Democracy in long term growth and social welfare

Deana Gabriele Natale
Matricola 1017086
Ph.D. in Economics
Ciclo XX

Introduction

It is now widely recognized that growth series show wide variations in time, so that multiple trends may arise for each country. Abrupt variations in growth can impact dramatically on the standard of living of the people; moreover, how to ignited a prolonged increase in growth is of particular interest for policy-makers and the recipes may be different from policies aimed at sustaining growth.

In this thesis I identify the role of democracy and other determinants in growth acceleration and downturns and social welfare. In the first chapter I define positive and negative breaks in growth series through Bai and Perron methodology, and it is analysed the country specific determinants of jumps in lung run growth. Change in political regime towards democracy increases the chances of booms, while moving to autarky reduces them. Economic liberalization undermines the probabilities of crises. In the second part of this work the attention is shifted from country specific determinants, to contagious effect. Once identified internal determinants of growth break, the second chapter highlights the channels through which a break in a country affects the probabilities of a similar event in other countries. Geographical proximity plays a key role for the contagious of positive shocks: jumps in neighbor countries increase the probabilities of a booms. On the contrary, for crisis, the channel through the negative shock spread out it is not the distance, but the dimension of the economy and the relative importance of bilateral trade.

Since the democracy is a key determinants of positive shock, I identify its effects on Social Welfare, measured with the infant mortality rate in the last chapter. Democracy and democratization can increase the chance of positive jumps, but it is no clear if it is able to improve the quality of life of poorest. Introducing the concept of democratic

stock, the effects of both the contemporary level of democracy and its historical dimension on social welfare are explored. They have a different behaviour, according to the democratic environment. The contemporary level of democracy seems associated with the measure of social welfare in autocracy. On the contrary the length of time a country has been democratic, and its degree of democracy during that period, matters in a democratic framework.

Chapter 1: Democracy, openness and jumps in growth

Gabriele Deana Andrea Gamba

Abstract

We identify multiple structural breaks in a growth series using an algorithm developed by Bai and Perron (1998, 2003). We then regress the indicator of detected positive and negative breaks on a number of variables. We show that smooth growth determinants that are known to impact on yearly growth do not matter on the probability of regime changes. Conversely, external shocks, abrupt shifts in policies and political regimes changes have significant effects both on yearly growth and on swings in growth trends. Program evaluation results show that democratization fosters booms. Moves towards autocracy and economic liberalizations do not impact on the probability of growth jumps, while moves towards autarky undermine the chances of booms and trigger crises. We also study reform sequencing and find that democratization is a driver for growth and subsequent liberalization ensures stability.

1. Introduction

It is now widely recognized that growth series show wide variations in time, so that multiple trends may arise for each country. Abrupt variations in growth can impact dramatically on the standard of living of the people; moreover, how to ignited a prolonged increase in growth is of particular interest for policymakers and the recipes may be different from policies aimed at sustaining growth.

Our paper aims to identify the determinants of growth swings, using matching techniques to evaluate each reform impact. Our results show that political liberalization is a key move to raise one country's probability of experiencing a positive jump in growth, while economic liberalization or moving towards autocracy do not have significant impact. In contrast, closing up the economy raises the probability of downturns. These findings provide new insights about which policies might induce accelerations in growth, or prevent growth collapses. We also explicitly compare the impact of abrupt changes in policies on yearly growth and on the probability of growth regime changes. The same comparison is carried out with commonly used "continuous" growth determinants: interesting differences emerge. First, continuous growth determinants do not impact on the probability of a growth regime change. Second, "extreme policies" follow different channels: economic liberalization increases yearly growth, but does not impact on changes in its longer term trend; democratization does not affect yearly growth, but is a powerful determinant of economic booms.

The relationship between growth, institutions and economic policy has been widely studied, leading sometimes to contrasting results. Recently, Hausman, Pritchett and Rodrik (HPR, 2005) and Jones and Olken (JO, 2008) noted that growth series show large

swings over time and analysed such episodes. These two seminal papers yield, interestingly, very different results. HPR show a positive relation between political-regime changes and economic booms, while JO do not find such link. In contrast, economic liberalization is not significant in HPR regressions, while JO find a strong positive association between openness and positive jumps in growth.

Hausmann, Pritchett and Rodrik (2005) first define growth accelerations as episodes of rapid, prolonged growth in real percapita GDP. Such episodes are then regressed on a number of possible determinants. They show that external shocks are important drivers of growth accelerations. Most importantly, though, they find that political changes impact on booms, but that the effects of moves towards autocracy are much stronger than the ones deriving from democratizations. In their paper, economic liberalization does not impact on the majority of high growth episodes, but shows a positive and significant impact on growth accelerations that last longer (thus, on sustained accelerations).

Jones and Olken (2008) allow for positive and negative breaks in a growth series. Breaks detection is achieved through an econometric algorithm originally proposed by Bai and Perron (1998). JO compare the means of several economic variables before and after the detected breaks and find that international trade is positively associated with upwards breaks, while negative breaks are correlated with falls in investment and monetary instability. Political variables do not change significantly around the estimated break points.

Our work focuses on the determinants of swings in growth. We detect large and persistent breaks in a growth series and split them in booms (jumps that leave growth higher than before) and crises (decelerations in growth that lead to a decrease in average growth in the following years). We then regress break indicators on variables capturing

substantial changes in the political and economic policy dimensions, controlling for a number of potential covariates. Both pooled and panel specifications show that democratization fosters booms, while moves towards autocracy do not matter. Openness has an insurance effect against crises; conversely, moves towards autarky effectively prevent growth accelerations. Sharp currency appreciations trigger economic downturns. Exogenous shocks, such as the death of a political leader, are positively associated with booms, but not with crises.

As a corollary to our baseline regressions, we investigate whether extreme policies matter also on "smooth" growth (i.e. yearly growth). Another implication of interest is whether growth determinants usually employed in the literature matter not only for yearly growth, but also for changes in the longer term growth regime.

It turns out that different "extreme" policies matter both for yearly growth and for the probability of shifting a country's growth trend. Democratization fosters booms, but does not raise a country's short term growth. On the contrary, economic liberalization does not help shifting growth regimes, but really boosts yearly growth.

More standard indicators of political and economic features, such as the share of trade over GDP and simple absolute changes in the exchange rates and in the polity score, retain their strong predictive power when employed to explain yearly growth, but fail to have significant impacts on the probability of changing growth trends.

We next focus our attention on the determinants of breaks in growth and consider that our baseline regressions suffer from both self selection bias and potential endogeneity, as other papers in this literature. We then adopt matching techniques to isolate the Average Treatment Effect of single and joint reforms.

Our results on single reforms stand in contrast with previous works. We find that democratization has a strong positive impact on the probability of a positive jump in growth and a negative but statistically insignificant impact on the probability of a negative jump. Moves towards less liberal economic policies, in contrast, have a significant and strong negative impact on the probability of positive shift in growth, and considerably increase the probability of an economic downturn. Interestingly, all other variables do not have a significant impact either on economic booms or crises. In particular, moves towards autocracy and economic liberalizations have a negligible and not statistically significant impact on jumps in growth, irrespective of their direction.

