitimate rights of all citizens, whereas [Maoz](#)

⁵The papers by [Broz \(2002\)](#) and [Bearce and Hallerberg \(2011\)](#) are notable exceptions, albeit they focus on different research questions and nominal exchange rate movements. In particular, these contributions examine the relationship between democracy and de facto exchange rate regimes and the stability of exchange rates. Due to a monetary preference of the median voter for domestic policy autonomy, [Bearce and Hallerberg \(2011\)](#) argue that exchange rates are less stable in democracies.

⁶In his seminal essay, [Doyle \(1983\)](#) shows how Kant's essay *Perpetual Peace (Zum ewigen Frieden)* from 1795 can be constructed as a coherent explanation of two important regularities in world politics, namely the tendencies of liberal states to be peace-prone in their relations with each other and to simultaneously be unusually war-prone in their relations with non-liberal states ([Russett et al. 1995](#), p. 180).

and Russett (1993) emphasize the belief rooted in democracies that conflicts can be settled peacefully. This lowers the relative benefit to be achieved from violence. In other words, citizens in democracies tend to value negotiation, compromise, and the rights of others.⁷

In this paper we argue that the democratic peace theory is also able to explain movements in real exchange rates. In particular, we hypothesize that democratization reduces the incentives to establish monetary policies which yield undervalued exchange rates. Consequently, in our empirical analysis we should identify significant exchange rate appreciation after democratization.

3. Data and methodology

3.1. Econometric methodology

In our empirical analysis we combine propensity score matching methods with a difference-in-difference (DID) estimation framework (see, e.g., Heckman, Ichimura, and Todd 1997). This approach allows to control for unobserved and time-invariant heterogeneity across countries when estimating the causal democratization effect for real effective exchange rates (REERs). Thereby, propensity score matching allows to overcome both the missing data problem and self-selection into treatment. Suppose that we observe an indicator variable which informs whether a country is currently in transition to more democracy or not. In such a situation, for each country i at any time t , we can only observe one of two potential outcomes $y_{it}^{(0)}$ or $y_{it}^{(1)}$, where $y_{it}^{(0)}$ ($y_{it}^{(1)}$) refers to a situation without (with) democratization. Formally, the potential outcome y_{it} is then specified as

$$y_{it} = (1 - d_{it})y_{it}^{(0)} + d_{it}y_{it}^{(1)}, \quad (1)$$

where d_{it} equals one if a country is at a state of democratizing at the time t and zero otherwise. To overcome the missing data problem and self-selection into treatment, we use propensity score matching methods. This allows us to extract a relevant control group among the non-democratized countries in order to produce counterfactual information on the treated outcomes had they not been democratized. In order to estimate each country's year-specific propensity score (i.e., the probability that a country is in a state of democratization) we apply standard probit models. Formally, this implies that we estimate the probability of democratization $p(x_{it})$ which is given by

$$p(x_{it}) = \Phi(\mathbf{x}'_{i,t-1}\beta), \quad (2)$$

⁷Despite of numerous studies that demonstrate that democracies hardly go to war with each other (see Oneal, Oneal, Maoz, and Russett 1996, for an overview), the theory of democracy has been put into question by several authors. Specifically, the theory is vigorously criticized by the proponents of realism, where power and strategic interests are the most important determinants of going to war. Moreover, the democratic peace theory attract additional critique due to statistical insignificance (see, e.g., Spiro 1994) or definitions and methodology (see, e.g., Layne 1994). Similarly, economic interdependence has received only limited attention in the relevant literature on democratic peace (see, e.g., Oneal *et al.* 1996).

where Φ denotes the cdf of the normal distribution and \mathbf{x}_i is a vector of explanatory variables measured in $t - 1$ (i.e. pre-democratization). Empirically, we are interested in the average treatment effect for the countries which actually experienced democratization (i.e., the average treatment effect on the treated or ATT). Another (econometric) reason for the estimation of the ATT is that it provides a consistent treatment effect estimate for non-randomized treatments (Blundell and Dias 2009). This, in turn, is likely to be the case for democratization of countries. Formally, the ATT can be expressed as follows (see, e.g., Wooldridge 2010)

$$ATT = E(y_{it}^{(1)} - y_{it}^{(0)} | d_{it} = 1). \quad (3)$$

In a next step, we formulate the DID estimator which is based on the difference between $\tilde{y}_{it}^{(1)} = y_{it}^{(1)} - y_{i,t-1}^{(1)}$ and $\tilde{y}_{it}^{(0)} = y_{it}^{(0)} - y_{i,t-1}^{(0)}$ and rewrite the ATT for our propensity score approach. Thereby, the actual treatment status is simply replaced by each country's propensity score yielding

$$ATT = E[y_{it}^{(1)} | d_{it} = 1, p(x_{it})] - E[y_{it}^{(0)} | d_{it} = 0, p(x_{it})] = E[\tilde{y}_{it}^{(1)} - \tilde{y}_{it}^{(0)} | p(x_{it})]. \quad (4)$$

Intuitively, equation (4) states that the average democratization effect for the group of democratizing countries is given by the expected DID in the REERs for treated and non-treated countries with the same (or a very similar) propensity score $p(x_{it})$. In this regard propensity score matching methods solve the problem of the non-observable counterfactual outcome by constructing a control group consisting of non-democratizing countries with a similar democratization probability as the actually democratized countries. Moreover, the DID estimator allows to control for unobserved time-invariant heterogeneity across the groups of treated and non-treated countries.