We next study the impact of reforms when they are sequenced in time. We find some evidence that liberalizing the economy after political changes yields different results than when taking liberalization alone. After a move to democracy, a liberalizing the economy reduces the probability of subsequent jumps in growth, be they positive or negative. After a democratic collapse, opening the economy depresses the probability of negative jumps, but (insignificantly) raises the probability of a boom in growth. Democratization, when undertaken after economic reforms (either pro- or anti-market) has still a positive effect on boom probability and a negative effect on downturn probability, but these are not significant any more.

The paper is organized as follows: in section 2 we provide a brief description of the steps involved in the estimation of the breaks; in section 3 we describe the dataset and provide some descriptive statistics; section 4 describes our estimation strategy and discusses the matching techniques to circumvent the problems of pooled and panel regressions. Section 5 presents results from our baseline estimates; compares the impact

of different growth determinants both on growth breaks and on yearly growth; and shows program evaluation results, dealing also with reform sequencing. Section 6 concludes.

2. Detecting breaks in a growth series

We define growth as the yearly percentage change in real per capita GDP. Data are taken from the Penn World Tables, version 6.1 (Summers and Heston, 2002). Real per capita GDP shows different patterns across time and countries. The intuition behind our analysis is that, due to this variability, there is not a single trend in a growth series for a given country. Instead, multiple "growth regimes" can be detected and explained by a variety of factors. These “regimes” are different from usual business cycles, whose time horizon is confined to a few quarters, and are associated with different average growth rates for relatively long time horizons. Obvious examples are the economic boom of western countries in the 60s followed by stagflation in the 70s, or even the advent of the new economy in the US in the 90s. Figure 1 plots the real per capita GDP growth for different countries over time. Large swings are present in all countries and the dashed vertical lines identify potential “turning points” in growth trends. For example, Mozambique shows a very volatile growth path, but before 1973 its growth trend is quite positive, while it turns negative between the mid-70s and the mid-80s. Then, a jump occurs and subsequent growth is high again.

Multiple trends are such a wide phenomenon in growth series, the natural question is whether changing trends matters or not. We believe it does: on the one hand, large

swings in growth can have a dramatic impact on poverty and on people's standard of living; on the other, many policies that have a certain effect on yearly growth can have different impact on the long-run growth path of countries.

In this paper, we focus on the last statement. Before going on, though, we must:

1. find a proper way to detect breaks in the series that are persistent enough to reflect a change in the long term growth pattern of a country;
2. ensure that such detected breaks are not due to a simple increase in the variance of the series over time.

The works by Bai and Perron (1998, 2003) suit well our aims. They design a methodology to search for multiple structural breaks in a structural change model. In particular, they show how to implement a methodology that minimises the global sum of squared residuals of the model resulting from the split of a series according to the detected breaks.

More formally, they start with a pure structural change model

$$Y_t = \overline{Z}\delta_t + u_t \qquad (1)$$

where the regressors are constant over time, but the coefficient is allowed to change if breaks are detected. Suppose a maximum of *m* breaks and *(m+1)* segments is allowed. Then, in (1), $t = T_{j\text{-}1} + 1, ..., T_j$ where $j = 1, ..., m+1$. $T_1, ..., T_m$ are the unknown break dates; by convention, $T_0 = 0$ and $T_m = T$. To estimate the regression coefficient and the break dates, Bai and Perron split the series in two segments and calculate the sum of squared residuals (SSR) resulting from the regression carried out on each spell. Iterating this process to cover all possible breaks, they retain the estimated SSR for

each segment and store them in a triangular matrix of order $(T \times T)$, whose rows represent the initial dates of each segment and columns represent the terminal dates. Therefore, each matrix entry represents the estimated SSR associated to a specific segment. So, any m-partition will be a linear combination of the matrix cells. The dynamic programming algorithm proposed by Bai and Perron compares all possible combinations of the estimated SSRs to achieve a global minimum SSR for the model. Given *h*, the pre-specified length of one segment, the algorithm solves

$$SSR\left(\left\{T_{m,T}\right\}\right) = \min_{mh \le j \le T-h}\left[SSR\left(\left\{T_{m\text{-}1,j}\right\}\right) + SSR\left(j+1, T\right)\right] \qquad (2)$$

In practice, the algorithm computes all the SSR associated with one-break partitions and finds the ones that minimize the global SSR of the model. For each of these optimal partitions, the procedure then computes if and at what point an additional partition can be inserted to minimize the global SSR. After a sequence of such minimization, the last step involves choosing which optimal (m-1) breaks minimize the overall SSR of the model when an additional segment is added. The result is a model with *m* partitions and $(m+1)$ segments.

Jones and Olken (2008) test the performance of the procedure described above on small samples, implementing a Monte Carlo experiment. They model a growth process spanning 40 years, allowing for autocorrelation and structural mean shifts of different sizes. They find that the method developed by Bai and Perron is "conservative in detecting breaks, capturing only major accelerations and collapses" (p.583).

In this paper, we employ the methodology described above and adapt it to detects breaks in the growth series of all countries in the Penn World Tables with at least 20

years of data. We get 183 country growth series, spanning a maximum of 50 years. We run the simple regression

$$g(t)=a(R)+e(t) \qquad (3)$$

where $g(t)$ is the real annual growth rate in per-capita income, $a(R)$ is the mean growth rate during regime R, and $e(t)$ is an error term drawn from a common distribution across regimes. We set the maximum number of breaks for each country at 5. The minimum interval between breaks (so the minimum length of each segment) is 10% of sample size for each series. So, if a country spans 50 years of data, the minimum length of each segment is 5.

As expected, our results are very similar to the ones obtained by Jones and Olken: we find a total of 71 breaks, listed in Table 2. Breaks are featured by both developed and developing countries in all continents.

To check our findings, we analyze the behaviour of the residuals of simple trend regressions around the break points. Thus, we regress the yearly growth rate on its time average and then compute the residuals. As shown in Figure 2, residuals show large and persistent swings at the breakpoints. A simple trend regression does not take into account such swings. Segmenting the growth series at the breakpoints (and running three *separate* trend regressions) leads to a much better fit, as can be easily seen considering the dashed line of Figure 2.

3. Dataset and preliminary evidence

We can now move to the next questions: is there any cause of economic booms or depressions that may be detected? Are there particular events that may increase the probability of entering a phase of economic expansion, or act as an insurance against the probability of crises?

We start from the estimated breakpoints of section 2. We define two dummy variables that assume value 1 in the five-year time interval (a "window") centred around the year when a break has been detected, zero otherwise. One dummy captures a positive break (one which brings the country to a higher growth path than the one registered in the previous regime); the other dummy identifies negative breaks in a symmetric way. Constructing five-year window is convenient, because this allows to take into account the uncertainty related to the estimation of the breakpoints. There is another reason for keeping "event windows": since we are capturing long-term switches in growth, it makes more sense to investigate what happens not only in the first year of the new regime, but also around the turning point: some shocks may take some years to display fully. Changing the variable definition in order to take as positive outcomes only the point estimates of the breakpoints does not alter the results, although it drives down the proportion of positive outcomes substantially.

We then regress the two dependents on a number of political, economic and external covariates. Our variables of interest are all based on the concept that moderate policies may not have a substantial impact on growth (Easterly, 2001). Therefore, we construct them in order to reflect significant shifts in one potential determinant of growth.

A set of variables identifies political regime changes. They are based on the Polity IV dataset (Jaggers and Marshall, 2007): a regime change is defined as either a three unit 5-year change in the *polity2* variable or a regime interruption. We distinguish between positive and negative changes, constructing two dummies that take value 1 in the period of change towards democracy or autocracy, respectively.

The economic policy variables are related to the index developed by Sachs and Warner (1995), revisited by Wacziarg and Welch (2003). This index tries to capture the changes in the level of economic openness to trade, combining structural features and macroeconomic environment: we value it as a good proxy to measure broad economic reforms. With the same strategy adopted for the other variables, we create two dummies taking value 1 in the first five years of a transition towards, respectively, "openness" or "autarky".

Exchange rate “shocks” are constructed following Hausmann, Pritchett and Rodrik (2005). we define a dummy variable that takes value 1 whenever the change in the exchange rate with respect to the preceding 5 years falls in the upper decile of the changes experienced by all countries. In the same way, we define negative shocks to the exchange rate when their 5-year change falls in the lowest decile.

Jones and Olken (2002) construct a variable that captures the death of political leaders that are due solely to exogenous factors, such as accident, illness or age. We use this variable to isolate political shocks and define an indicator that takes value one in the year of a political leader’s accidental death and in the following four years, zero otherwise. We also interact such dummy with the number of years that leader had been in power at the time of death, to get a sense of his potential influence on a country’s political and economic shape.

After cleaning the dataset, we end up with 3776 valid observations. Table 3 shows the frequencies of both the dependent and the explanatory variables. Including all windows, we get 109 positive outcomes for economic booms and 171 positive outcomes for economic slowdowns. Moves towards democracy are relatively more frequent than abrupt changes towards autocracy. Economic liberalizations are over four times more frequent than moves to autarky. Strong declines in real exchange rate are more frequent than appreciations. Finally, death of leaders are a relatively infrequent event, and the average tenure of the leader at his death is slightly over ten years.

Table 4 splits positive and negative outcomes of the explanatory variables according to the final outcome of the dependent. Here we observe a striking result: moves towards autarky are never associated with economic booms, and economy-wide liberalizations are never associated with economic slowdowns. Thus, economic reforms act as a powerful insurance against a prolonged and significant decrease in economic growth. Moreover, leaders' tenures at their death are longer when they are associated with economic booms.

To get an idea of correlations between our variables of interest, Table 5 presents two linear probability models. In column (1) the dependent variable is economic booms (poswinbreak); in column (2) the dependent is negative jumps (negwinbreak). Economic liberalization have a positive insignificant impact on economic booms and a negative one on crises; moves to autarky have the reversed effects. Democratization is strongly associated with booms, but not with negative jumps in growth. Moves towards autocracy, on the other hand, have no impact on booms, while considerably increase the probability of a fall in growth.

4. Estimation

We start running two distinct pooled logit models, one for negative and one for positive breaks, using all the variables described above as regressors:

$$y_{it} = \alpha + \beta_1 democratization_{it} + \beta_2 autocracy_{it} + \beta_3 liberalization_{it} + \beta_4 autarky_{it} + \beta_5 appreciation_{it} + \beta_6 depreciation_{it} + \beta_7 leader\_death_{it} + \beta_8 death * tenure_{it} + \gamma Z_{it} + \varepsilon_{it} \quad (4)$$

where Z_{it} is a vector of controls. Among them, we include yearly growth, since we are interested in the additional effects that covariates may have on growth regimes *on top* of yearly growth impacts. Secondly, we add the democracy score as indicated by the *polity2* score of the PolityIV dataset. Indicators of ongoing conflicts (taken from Sarkees, 2000) and dummies to identify developing countries and LDCs are also included. Finally, an expansion in world economic activity could positively influence the probability of a growth long term acceleration or decline; to take this into account, we construct a variable that proxies world growth in a given year: it is the sum of he growth rate of neighbouring countries. We also include year and decade fixed effects in separate specifications. To evaluate each outcome separately against the baseline of no jumps in growth, we also run a multinomial logit regression.

The procedures just set out would yield only statistical correlations. To get a grip on causal relationships, we have to tackle three issues:

1. A pooled analysis might miss one of the key characteristics of our data: their panel structure.

2. A well-known problem in the literature is the possibility of "selection bias": countries may self-select into certain political regime or economic reforms, according to their characteristics. Reform impacts may also be correlated with other observable features of each country.
3. Endogeneity has to be tackled to rule out reverse causation: it could be that reforms are undertaken because the economy has entered a boom, and not the other way round.

4.1 Dynamic inconsistency

Panel data have been widely employed in the growth literature, but the emerging stream focusing on growth episodes has limited its analysis to pooled regressions. To check whether this approach is correct, we conduct a simple test of dynamic consistency (Wooldridge, 2001. We find that the lagged residuals of the pooled regressions are correlated with the dependent. Pooled estimates would then yield inconsistent results. We then turn to a panel specification. The fixed effects hypothesis delivers consistent estimates, at the cost of conditioning our analysis to the fact that one country experiences at least one boom or one crisis in our data.

4.2 Selection bias and endogeneity

Democracies may be more likely to liberalize the economy than, say, autocracies; moreover, the impact of one particular reform could affect a country in a different manner, according to its institutional or economic setting. Taking economic

liberalization as an example, it would be impossible to determine how much of the probability of jumps is due to the direct effect of economic liberalizations and how much to the indirect effect of democratization.

An additional problem arises from the potential endogeneity of our variables: an economic boom might provide a favourable setting to introduce potentially unpopular economic reforms, or to make political shifts more or less likely.

A program evaluation approach can be employed to effectively tackle both selection bias and reverse causation. Difference-in-difference estimation is appropriate to evaluate variables that are exogenous by construction, such as macroeconomic shocks and the accidental death of a political leader. On the other hand, the impact of potentially endogenous treatments should be evaluated with the tool of propensity score matching.

We have four potential endogenous treatments: economic liberalizations, moves towards autarky, democratic revolutions and democratic breakdowns. We deal each treatment separately. First, we construct a variable (the propensity score) that summarizes the likelihood of each country to be treated in any given year. The determinants of this propensity score are its other observable characteristics.

We next split treated and non treated countries (treated ones are countries experiencing that particular reform at least once) and match them according to their propensity score. Each treated country is matched with all controls in our sample, but each control is weighted according to the inverse of its distance, in terms of propensity score, from the treated country under consideration. We thus construct a "synthetic control" that shows population characteristics similar to each treated unit; comparing the latter with this control, we can infer the Average Treatment on the Treated.

5. Results

Baseline regression findings are summarized in Table 6 and show that a change towards democratization unambiguously fosters boom does not significantly impact on crises (though the sign of the coefficient is, reassuringly, negative). Moves towards autocracy do not have significant impact on jumps in growth. The death of a leader does not have any impact *per se* on the chances of growth transition; when interacted with the number of years the political leader had been in power, though, the variable shows a strong positive effect on the probability of booms. The probability of a crisis remains unaffected even by the interaction term. This result is fully consistent with the one found by Jones and Olken (2005). Exchange rate appreciations have a negative impact on the economy, increasing the chance of a slowdown in the subsequent 5 years. This is explained with the higher price of the home country exports, that depress international demand for these goods and puts domestic firms under pressure.