In order to determine which observations enter the control group, we need to define the proximity between the propensity scores of the treated and their controls. Further we can attribute weights to the selected observations in the comparison group. In this paper, we apply various different matching methods such as one, three and five nearest neighbor matching as well as kernel matching. Thereby, in the former three procedures for each democratizing country the control group consists of one, three or five non-democratizing countries with the most similar democratization probabilities, respectively. On the contrary, kernel matching procedures calculate weighted averages of the changes in REERs for all non-democratizing countries and compare each democratizing country with the respective weighted average from the control group (Heckman *et al.* 1997; Smith and Todd 2005). The weights of the control group countries depend on their distances in propensity scores to each democratized country, respectively.

The estimation of the average treatment effect requires the following assumptions to hold. The stable unit treatment value assumption (SUTVA) states that the treatment of unit i only affects the outcome of i (see, Wooldridge 2010). This implies that the democratization of one country should not affect the real exchange rate of a non-treated country. For this reason, we utilize the real effective exchange rate index as reported in the World Bank world development indicators (World Bank 2011). This effective exchange rate is based on a (constant) set of foreign currencies consisting of the most traded ones (such as e.g., Euro, Dollar and Yen). This, in turn, implies that no single local currency of a democratized country is

used for the calculation of the exchange rate for non-democratized controls and the SUTVA holds by construction.

Furthermore, we also need the common support assumption stating that all democratizing countries have a counterpart in the non-treated population. The balancing property requires that democratized countries and matched controls with the same propensity scores exhibit the same distribution with regard to their observable characteristics.⁸ Finally, for the DID approach we need the common trend assumption which states that changes in REERs for both groups generally follow a common trend and deviations from this trend are only due to differences in the democratization status.

To sum up, if the democratic peace theory also holds in the field of currency over- and undervaluation, we would expect that democratization has a positive impact on a country's real effective exchange rate and thus, that the ATT is expected to be positive. The following section presents the data for our analysis, describes the specification of the propensity score equation and offers some first descriptive results.

3.2. Data, propensity score equation and descriptive statistics

The treatment in our study constitutes a significant change towards democracy. In order to define democratization, we use data from the Polity IV Project ([Integrated Network for Societal Conflict Research \(INSCR\) 2009](#)). More precisely, our democratization measure is based on the polity 2 index, which is a combined score ranging from -10 to +10, where higher values indicate more democracy and political freedom, respectively.⁹ In our baseline specification, the treatment variable democratization takes on the value of one if a country accumulates an increase in its polity 2 index by at least three points over a time frame of three years.¹⁰ Moreover, in order to carry out DID-estimation we define time windows of five years pre- and post-democratization and, thus, focus on medium-term REER adjustments. For the available sample period from 1980 to 2007, this implies that we are able to only consider democratization processes that are observable from 1985 to 2002 leaving us with 128 democratizations.

As already discussed above, the real effective exchange rate index provided by the International Financial Statistics is used to compile the outcome variable. The REER is defined as the nominal effective exchange rate divided by a price deflator. Thereby, the nominal effective exchange rate is calculated as the (relative) value of a currency against a weighted average of the most traded foreign currencies ([World Bank 2011](#)). Consequently, an increase in the REER implies a real exchange rate appreciation.

⁸This assumption can be verified with a test proposed by [Rosenbaum and Rubin \(1985\)](#). In the Appendix, we report some balancing property tests which commonly point to a considerable bias reduction indicating that the difference between both country types is reduced substantially after matching.

⁹A value of +10 indicates perfect democracy, whereas -10 states that a country is fully autocratic.

¹⁰In our robustness analysis we utilize alternative definitions of democratization. In particular, we vary the number of accumulated changes in the polity 2 index between only one and four points over the three year time period and utilize alternative data sources for democratizations.