One striking feature of our data is that the economic liberalization variables almost completely predict the behaviour of our dependent. In particular, an opening of the economy is never associated with a negative jump in growth, and a move towards autarky never happens close to an economic boom. Our results show the models retaining these "perfect predictors", in order to give an idea of the potential importance of economic reforms on preventing negative shocks to growth. Table 7 shows that when dropping perfect predictors, our results are confirmed and are even sharper.

From an economic viewpoint, democratization has an explosive effect on the probability of growth acceleration. While, in the pooled sample, the average probability of a boom is only 1.37%, moving towards democracy more than quadruples it (the

effect of a discrete change in the democratization variable increases the probability of booms by 310%). Similarly, the probability of an acceleration in growth increases by 5.8% for any year of power of political leaders that have just passed away. On the other hand, the sample averaged probability of entering into an economic contraction is even lower (0.04%), but an exchange rate appreciation more than doubles that value (the marginal effect is 106%).

Table 8 presents results from a multinomial logit specification: they are fully consistent with the ones in the previous Tables and confirm that democratization improves the chance of booms, while not affecting negative breaks. Moves to autocracy impact neither accelerations nor decelerations in growth, but the death of a political leader positively and significantly affects the chance of a boom. Economic liberalizations heavily insure against crises, while moves towards autarky significantly depress the probability of a positive jump in growth.

Panel fixed effect results are shown in Tables 9 and 10, and broadly resemble the main results of the pooled analysis. The positive coefficient of democratization on booms is even larger, in all specifications. Moves towards autocracy do not have impact of either boom or crises, except a weakly negative effect on crises in the specification with year dummies. The economic liberalization variables keep the same sign and significance as in the pooled analysis. The accidental death of a political leader turns out to be significant in the specification with year fixed effects. There, the death of a leader *per se* is highly detrimental for the chance of growth accelerations, but any additional year of ruling of that leader has a positive coefficient. This result could be explained assuming that the more a leader holds power, the more he can prepare its successors, so concerns about a gap in political power are mitigated. Exchange rate

appreciations reduce the probability of a boom, confirming the results from the pooled regressions; depreciations do not have any impact on either booms or crises.

5.1 Smooth and "extreme" policies: different channels?

What is important to stress is that, since we control for growth in all specifications, we are effectively separating the influence of our independent variables on non-smooth growth episodes from their impact on yearly growth. It is then natural to ask whether the extreme policies used in the right hand side of (4) impact differently on yearly GDP growth than on the probability of changing longer term regime trends. We run two regressions with yearly GDP growth as the dependent variable and the same set of right hand side variables as above. Results are shown in Table 11: column 1 contains the pooled regression coefficients, column 2 shows estimates with panel fixed effects. Both specifications show a positive and very significant impact of economic liberalization on growth. Exchange rate depreciations significantly depress growth, while political change variables do not have significant effects.

These results, together with evidence provided in Tables 6-10, show that political and economic variables impact growth differently if we look at its short-run, smooth variation, or at the probability of improving (or depressing) its longer-horizon *trend*. Reforms that seem not to have an immediate impact, such as substantial political changes, turn out to be the best recipe to raise a country's long run performance. On the other hand, economic liberalizations seem to have an important and significant impact both in raising yearly growth, and in insuring against future downturns. Monetary shocks, such as sudden devaluations of the exchange rate, significantly depress yearly

growth; on the other hand, exchange rate appreciations seems not to impact on growth immediately, but increase significantly the probability of a recession in the longer run.

We next investigate the impact on growth regime changes of "smooth" policies. In Table 12, we use as regressors the variables commonly used in standard growth regressions. These variables can be regarded as the continuous version of the extreme policy indicators employed in the previous sections. We take the fraction of international trade over GDP as a proxy for economic openness; we use the simple 5-year difference in the exchange rate instead of an indicator of a shock in its change relative to other countries. Political variables are captured by the simple polity2 score and by its 5-year variation. We retain the controls of Tables 6-10 and include the indicator variables of leader deaths. Results are interesting. Openness impacts negatively on the probability of jumps in growth, either positive or negative. The level of democracy has a negative impact on growth swings of either kind, but such impact is significant only on positive jumps and with pooled estimates. A change in the polity score, on the other hand, has a positive impact on growth regime changes, but again significance is retained only with pooled regressions on positive jumps. Changes in exchange rate have negligible effects, as political leader deaths. The interaction term between a leader's death and its tenure is significant only in column (1). Dummies for developing and LDC countries are significant, showing that developing countries have a significantly higher chance of experiencing a boom, while LDC countries are much less likely to see their growth jump, either up or down. Finally, in pooled regressions, conflicts are associated with both upward and downward swings.

Looking at columns (2) and (4) of Table 12, we find a striking result: "smooth" variables capturing economic and political phenomena do not impact on the probability

of breaks in a growth series, once the time dimension is correctly taken into account. Comparing these findings with the ones in Tables 11 and 12 teaches us that, consistently with the claim of Easterly and Levine (2001), what matters for improving longer term economic growth are extreme policies. Mild deviations in economic and political behaviour do not matter.

5.2 Matching

One issue worth discussing is the nature of the treatments we want to analyze. Many countries, especially non-OECD ones, show multiple transitions in the time spanned by our dataset, with reform-reversals, democratic revolutions and subsequent coups. Examples on political variables include Ghana, Nigeria, Pakistan, Peru and Thailand. Economic reforms have been reversed at least once in Costa Rica, Ecuador, Honduras, El Salvador, Jamaica, Nicaragua, Peru, Sri Lanka and Venezuela. We deal with this problem in a simple way: we pool all our observations together and consider treated the countries that experience at least one time the treatment under consideration. Treatments are defined as periods following one particular reform and last until a subsequent reform reverses it. For example, Pakistan experiences its first move towards democracy in 1962 and progressively improves its democratization score until 1976. The period spanning 1962-1976 is then considered as a treatment period for democratization and Pakistan is considered under treatment in all these years. In 1977, though, there is a coup d'etat that pushes the country into a dictatorship that lasts until 1988. All years from 1977 to 1988 are considered treatment periods for a move to autocracy. Finally, a ten year "democratic" period follows from 1988 to 1998, before

the last coup takes place in 1999. This implies that, in case of multiple successive treatments, in computing the ATT we simply average out the effects of different treatment periods, considering as controls all countries that never experienced such a treatment.

We then proceed with matching treatment and controls; we start dealing each treatment separately. We run probit regressions for each of our potentially endogenous treatments. In order to ensure better quality of our matches, we condition the regression on observations within the common support, the ones for which the probability of treatment rests strictly inside the interval [0,1]. Results from the propensity score estimation are shown in Table 13. In matching observations, on the one hand, we needed to ensure that the variables on the right hand side of each equation were good treatment predictors; on the other hand, we needed to be as parsimonious as possible in order to satisfy the balancing property. The estimated probability of treatment generally rests under .7 in all our specifications, but in two cases (democratization and moves to autocracy) there are relatively few controls for the treated units close to the upper bound of the common support . Dropping these handful of observations does not alter our findings. No problems arise in matching treated and controls close to the lower bound of the common support.

To ensure that our matching strategy works well, we run a simple mean-difference test for treated and controls on all covariates and we never obtain results that reject the null of no-difference in the matched pairs at conventional levels. We also run a likelihood ratio test on the propensity score specification before and after matching. Table 14 shows that it is impossible to predict among two matched units which one is going to be treated and which will act as a control.

The program evaluation estimates, shown in Table 15, indicate that moves towards democracy have a positive and very significant effect on the probability of a boom; on the other hand, democratization is successful in lowering the probability of a negative jump in growth. Liberalization does not impact significantly on growth jumps, but moves to autarky significantly increase the probability of a subsequent economic crisis. Exchange rate shocks and political leader deaths, on the other hand, seem not to have any particular influence neither on booms nor on crises.

5.3 Reform sequencing and a new look at single reforms

Economic liberalization could be a good thing for democracies, but a bad one autocratic systems. As anticipated, our data show several countries adopting not just a single economic or political reform, but experiencing subsequent, and potentially intertwined, phases of liberalization, democratization and their reversal. In this section, we try to answer the questions: do joint reforms exert special effects on jumps in growth? Does the sequencing of reforms really matter?

Giavazzi and Tabellini (2005) answer similar questions on smooth growth with simple difference in difference estimation, separating countries that liberalize the economy after becoming a democracy from the ones that experience the reversed sequence. They find that a country that liberalizes the economy first and then becomes a democracy gets a higher benefit than it would if it engaged in the opposite sequence.

Here we study the effect of joint reforms on the probability of growth accelerations and collapses. Treated countries are defined as the ones that, having already experienced one transition (say, to democracy), subsequently enter another phase of

reform (say, economic liberalization). In practice, we construct a variable, called *demo_open*, that is one when a country already experiencing a democratization phase liberalizes its economy. Conversely, the variable *open_demo* captures events when one country, after liberalizing the economy, moves towards democracy. We proceed in the same way for all possible sequences of political and economic transitions, and end up with 8 mutually exclusive treatments. We consider as controls only the countries that did experience the first reform in the sequence, but did not start the second one.

In this way, we effectively isolate the impact of reforms on countries that are already benefiting from a past reform (that has not been reversed). Table 16 shows the results: economies that experience a democratization and then open up their markets see the probability of incurring into jumps in growth (either positive or negative) significantly reduced. Apparently, then, liberalizing the economy after democratization stabilizes the current growth regime, preventing swings in growth to happen. Conversely, economies that move to autocracy first, and then liberalize the economy, see their probability of incurring into a crisis reduced, but their probability of a positive jump in growth is unaffected. Becoming a democracy after liberalizing or closing up the economy does not affect the probability of a change in the growth regime, in either direction.

Another advantage of considering joint reforms consists in allowing us to better study the effect of *single* reforms. In Table 15, in fact, our results could have been driven not just by the treatment under consideration, but also by a subsequent and different reform taking place in the treatment period. We are now ready to control for this potential bias, restricting our analysis of political and economic reforms only to periods when only one reform is in place. We then compute the Average Treatment

effect on the Treated and obtain the results shown in Table 17. Democratization increases significantly the probability of experiencing a boom, while moves towards autocracy do not impact the probability of changing the growth regime. Economic liberalization has no significant effect either on the probability of a boom, or on the probability of a negative jump in growth. Moves towards autarky, in contrast, significantly depress the probability of growth accelerations, and increases the probability of slumps.

The results coming from Tables 16 and 17 can be easily compounded: democratization *per se* increases the probability of a boom (column 1 in Table 17); a subsequent liberalization (column 1 in Table 16) adds an insurance against falling into a crisis, but also hinders the chance of an additional acceleration. Interestingly, compounding the effects of democratization *per se* and subsequent liberalization gives an overall negative (insignificant) impact on the probability of boom. Persson and Tabellini (2006) provide estimates similar to ours of the compounded effect on yearly growth (they find a barely positive and insignificant overall impact).

Moves towards autocracy do not affect the probability of switching growth regime. Opening up the economy is again significant in lowering the probability of a negative jump if taken after moving to autocracy.

We have seen that liberalization does not have a significant impact on growth swings when taken alone, and that subsequent democratization does not alter regime-switch probabilities. We can then conclude that going democratic first and then opening up the economy is a better reform strategy than the reversed sequence. Giavazzi and Tabellini (2005) found that the best reform sequence to achieve a higher growth rate is to liberalize the economy first, and then move to democracy. Our findings suggest that

to increase the probability of a positive jump in long term growth what matters is going democratic first. Subsequently opening up the economy adds stability, but does not promote any further acceleration in growth.

Finally, closing up the economy has a negative and significant impact on the probability of booms, and subsequent democratization does not alter the chance of switching growth regime further.

The evidence set out above is striking, if we consider the growing anecdotal evidence on fast-growing, market-oriented countries whose government are far from democratic. But these anecdotes are limited to a few relatively large or resource-rich countries, such as China, Russia and some central-Asian economies. The south-east Asian tigers, with the exception of Taiwan, had either been always open in our time span (Thailand, in our sample), or have liberalized their economy during a period of relative democratization, as South Korea did.

5.4 A summary of results

Throughout the paper many results have been shown. To clarify our findings, it is better to collect them in a single picture. This is done in Table 18. In Columns (1)-(4) the dependent variable is the probability of a positive shift in growth. Democratization impacts positively and very significantly throughout the specifications. A move to autocracy has mixed results, and the Program Evaluation estimates indicate an insignificant positive relationship. Economic liberalization has a negligible and insignificant impact on booms; its sign changes when matching is employed. Moves

towards autocracy significantly depress the chance of an acceleration in growth. The evidence on other variables is more mixed and generally not significant.

Turning to economic slowdowns, it seems that political liberalization have a negative but insignificant impact on them. The same holds true for changes towards autocracy. Economic liberalization acts as an insurance in cross section and panel estimates, but the sign changes when more rigorous matching is adopted. Conversely, changes to autarky raise the threat of a growth collapse, and program evaluation yields moderately significant estimates. Other variables significance does not withstand the matching estimator.

6. Conclusion

Cross country and panel growth regressions usually consider continuous explanatory variables for yearly growth. We show that such "smooth" variables do not impact on a country's probability to change its longer-term growth regime.

We then turn to more "extreme reforms" indicators and find that they have a strong impact both on yearly growth and on the probability of growth regime changes. Their effects, though, are substantially different, depending on the investigated "horizon" of growth. Liberalization increases year on year growth, but apparently does not raise the probability of a boom; democratization does not influence smooth growth, but plays an important role in making future booms more likely.

A program evaluation approach allows to considerably reduce the potential bias due to self selection, heterogeneity and reverse causation when studying growth regime

changes. We find that big shifts towards democracy can be regarded as catalysers of prolonged economic expansion. Liberalization does not matter on growth jumps, but move to autarky increase the threat of a negative swing in growth.

We also find that the sequencing of reform matters and that it is advisable to promote democratization first, and then liberalize the economy, rather than implementing the opposite sequence.

In this paper we have found robust empirical evidence that the channels through which continuous and “extreme” determinants impact growth are different. The next step would be to understand what are the mechanisms behind each channel.