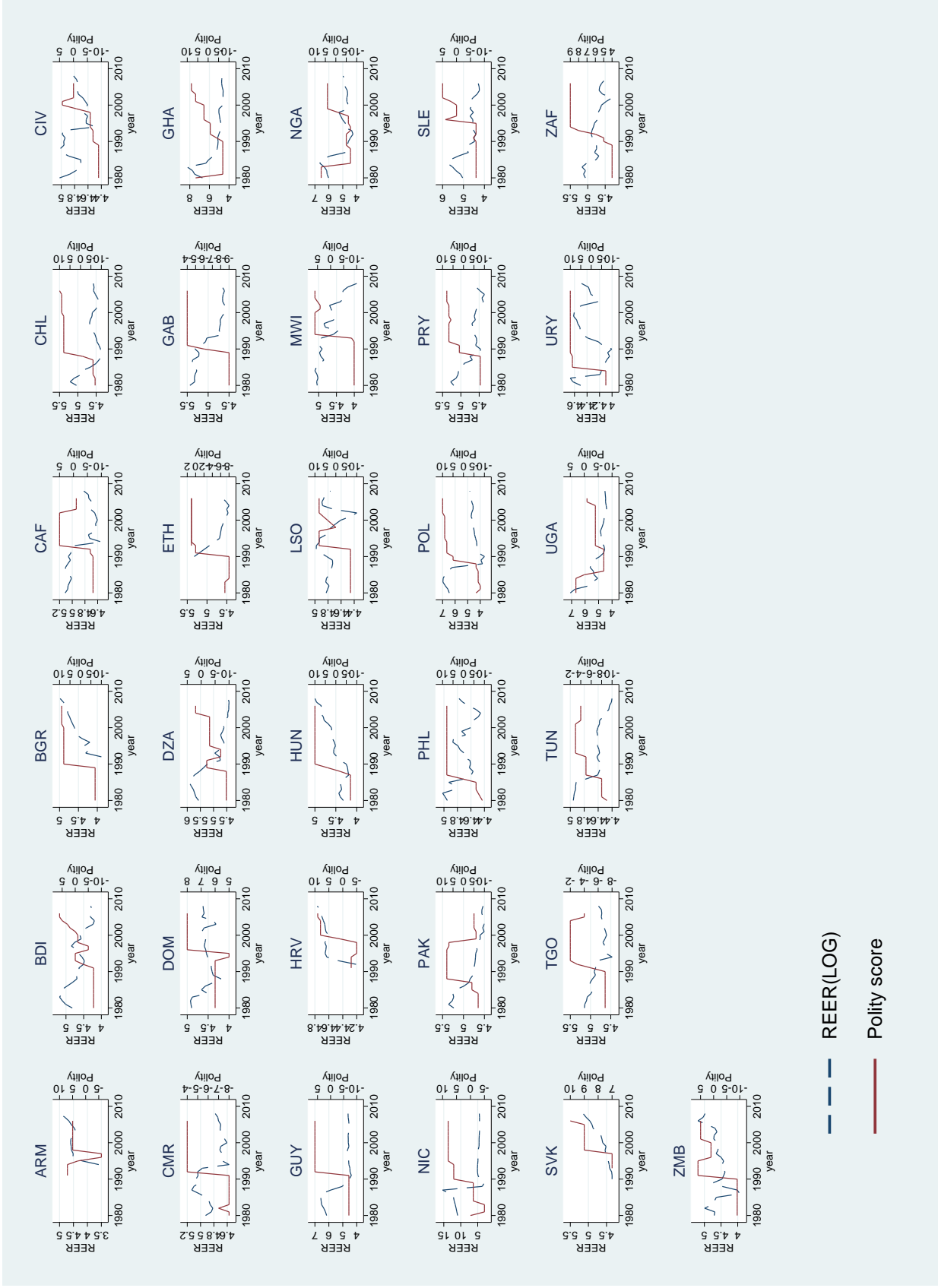


Figure 1: REER and democracy index of treated countries

Applying our baseline definition of democratization, Figure 1 graphically displays the REER and the polity 2 score for all 31 countries that experienced at least one democratization process between 1985 and 2002. From this figure, it can already be inferred that there is a considerable co-movement between a country's REER and its polity 2 score in most of all cases. We observe that currencies tend to appreciate in real terms after a democratization process (see, e.g., Chile 1989; Bulgaria 1990 and Armenia 1998) while autocratization tendencies seem to be accompanied by depreciation of the local currencies (see, e.g., Uganda 1986; Zambia 1996; Sierra Leone 1997 and Ivory Coast 2002). In this context, Nigeria can serve as a textbook example, where the drop in the the polity score from +7 to -6 during the military junta government which was in power from 1983 to 1998 was accompanied by a significant exchange rate depreciation. At the end of the military era in 1998 President Abdulsalami Abubakar encouraged a democratization process causing an increase in both the polity score index and the REER. On the contrary, Uruguay shows a slightly different picture as the process of democratization started in 1983 after the civilian-military regime from a polity score of -7 and reached the value of full democracy (+10) in 1989. Again, the exchange rate followed democratization with only a short delay.

In order to estimate the impact of democratization on REERs, we first have to specify the propensity score model which explains a country's democratization probability.¹¹ For that, we follow the related literature on the determinants of democratization. To start with, our model contains each country's initial polity 2 score (measured in 1980) as well as its respective score at the time of democratization (see, e.g., Barro 1999; Papaioannou and Siourounis 2008). Here, one might expect that initially already (relatively) democratized countries are less likely to experience further democratization. On the contrary, the relevant literature on democratization assumes that some institutional preconditions are necessary in order to enforce successful democratization. This, in turn, would imply that countries with a higher value of the polity 2 index at the time of democratization are more likely to exhibit sustainable democratization processes.

A country's nominal GDP per capita measured in 1975 (which is again taken from World Bank's world development indicators) enters our selection equation as a further control (see, e.g., Muller 1995; Papaioannou and Siourounis 2008). In this regard, we argue that the probability for a coup d'état is a negative function of a country's economic welfare, implying that democratization tendencies are more likely to be observed in poorer countries. Related to this discussion, one might additionally argue that due to large rents associated with exports of natural resources some dictators have been better able to retain non-democratic governmental structures (see, e.g., Barro 1999). In particular, as demonstrated by Crespo Cuaresma, Oberhofer, and Raschky (2011) among others, autocratic leaders which govern oil-rich countries exhibit a significantly increased dictatorship duration. Consequently, our empirical specification contains information on oil production (measured in terms of 1000 barrels per day) combined with an indicator variable capturing a country's oil exporter status as well as an interaction term between these two. The respective information is provided by the U.S. Energy Information Administration.

¹¹According to Blundell and Dias (2009), the appropriate matching variables should both describe the available information at the time of the treatment and simultaneously explain the outcome variable.

Moreover, anecdotal evidence suggests that a change in political leadership is often followed by democratization processes. Thereby, a leadership change can either be caused by natural deaths of the respective (former) leaders (see, e.g., Spain after the death of Francisco Franco in 1975 or President Abdulsalami Abubakar democratic reforms in Nigeria after the mysterious death of his predecessor Sani Abacha) or by coup d'états (see, e.g., Romania's democratization after the assassination of Nicolae Ceausescu during the Romanian Revolution of 1989). For this reason, utilizing data from the Archigos database which is provided by [Goemans, Gleditsch, and Todd \(2007\)](#), we construct a dummy variable for a change in political leadership. Finally, our selection equation also comprises a full set of time- and continent fixed effects in order to control for democratization waves across time and regions, respectively.