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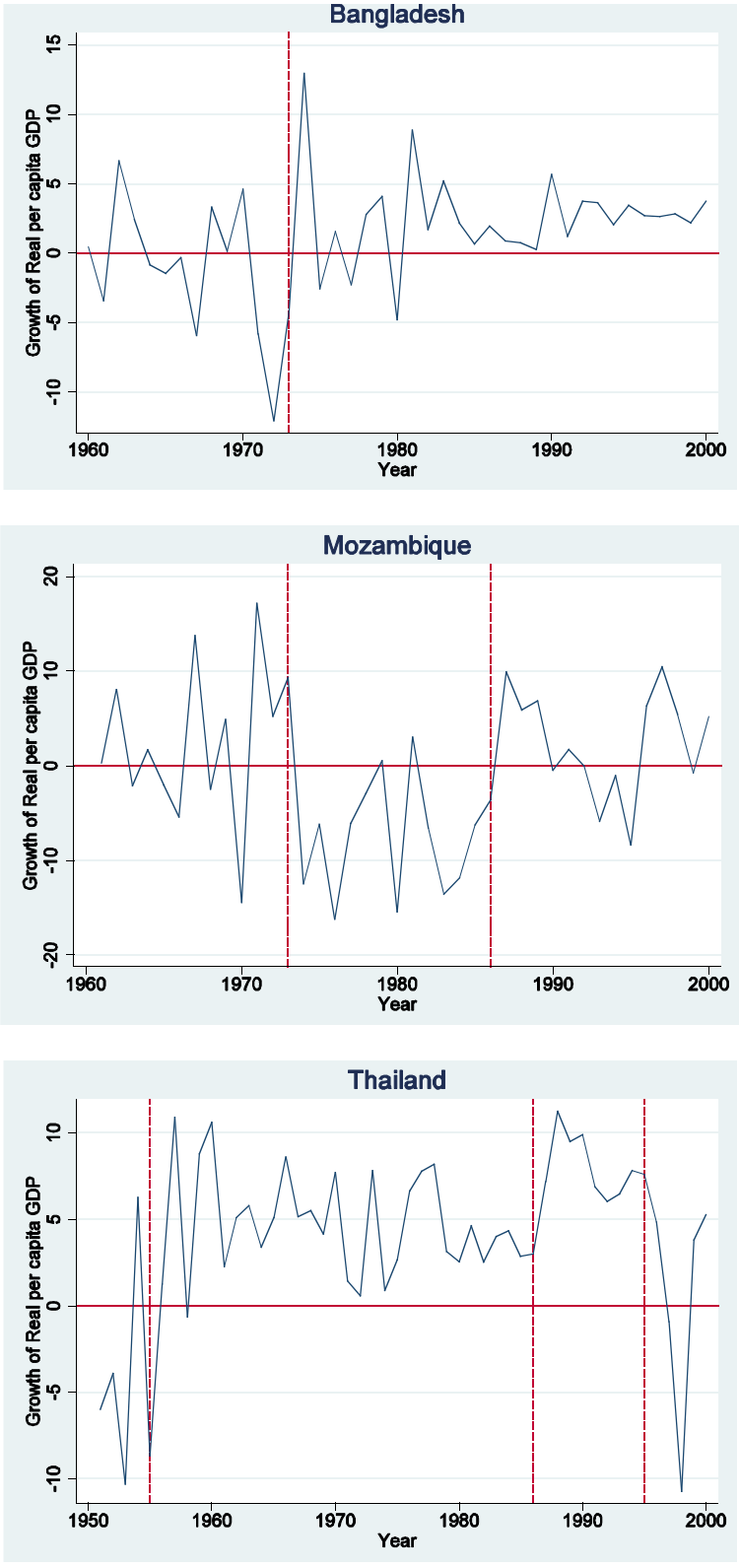
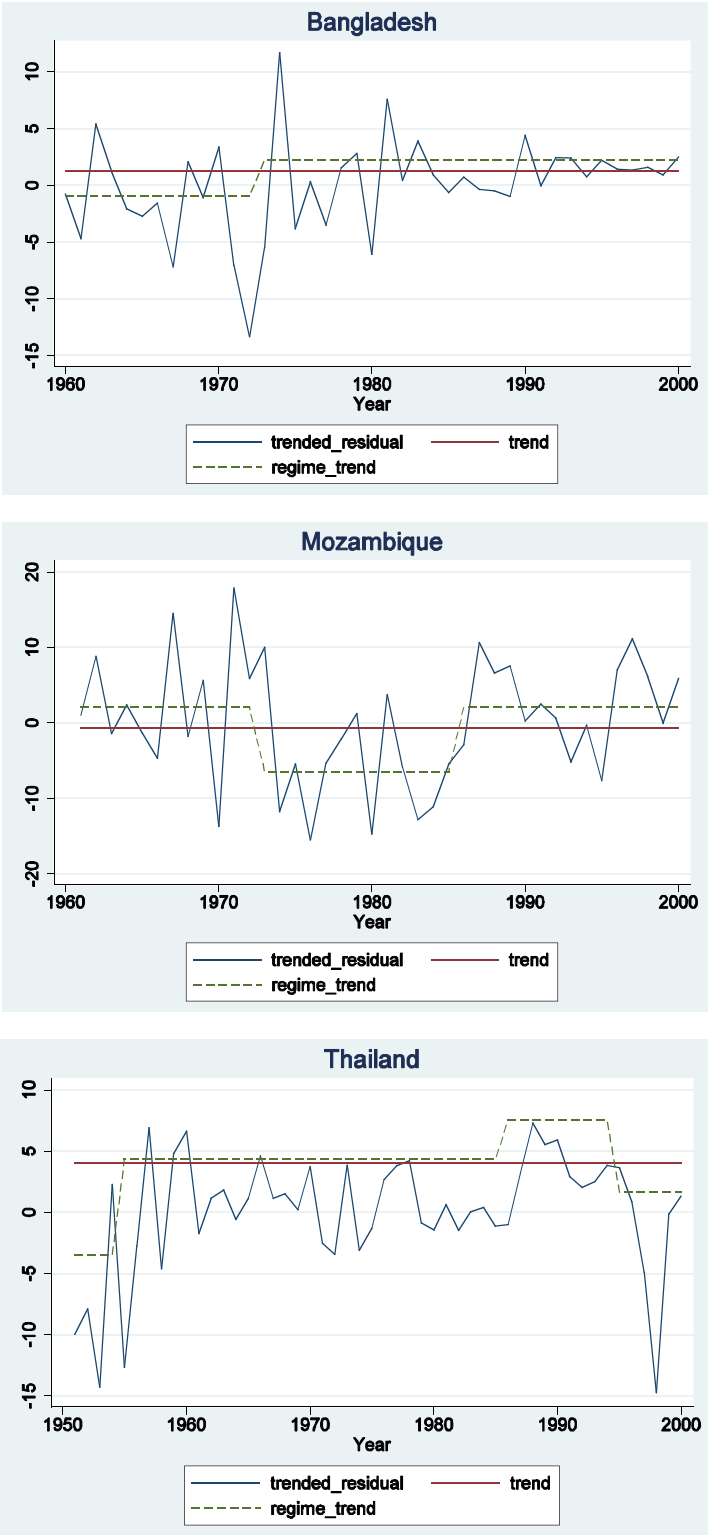
Figure 1: Growth series for a number of countries



Note: dashed lines denote breakpoints in the series.

Figure 2: Residuals behaviour around the breakpoints



Note: *trend* is the coefficient of the simple trend model; *regime trend* depicts the different coefficients from the breaking of the growth series at the estimated breakpoints. *Trended residuals* stands for residual from the simple trend regression.