Table 1: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Democratizing countries					
Δ REER	128	0.070	0.269	-0.174	-1.719
Polity 2 (1980)	128	-5.031	5.026	-9	7
Polity 2	128	3.156	4.720	-6	10
log GDP per capita (1975)	128	6.888	1.235	4.645	9.014
log Oil production	128	1.829	2.304	0	7.722
Oil exporter status	128	0.102	0.303	0	1
log Oil production * exporter status	128	0.705	2.120	0	7.722
Leader Change	128	0.281	0.451	0	1
Non-democratizing countries					
Δ REER	1,000	0.022	0.128	-0.194	2.252
Polity 2 (1980)	1,000	2.225	7.978	-9	10
Polity 2	1,000	4.645	6.853	-9	10
log GDP per capita (1975)	1,000	8.104	1.644	4.645	10.505
log Oil production	1,000	2.624	2.808	0	9.102
Oil exporter status	1,000	0.059	0.236	0	1
log Oil production * exporter status	1,000	0.362	1.470	0	7.665
Leader Change	1,000	0.184	0.388	0	1

Table 1 reports simple summary statistics for the variables of main interest where Δ REER refers to changes in the REER between a time period capturing five years prior and five years post democratization. When comparing democratized countries with their non-democratized counterparts some interesting first results can be obtained. First, the currencies of democratizing countries more strongly appreciated as indicated by an average increase of 7 percentage points. Second, democratizing countries are initially less democratized and poorer as measured in terms of GDP per capita in 1975. Interestingly, however, the actual pre-democratization polity 2 index of democratizing countries is substantially larger in comparison to its initial value in 1980. This, in turn, suggests that a country needs to pass a certain institutional threshold before it is able to experience a real boost in democratization.¹² Finally, democratizing countries tend to produce less oil which is more likely to be exported

¹²Intuitively, this effect might resemble the well known *poverty trap* conundrum in the economic growth literature. Empirical studies show considerable convergence among countries in economic development, whereas countries with a very low level of prosperity tend to remain in their poverty trap. Similarly, we could define

to foreign markets while approximately 28 percent of all democratizations are initiated by a change in the political leadership.

4. Estimation results

Table 2 reports the estimation results for our selection equation explaining a country's democratization probability. Note again, that democratization is defined as a minimum increase of three points in a country's polity 2 index observed over a time period of three years. The first column refers to our baseline specification including the full sample of democratizing and non-democratizing countries while the remaining three columns offer a first robustness analysis for various sub-samples of countries.¹³ In particular, in column 2 we exclude all non-sustainable democratization processes while in columns 3 and 4 we distinguish between consecutive and non-consecutive democratizations, respectively. Thereby, non-sustainable democratizations refer to situations where the increase in the polity 2 index is followed by a decrease in the index during the consecutive three years. Similarly, we identify consecutive democratizations as cases where one democratization process is immediately followed by further democratization.¹⁴ This distinction between consecutive and non-consecutive democratizations, later on, allows to assess whether a country's exchange rate is differently affected by short-run or medium-run democratization strategies.

The parameter estimates depicted in Table 2 are by and large in line with our discussion from above and the related literature on the key determinants of democratization. First, less democratized countries are more likely to experience democratization. This is indicated by negative and significant parameter estimates associated with the initial polity 2 scores measured in 1980. Contrary, conditional on this former effect, countries with a higher actual pre-democratization polity 2 index are more likely to democratize. This supports the view that there are certain institutional pre-conditions which foster successful democratization.

Second, the significantly negative initial GDP per capita estimates point to the importance of economic conditions for democratization. Correspondingly, economically well endowed autocratic states are less likely to experience any democratization. Moreover, with regard to the impact of crude oil on a country's democratization we obtain interesting results. Oil production *per se* has no significant impact on the propensity to experience any democratization while oil exporting countries are significantly less likely to democratize. This latter effect, however, diminishes with an increase in oil production. Intuitively, this suggests that oil exports might allow autocratic leaders to maintain their non-democratic regimes while increasing dependence on these oil trades opposes this effect.

a *democracy trap* where a certain level of democratic institutions are a prerequisite for further progress in democratization efforts.

¹³Table A.1 provides a list of all democratizing countries including the year of democratization and the sub-sample assignments.

¹⁴In this context, it is worth noting that for consecutive democratizations we allow the three years time periods to overlap each other.

Table 2: Estimation results for the selection equation (democratization probability)

Variable	Full sample	Excluding non sustainable	Consecutive democratization	Non-consecutive democratization
Polity 2 (1980)	−0.064*** (0.011)	−0.056*** (0.012)	−0.061*** (0.014)	−0.054*** (0.020)
Polity 2	0.081*** (0.015)	0.091*** (0.016)	0.093*** (0.018)	0.103*** (0.027)
GDP per capita (1975)	−0.163** (0.079)	−0.226*** (0.084)	−0.211** (0.094)	−0.277** (0.135)
Oil production	−0.011 (0.041)	−0.020 (0.043)	−0.015 (0.049)	−0.051 (0.075)
Oil exporter status	−3.348** (1.645)	−3.313** (1.644)	−3.511* (1.907)	−3.084 (2.628)
Oil production * exporter status	0.625*** (0.244)	0.637*** (0.247)	0.669** (0.286)	0.640 (0.396)
Leader change	0.325** (0.153)	0.204 (0.164)	0.442** (0.176)	−0.669** (0.342)
Time effects ^a	41.95***	41.95***	38.33***	24.65*
Regional effects ^b	27.91***	28.53***	114.62***	8.85
McFadden's-R ²	0.31	0.33	0.34	0.34
Observations	1,128	1,059	1,029	868

Notes: Parameter estimates are reported. The dependent variable *democratization* equals one if a country increases its polity 2 index by a minimum of 3 points over a time period of 3 years and zero otherwise. Parameter estimates of the constant are not reported. Robust standard in parentheses. *, **, *** denote 10%, 5% and 1% significance levels, respectively. ^aTests for joint significance are based on F-tests with 17, 17, 17 and 15 degrees of freedom, respectively. ^bTests for joint significance are based on chi²-tests with 6 degrees of freedom.