Table 1: Length of each country growth series

country	starting year	ending year	sample length	country	starting year	ending year	sample length
Algeria	1967	2000	34	Kenya	1968	2000	33
Argentina	1955	2000	46	Korea, Repub	1958	1998	41
Australia	1955	2000	46	Madagascar	1965	2000	36
Austria	1955	1998	44	Malawi	1969	2000	32
Bangladesh	1977	2000	24	Malaysia	1962	2000	39
Belgium	1955	1996	42	Mali	1965	2000	36
Benin	1965	2000	36	Mauritania	1965	2000	36
Bolivia	1955	2000	46	Mauritius	1973	2000	28
Botswana	1971	2000	30	Mexico	1955	1996	42
Brazil	1955	1998	44	Morocco	1961	2000	40
Burkina Faso	1965	1998	34	Mozambique	1980	2000	21
Burundi	1967	2000	34	Nepal	1965	2000	36
Cameroon	1965	1996	32	Netherlands	1955	2000	46
Canada	1955	2000	46	New Zealand	1955	2000	46
Chad	1965	2000	36	Nicaragua	1955	1998	44
Chile	1956	2000	45	Niger	1965	2000	36
China	1957	1998	42	Nigeria	1965	2000	36
Colombia	1955	2000	46	Norway	1955	2000	46
Costa Rica	1955	2000	46	Pakistan	1955	2000	46
Cote d'Ivoir	1965	1998	34	Paraguay	1956	2000	45
Cyprus	1965	1997	33	Peru	1955	1999	45
Denmark	1955	2000	46	Philippines	1955	1996	42
Dominican Re	1956	2000	45	Poland	1975	1998	24
Ecuador	1956	1996	41	Portugal	1955	1996	42
Egypt	1955	1994	40	Rwanda	1966	2000	35
El Salvador	1955	1994	40	Senegal	1965	2000	36
Ethiopia	1955	2000	46	Sierra Leone	1966	1998	33
Finland	1955	1998	44	Singapore	1967	2000	34
France	1955	1998	44	South Africa	1955	1998	44
Gabon	1965	2000	36	Spain	1955	1998	44
Ghana	1965	2000	36	Sri Lanka	1955	2000	46
Greece	1956	1998	43	Sweden	1956	1998	43
Guatemala	1955	1996	42	Switzerland	1955	1998	44
Guinea	1964	2000	37	Syria	1966	2000	35
Guyana	1971	2000	30	Taiwan	1956	1999	44
Haiti	1965	1995	31	Tanzania	1966	2000	35
Honduras	1955	2000	46	Thailand	1955	1996	42
Hungary	1975	2000	26	Togo	1965	2000	36
India	1955	2000	46	Tunisia	1966	1996	31
Indonesia	1965	1996	32	Turkey	1955	2000	46
Iran	1960	1996	37	U.K.	1955	2000	46
Ireland	1955	1998	44	U.S.A.	1955	2000	46
Israel	1955	2000	46	Uganda	1967	1999	33
Italy	1955	1998	44	Uruguay	1955	2000	46
Jamaica	1964	1997	34	Venezuela	1955	1998	44
Japan	1957	1994	38	Zambia	1969	2000	32
Jordan	1959	2000	42	Zimbabwe	1975	2000	26

Table 2: Estimated break points

Positive breaks				Negative breaks					
country	**year**	**country**	**year**	**country**	**year**	**country**	**year**	**country**	**year**
Bangladesh	1973	Iran	1981	Austria	1974	Hungary	1979	Poland	1980
Belgium	1958	Ireland	1994	Belgium	1974	Indonesia	1996	Portugal	1973
Botswana	1966	Japan	1959	Brazil	1980	Iran	1976	Romania	1985
Burkina Faso	1966	Korea, Republic of	1962	Cameroon	1987	Italy	1974	South Africa	1981
Cameroon	1993	Luxembourg	1983	Congo, Dem. Rep.	1974	Jamaica	1972	Spain	1974
China	1978	Mauritius	1960	Cote d'Ivoire	1979	Jamaica	1976	Sweden	1970
Ecuador	1971	Mexico	1995	Ecuador	1977	Japan	1970	Switzerland	1973
Egypt	1975	Mozambique	1986	Egypt	1970	Japan	1991	Thailand	1995
El Salvador	1983	Papua New Guinea	1991	Egypt	1980	Mexico	1981	Tunisia	1972
El Salvador	1991	Philippines	1986	El Salvador	1978	Mozambique	1973	Venezuela	1970
Equatorial Guinea	1995	Portugal	1966	Equatorial Guinea	1974	Nicaragua	1977	Zambia	1964
Guatemala	1955	Thailand	1955	Finland	1973	Papua New Guinea	1994	Zimbabwe	1976
Guatemala	1987	Thailand	1986	France	1973	Philippines	1956		
Haiti	1991	Tunisia	1967	Greece	1973	Philippines	1981		
Indonesia	1967			Guatemala	1980	Poland	1977		

Total positive breaks: 29
Asia 10
Africa 8
South America 7
Europe 4
Developing countries 20
Developed countries 9

Total negative breaks: 42
Asia 8
Africa 11
South America 9
Europe 14
Developing countries 24
Developed countries 18

Grand total: 71

Table 3: Number of positive and negative outcomes for dependent and explanatory variables

	positive outcome	negative outcome
Positive jump in growth	109	3667
Negative jump in growth	171	3605
Democratization	326	3450
Move to autocracy	191	3585
Economic liberalization	348	3330
Move to autarky	80	3598
Exchange rate depreciation shock	369	3407
Exchange rate appreciation shock	282	3494
Death of leader	49	3727
Conflict	390	3379
Leader's average tenure at death	10.06	
N	3776	

Table 4: Number of positive and negative outcomes for each regressor, conditional on jumps in growth.

	Positive jumps		Negative jumps	
	positive outcome	**negative outcome**	**positive outcome**	**negative outcome**
Democratization	25	84	8	163
Move to autocracy	4	105	6	165
Economic liberalization	7	98	0	169
Move to autarky	0	105	4	165
Exchange rate depreciation shock	9	100	10	161
Exchange rate appreciation shock	9	100	27	144
Death of leader	2	107	4	167
Conflict	27	82	29	142
Leader's average tenure at death	20.02		12.4	
N	109		171	

Table 5: Linear probability model of a growth regime change on economic and political liberalizations

	positive jumps	negative jumps
	(1)	(2)
Democratization	0.064***	-0.011
	(0.009)	(0.011)
Move to autocracy	-0.005	-0.031**
	(0.011)	(0.015)
Economic liberalization	-0.012	-0.023*
	(0.009)	(0.012)
Move to autarky	-0.037**	0.019
	(0.019)	(0.024)
N	3678	3678
Adjusted R-squared	0.013	0.049

Note: Standard errors in parenthesis
*Significant at 10%; ** significant at 5%; ***significant at 1%