Finally, a change in political leadership tends to be associated with the initiation of democratization processes as indicated by the positive and significant parameter estimate for the full sample. Interestingly, however, this effect is mainly observable for countries which experience consecutive democratization, while a change at the head of the state seems to reduce the probability of a non-consecutive democratization. Summing up this last result, we are able to infer that leadership changes positively affect the probability of consecutive democratization efforts.

The overall quality of our selection equation is crucial for obtaining reasonable matching results. The reported McFadden's-R² measures for all four samples indicate a satisfactory model specification. Consequently, the estimation outcomes of the just described selection equations allow to predict propensity scores for both democratizing and non-democratizing countries. Subsequently, these predications are used for the construction of the control group of non-democratized countries. Hereby, it is crucial that the above described common support restriction is imposed and that the balancing property is fulfilled. The former is needed to ensure that all democratizing countries have a relevant counterpart in the non-treated population.

With regard to the latter, Table A.2 in the appendix reports balancing property tests for the baseline model with all observations and for three nearest neighbour matching.¹⁵ Evidently, after matching, both groups of countries (the democratizing ones and their non-democratizing matched counterparts) do not significantly differ with regard to their covariates. Consequently, especially for the full sample of all countries the matching procedure induces a considerable bias reduction.¹⁶ This implies that observations with the same propensity score have the same distribution of their observable characteristics, exposure to the treatment is random and treated and control are on average identical.

Table 3 reports various ATTs applying our baseline definition of democratization for the full sample of all countries as well as for the three above discussed sub-samples. Thereby, we separately report results based on the four alternative matching procedures discussed above, namely one, three and five nearest neighbour matching and kernel matching.¹⁷ In line with the democratic peace theory applied to real exchange rates, Table 3 indicates that democratization exerts a positive impact on a country's REER. More specifically, focussing on the full sample of all democratizations our estimated ATTs range from 0.058 to 0.062 and are statistically significant at the 5 percent level, throughout. This indicates that democratizing countries increase their REERs by approximately 6 percentage points in comparison to a counterfactual situation where these countries would have not experienced any democratization. In a similar vein, with the exception of one-to-one nearest neighbour matching we obtain significant ATTs of a similar magnitude for the sub-sample which excludes all non-sustainable democratizations. For the group of consecutively democratizing countries the impact of democratizations on a country's monetary policy is further increased indicating that the average appreciation of REERs is around 7 percentage points larger than for their non-democratizing controls. On the contrary, when one only focuses on non-consecutive democratizations we are not able to estimate significant democratization effects for REERs. This implies that democratization has to be experienced consecutively in order to affect a countries currency policy. Due to the small number of only 34 observed democratizations in this sub-sample, this result, however, should be interpreted cautiously.

The matching results discussed above rely on only one potential definition of democratization. For this reason, we offer a comprehensive sensitivity analysis where we apply three alternative possible definitions. In particular, the upper part of Table 4 reports ATT estimates where a country is classified to experience a democratization if the polity 2 index increases by only one point during three years. This obviously inflates the number of treatments in our sample and, thus, leads to statistically somewhat weaker results. Most importantly, applying kernel matching methods for the four different samples of countries, we obtain qualitatively similar

¹⁵For the sake of brevity, we do not report the balancing property statistics for the alternative matching techniques as well as for our three alternative sub-samples. However, the outcomes of the respective tests are strikingly similar to Table A.2 and are available from the authors upon request.

¹⁶Note, that for our sub-samples of consecutive and non-consecutive democratizations we observe a negative bias reduction for the oil exporting indicator and the interaction effect between oil production and oil exporting, respectively. Here, both groups of non-democratizing and democratizing countries do not differ in their characteristics already before matching and, thus, the matching procedure does not lead to further improvements in homogenising both types of countries.

¹⁷Table 3 indicates that the common support restriction is not fulfilled for three (one) democratization observation in the full sample ('excluding non sustainable' subsample). These observations refer to Lesoto in 1993 and 1994, Malawi in 1994 and Lesoto in 1993, respectively.

Table 3: Baseline results for real effective exchange rates (REERs)

	ATT	Std. Err.
Full sample (n=125, 3 off support)		
Nearest Neighbour	0.061**	(0.028)
Neighbour 3	0.062**	(0.026)
Neighbour 5	0.059**	(0.026)
Kernel	0.058**	(0.026)
Excluding non sustainable (n=113, 1 off support)		
Nearest Neighbour	0.048	(0.032)
Neighbour 3	0.051*	(0.030)
Neighbour 5	0.055*	(0.030)
Kernel	0.060**	(0.029)
Consecutive democratization (n=84)		
Nearest Neighbour	0.068*	(0.036)
Neighbour 3	0.075**	(0.034)
Neighbour 5	0.073**	(0.033)
Kernel	0.064*	(0.033)
Non-consecutive democratization (n=34)		
Nearest Neighbour	0.040	(0.062)
Neighbour 3	0.049	(0.060)
Neighbour 5	0.044	(0.059)
Kernel	0.044	(0.059)

Notes: The dependent variable *democratization* equals one if a country increases its 3 polity 2 index by a minimum of points over a time period of 3 years and zero otherwise. Bootstrapped standard errors with 500 replications reported. *, **, *** denote 10%, 5% and 1% significance levels, respectively.

results and democratization positively and significantly affects a country's REER. Quantitatively, the effect amounts to approximately 4.5 percentage points additional appreciation and again seems to be driven by consecutive democratizations.

On the contrary, the second alternative definition of democratization is more restrictive. In this robustness analysis a country experiences democratization if the polity 2 score increases by (at least) four points during three years. With regard to this sensitivity analysis the corresponding ATT estimates once more point to the robustness of our baseline results. Focusing on the full sample, we again obtain significant estimates for all four alternative matching procedures, with a real appreciation ranging from 6.8 to 7.8 percentage points. The results for the three sub-samples are slightly less significant which is due to the substantial reduction of democratizing countries.

Finally, we define an alternative measure of democratization using data from [Cheibub, Gandhi, and Vreeland \(2010\)](#). This dataset includes information on a country's governmental system distinguishing between royal dictatorships, military dictatorships, civilian dictatorships, presidential democracies, semi-presidential democracies and parliamentary democracies. We define

Table 4: Robustness analysis for alternative definitions of democratization

	Full sample	Excluding non sustainable	Consecutive democratization	Non-consecutive democratization
Robustness 1: One point increase in polity 2 during three years				
Nearest Neighbour	0.032* (0.019)	0.051** (0.021)	0.046** (0.022)	0.005 (0.036)
Nearest Neighbour 3	0.027 (0.018)	0.048** (0.019)	0.047** (0.021)	0.024 (0.032)
Nearest Neighbour 5	0.032* (0.017)	0.046** (0.018)	0.042** (0.020)	0.027 (0.032)
Kernel	0.041*** (0.015)	0.044*** (0.017)	0.050*** (0.019)	0.037 (0.031)
Robustness 2: Four points increase in polity 2 during three years				
Nearest Neighbour	0.078** (0.035)	0.092** (0.041)	0.066 (0.044)	0.057 (0.069)
Nearest Neighbour 3	0.068** (0.033)	0.076* (0.039)	0.078* (0.043)	0.070 (0.067)
Nearest Neighbour 5	0.070** (0.032)	0.076** (0.039)	0.077** (0.042)	0.070 (0.066)
Kernel	0.069** (0.031)	0.076** (0.038)	0.075* (0.043)	0.071 (0.067)
Robustness 3: Alternative democratization classification, Cheibub et al. (2010)				
Nearest Neighbour	0.084 (0.056)	-	-	-
Nearest Neighbour 3	0.092* (0.055)	-	-	-
Nearest Neighbour 5	0.090* (0.055)	-	-	-
Kernel	0.090* (0.054)	-	-	-

Notes: Bootstrapped standard errors with 500 replications reported. *, **, *** denote 10%, 5% and 1% significance levels, respectively.

democratization as a change from one of the former three political systems to any type of a democracy. With this data at hand we are able to identify 54 democratizations, but are not able to distinguish between sustainable and consecutive democratizations. For this reason, we only report results for the full sample of all treatments. Table 4 documents that our results are robust against this alternative definition of democratization. Accordingly, democratizations are indicated to increase a country's REER by 8.4 to 9.2 additional percentage points.

To sum up, our results suggest that democratization processes, mostly observed in developing and emerging countries, are accompanied by a significant appreciation of the corresponding currency in real terms. Furthermore, the effect is of considerable magnitude, as the democratization effect leads to an appreciation of approximately 6% which would not be observed without democratization.

5. Discussion and Conclusion

This paper uses the democratic peace theory, which is widely recognized in the field of political science, in order to explain movements in real exchange rates. In particular, we argue that less democratic states are more likely to undervalue their currency for boosting their exports. Thus, we would expect that democratization has a positive impact on the real effective exchange rate, ending misalignments in foreign exchange markets. Our explanations follow the scientific reasoning of earlier papers in political science which attribute the absence of a ‘war’ between democratic countries back to institutional constraints of democratic leaders and the pronounced democratic norms and culture in democratic countries as compared to autocracies. Moreover, earlier studies suggest that central banks tend to be less independent in autocracies, which is a necessary condition for government intervention in monetary policy.

In our empirical analysis we combine a difference-in-difference (DID) approach with propensity score matching estimators for a sample of countries observed from 1980 to 2007. Thereby, the latter allows to overcome both the unobserved counterfactual problem and non-random selection into democratization while the DID estimator additionally allows to control for unobserved heterogeneity across democratizing and non-democratizing countries.

In line with the democratic peace theory, our empirical results suggest that the process of democratization leads to an appreciation of the real exchange rate, and thus, reduces misalignments in foreign exchange markets. This effect, however, is most pronounced for countries which consecutively promote further steps towards full democratization. The recent democratization tendencies initiated by the Arab spring in 2011 might, therefore, change international trade by reducing the number of countries which strategically undervalue their currencies in order to promote their exports. This, of course, will only be a mid- to long-run effect which crucially depends on the success of the democratization efforts in exporting countries such as Egypt, Libya or Tunisia.

Our study leaves several doors open for future research. First, an alternative test for the democratic peace theory could be to investigate whether autocratization induces exchange rate depreciations.¹⁸ Second, another interesting research question could involve the relationship between real exchange rate stability and democracy. This is insofar of special interest, as stability in real exchange rates reduces incentives for competitive devaluations and beggar-thy-neighbor policies, and thus, would likely reduce the turmoil in world financial markets. Overall, the role of political variables for the competitiveness of countries in general and for real exchange rates in particular is an underdeveloped topic in the literature.

¹⁸Preliminary estimates for countries which experienced a three points decline in the polity 2 index over a time period of two years indicate that the REER is negatively affected by autocratizations. During our sample period the number of this autocratizations, however, is extremely small (i.e., 28 cases) leading to relatively weak t-tests for the significance of this effect.

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Appendix

Table A.1: List of Treatment Groups

Country	Code	Year	Sample
Armenia	ARM	1999	consecutive
Armenia	ARM	2000	non-consecutive
Burundi	BDI	1992	consecutive, non-consecutive
Burundi	BDI	1993	
Burundi	BDI	1994	non-sustainable
Burundi	BDI	1995	non-sustainable
Burundi	BDI	1999	consecutive
Burundi	BDI	2000	non-consecutive
Burundi	BDI	2002	consecutive
Bulgaria	BGR	1992	non-consecutive
Central African Republic	CAF	1993	consecutive
Central African Republic	CAF	1994	consecutive
Central African Republic	CAF	1995	non-consecutive
Chile	CHL	1988	consecutive
Chile	CHL	1989	consecutive
Chile	CHL	1990	consecutive
Chile	CHL	1991	non-consecutive
Ivory Coast	CIV	1999	non-sustainable
Ivory Coast	CIV	2000	non-sustainable
Ivory Coast	CIV	2001	non-sustainable
Cameroon	CMR	1992	consecutive
Cameroon	CMR	1993	consecutive
Cameroon	CMR	1994	non-consecutive
Czech Republic	CZE	1993	consecutive
Czech Republic	CZE	1994	consecutive
Czech Republic	CZE	1995	non-consecutive
Dominican Republic	DOM	1997	consecutive
Dominican Republic	DOM	1998	non-consecutive
Algeria	DZA	1989	non-sustainable
Algeria	DZA	1990	non-sustainable
Algeria	DZA	1991	non-sustainable
Algeria	DZA	1995	consecutive
Algeria	DZA	1996	consecutive
Algeria	DZA	1997	non-consecutive
Ethiopia	ETH	1991	consecutive
Ethiopia	ETH	1992	consecutive
Ethiopia	ETH	1993	non-consecutive
Gabon	GAB	1990	consecutive
Gabon	GAB	1991	consecutive
Gabon	GAB	1992	non-consecutive
Ghana	GHA	1991	consecutive
Ghana	GHA	1992	consecutive
Ghana	GHA	1993	consecutive
Ghana	GHA	1994	non-consecutive
Ghana	GHA	1996	consecutive
Ghana	GHA	1997	consecutive
Ghana	GHA	1998	non-consecutive
Ghana	GHA	2001	consecutive
Ghana	GHA	2002	consecutive
Guyana	GUY	1992	consecutive

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Table A.1 – continued from previous page

Guyana	GUY	1993	consecutive
Guyana	GUY	1994	non-consecutive
Croatia	HRV	1992	non-sustainable
Croatia	HRV	1993	non-sustainable
Croatia	HRV	1999	consecutive
Croatia	HRV	2000	consecutive
Croatia	HRV	2001	consecutive
Croatia	HRV	2002	non-consecutive
Hungary	HUN	1988	consecutive
Hungary	HUN	1989	consecutive
Hungary	HUN	1990	consecutive
Hungary	HUN	1991	consecutive
Hungary	HUN	1992	non-consecutive
Lesotho ^{a b}	LSO	1993	consecutive
Lesotho ^a	LSO	1994	consecutive
Lesotho	LSO	1995	non-sustainable
Lesotho	LSO	2001	consecutive
Lesotho	LSO	2002	consecutive
Malawi ^a	MWI	1994	consecutive
Malawi	MWI	1995	consecutive
Malawi	MWI	1996	non-consecutive
Nigeria	NGA	1998	consecutive
Nigeria	NGA	1999	consecutive
Nigeria	NGA	2000	consecutive
Nigeria	NGA	2001	non-consecutive
Nicaragua	NIC	1985	consecutive
Nicaragua	NIC	1986	non-consecutive
Nicaragua	NIC	1990	consecutive
Nicaragua	NIC	1991	consecutive
Nicaragua	NIC	1992	non-consecutive
Pakistan	PAK	1985	consecutive
Pakistan	PAK	1986	consecutive
Pakistan	PAK	1987	consecutive
Pakistan	PAK	1988	consecutive
Pakistan	PAK	1989	consecutive
Pakistan	PAK	1990	non-consecutive
Philippines	PHL	1986	consecutive
Philippines	PHL	1987	consecutive
Philippines	PHL	1988	consecutive
Philippines	PHL	1989	non-consecutive
Poland	POL	1989	consecutive
Poland	POL	1990	consecutive
Poland	POL	1991	consecutive
Poland	POL	1992	consecutive
Poland	POL	1993	non-consecutive
Paraguay	PRY	1989	consecutive
Paraguay	PRY	1990	consecutive
Paraguay	PRY	1991	consecutive
Paraguay	PRY	1992	consecutive
Paraguay	PRY	1993	consecutive
Paraguay	PRY	1994	consecutive, non-consecutive
Sierra Leone	SLE	1996	non-sustainable
Sierra Leone	SLE	1997	consecutive
Sierra Leone	SLE	1998	non-consecutive
Sierra Leone	SLE	2002	consecutive

Continued on next page

Table A.1 – continued from previous page

Slovakia	SVK	1993	consecutive
Slovakia	SVK	1994	consecutive
Slovakia	SVK	1995	non-consecutive
Togo	TGO	1992	consecutive
Togo	TGO	1993	consecutive
Togo	TGO	1994	non-consecutive
Tunisia	TUN	1987	consecutive
Tunisia	TUN	1988	consecutive
Tunisia	TUN	1989	non-consecutive
Uganda	UGA	1993	consecutive
Uganda	UGA	1994	consecutive
Uganda	UGA	1995	non-consecutive
Uruguay	URY	1985	consecutive
Uruguay	URY	1986	consecutive
Uruguay	URY	1987	non-consecutive
South Africa	ZAF	1993	consecutive
South Africa	ZAF	1994	consecutive
South Africa	ZAF	1995	non-consecutive
Zambia	ZMB	1991	consecutive
Zambia	ZMB	1992	consecutive, non-consecutive
Zambia	ZMB	1993	non-sustainable
Zambia	ZMB	2001	consecutive
Zambia	ZMB	2002	consecutive

Notes: ^a (^b) off support in full sample (non-sustainable treatment).

Table A.2: Balancing property tests for the baseline model and three nearest neighbor matching

Baseline Treatment															Excluding non-sustainable									
Variable	Sample	Treated	Control	% bias	% reduct bias	t	t-test p> t	Treated	Control	% bias	% reduct bias	t	t-test p> t											
Polity 2 (1980)	Unmatched Matched	-5.031 -4.968	2.225 -4.851	-108.8 -1.8	98.4	-10.04 -0.17	0.000 0.862	-4.702 -4.681	2.452 -4.575	-106.4 -1.6	98.5	-9.36 -0.15	0.000 0.883											
Polity 2	Unmatched Matched	3.185 3.048	4.687 3.939	-25.8 1.9	92.7	-2.46 0.14	0.014 0.885	3.435 3.381	4.711 2.832	-21.6 9.3	57.0	-1.94 0.68	0.052 0.495											
GDP per capita (1975)	Unmatched Matched	6.898 6.926	8.088 6.877	-82.6 3.3	96.0	-8.06 0.32	0.000 0.752	6.918 6.926	8.178 6.849	-88.3 5.4	93.9	-8.09 0.47	0.000 0.640											
Oil production	Unmatched Matched	1.866 1.873	2.601 2.045	-28.7 -6.7	76.5	-2.88 -0.58	0.004 0.565	1.758 1.752	2.596 1.856	-33.1 -4.1	87.5	-3.10 -0.34	0.002 0.731											
Oil exporter status	Unmatched Matched	0.100 0.104	0.057 0.099	15.8 2.0	87.5	1.89 0.14	0.059 0.889	0.087 0.089	0.058 0.097	11.2 -3.4	69.7	1.24 -0.23	0.217 0.820											
Oil production * exporter status	Unmatched Matched	0.695 0.722	0.352 0.714	18.9 0.5	97.5	2.39 0.03	0.017 0.975	0.601 0.612	0.350 0.687	14.5 -4.4	70.0	1.69 -0.28	0.091 0.783											
Leader change	Unmatched Matched	0.277 0.264	0.182 0.280	22.6 -3.8	83.1	2.59 -0.28	0.010 0.777	0.270 0.265	0.184 0.227	20.6 9.2	55.3	2.21 0.67	0.027 0.506											
Consecutive Treatment															Non-Consecutive Treatment									
Variable	Sample	Treated	Control	% bias	% reduct bias	t	t-test p> t	Treated	Control	% bias	% reduct bias	t	t-test p> t											
Polity 2 (1980)	Unmatched Matched	-4.845 -4.778	2.452 -4.778	-108.7 -1.0	99.1	-8.25 -0.08	0.000 0.934	-4.706 -4.706	2.452 -5.235	-106.8 7.9	92.6	-5.20 0.41	0.000 0.682											
Polity 2	Unmatched Matched	3.333 3.333	4.711 3.964	-23.4 -10.7	54.2	-1.81 -0.68	0.071 0.494	3.800 3.765	4.711 3.056	-15.3 11.9	22.5	-0.78 0.50	0.436 0.622											
GDP per capita (1975)	Unmatched Matched	6.878 6.878	8.178 6.922	-91.0 -3.1	96.6	-7.20 -0.23	0.000 0.821	6.908 6.889	8.178 6.961	-88.0 -5.0	94.3	-4.60 -0.23	0.000 0.817											
Oil production	Unmatched Matched	1.727 0.727	2.596 1.783	-34.5 -2.2	93.6	-2.78 -0.17	0.006 0.866	1.630 1.555	2.596 2.169	-38.0 -24.2	36.3	-2.02 -1.07	0.043 0.288											
Oil exporter status	Unmatched Matched	0.083 0.083	0.058 0.048	9.9 13.9	-39.8	0.95 0.93	0.344 0.352	0.086 0.088	0.058 0.147	10.7 -22.6	110.7	0.69 -0.74	0.491 0.459											
Oil production * exporter status	Unmatched Matched	0.578 0.578	0.350 0.348	13.3 13.4	-0.9	1.35 0.84	0.178 0.401	0.588 0.605	0.350 0.991	13.8 -22.4	-62.3	0.95 -0.71	0.344 0.478											
Leader change	Unmatched Matched	0.333 0.333	0.184 0.341	34.6 -1.8	94.7	3.33 -0.11	0.001 0.914	0.114 0.118	0.184 0.049	-19.5 19.2	1.1	-1.05 1.02	0.296 0.313											

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