Table 6: Pooled logit

	Booms			Crises		
	(1)	(2)	(3)	(4)	(5)	(6)
Democratization	1.590***	1.687***	1.687***	-0.173	-0.132	-0.174
	(0.262)	(0.269)	(0.301)	(0.322)	(0.323)	(0.345)
Move to autocracy	-0.599	-0.633	-0.709	-0.639	-0.755	-0.775
	(2.285)	(2.293)	(576109)	(0.882)	(0.909)	(0.751)
Economic liberalization	-0.217	-0.214	-0.339	-17.76***	-16.95***	-17.78***
	(0.705)	(0.734)	(0.674)	(0.486)	(0.473)	(0.478)
Move to autarky	-17.69***	-17.97***	-18.10	-0.196	0.158	0.396
	(0.569)	(0.632)	(2279247)	(2.257)	(2.375)	(2.407)
Exchange rate depreciation shock	-0.367	-0.340	-0.368	-0.567	-0.596	-0.593
	(0.432)	(0.422)	(0.474)	(0.363)	(0.385)	(0.400)
Exchange rate appreciation shock	0.0176	0.00509	0.0623	0.754***	0.714***	0.662***
	(0.888)	(0.911)	(0.830)	(0.229)	(0.236)	(0.255)
Death of leader	-0.528	-0.599	-0.874	-0.201	-0.244	-0.325
	(0.514)	(0.518)	(0.733)	(0.603)	(0.616)	(0.666)
Tenure at leader death	0.0597***	0.0739***	0.101***	0.00676	0.00004	0.00725
	(0.0203)	(0.0213)	(0.0376)	(0.0503)	(0.0461)	(0.0506)
Real percapita GDP growth	0.0111	0.0116	-0.0782	-0.0304*	-0.0265*	0.0840
	(0.0165)	(0.0179)	(10309)	(0.0171)	(0.0161)	(4197)
Rest of world growth	-0.0004	0.0006	-0.0912	0.002***	-0.00007	0.111
	(0.0008)	(0.001)	(10309)	(0.0008)	(0.0008)	(4197)
POLITY2 score	-0.0538***	-0.0563***	-0.0522***	-0.0508***	-0.0348***	-0.0310**
	(0.0179)	(0.0181)	(0.0192)	(0.0133)	(0.0133)	(0.0145)
Developing country	0.513*	0.566**	0.676**	-0.331	-0.226	-0.188
	(0.272)	(0.281)	(0.307)	(0.207)	(0.219)	(0.233)
Ldc	-1.368***	-1.252***	-1.328***	-18.37***	-18.08***	-17.98***
	(0.386)	(0.382)	(0.391)	(0.672)	(0.351)	(0.483)
Conflict	0.974***	0.994***	1.020***	0.604**	0.520**	0.548**
	(0.278)	(0.287)	(0.307)	(0.239)	(0.251)	(0.264)
Constant	-3.988***	-4.449***	-9.648	-2.956***	-3.588***	-37.13
	(0.262)	(0.440)	(1648268)	(0.222)	(0.331)	(1042297)
Observations	3653	3653	3653	3653	3653	3653
Pseudo R-squared	0.110	0.133	0.163	0.113	0.196	0.250

Note: (1) and (4) baseline regressions. (2) and (5) with decade fixed effects. (3) and (6) with year fixed effects. Bootstrapped standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 7: Pooled logit dropping perfect predictors

	Booms			Crises		
	(1)	(2)	(3)	(4)	(5)	(6)
Democratization	1.315***	1.427***	1.453***	-0.524	-0.402	-0.475
	(0.262)	(0.273)	(0.251)	(0.346)	(0.350)	(0.335)
Move to autocracy	-0.930*	-0.961*	-1.053**	-0.123	-0.318	-0.334
	(0.560)	(0.566)	(0.486)	(0.349)	(0.365)	(0.326)
Economic liberalization	-0.252	-0.251	-0.374			
	(0.461)	(0.464)	(0.431)			
Move to autarky				0.210	0.606	0.863
				(0.602)	(0.605)	(0.572)
Exchange rate depreciation shock	-0.356	-0.349	-0.369	-0.527	-0.529	-0.549
	(0.417)	(0.416)	(0.375)	(0.359)	(0.371)	(0.356)
Exchange rate appreciation shock	0.036	0.027	0.058	0.874***	0.841***	0.781***
	(0.403)	(0.422)	(0.426)	(0.225)	(0.232)	(0.250)
Death of leader	-0.379	-0.444	-0.354	0.584	0.783	0.693
	(0.692)	(0.694)	(0.817)	(0.637)	(0.676)	(0.627)
Tenure at leader death	0.048***	0.059***	0.071***	-0.001	-0.014	-0.009
	(0.017)	(0.018)	(0.019)	(0.035)	(0.036)	(0.024)
Real percapita GDP growth	0.008	0.007	0.008	-0.020	-0.014	-0.011
	(0.018)	(0.019)	(0.019)	(0.016)	(0.015)	(0.015)
Rest of world growth	-0.000	0.001	0.000	0.003***	-0.000	0.001
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
POLITY2 score	-0.052***	-0.055***	-0.054***	-0.037***	-0.017	-0.012
	(0.018)	(0.018)	(0.018)	(0.014)	(0.015)	(0.014)
Developing country	0.512*	0.554**	0.625**	-0.632***	-0.532**	-0.512**
	(0.272)	(0.276)	(0.266)	(0.224)	(0.240)	(0.227)
Ldc	-1.328***	-1.226***	-1.303***			
	(0.376)	(0.376)	(0.355)			
Conflict	0.966***	0.989***	0.993***	0.640***	0.585**	0.653***
	(0.272)	(0.280)	(0.255)	(0.230)	(0.239)	(0.234)
Constant	-3.956***	-4.412***	-4.834***	-3.171***	-3.904***	-2.284***
	(0.255)	(0.439)	(0.698)	(0.235)	(0.338)	(0.377)
Observations	3653	3653	3391	3653	3653	2869
R-squared	0.093	0.114	0.130	0.039	0.129	0.130

Note: (1) and (4) baseline regressions. (2) and (5) with decade fixed effects. (3) and (6) with year fixed effects. Bootstrapped standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 8: Multinomial logit

	Positive jumps (1)	Negative jumps (2)
Democratization	1.283***	-0.441
	(0.260)	(0.354)
Move to autocracy	-0.921	-0.288
	(3.478)	(0.348)
Economic liberalization	-0.338	-33.800***
	(1.230)	(2.027)
Move to autarky	-33.851***	-0.289
	(1.982)	(4.674)
Exchange rate depreciation shock	-0.384	-0.576
	(0.418)	(0.358)
Exchange rate appreciation shock	0.137	0.755***
	(1.630)	(0.229)
Death of leader	-0.585	-0.224
	(0.509)	(0.613)
Tenure at leader death	0.065***	0.013
	(0.020)	(0.052)
Real percapita GDP growth	0.006	-0.030*
	(0.018)	(0.017)
Rest of world growth	-0.0002	0.003***
	(0.0008)	(0.0008)
POLITY2 score	-0.053***	-0.049***
	(0.018)	(0.013)
Developing country	0.536*	-0.280
	(0.278)	(0.207)
Ldc	-1.442***	-34.424***
	(0.384)	(2.061)
Conflict	1.002***	0.677***
	(0.280)	(0.239)
Constant	-3.883***	-2.930***
	(0.257)	(0.223)
Observations	3653	
Pseudo R-squared	0.109	
Log likelihood	-1026.072	

Note: Bootstrapped standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 9: Panel fixed effects

	Positive jumps			Negative jumps		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Democratization	2.258*	2.492*	2.915***	0.105	-0.283	-0.415
	(1.237)	(1.436)	(0.459)	(0.538)	(0.531)	(0.436)
Move to autocracy	-0.273	0.524	0.479	-0.792	-1.024	-0.914*
	(4.547)	(4.519)	(0.676)	(2.149)	(2.246)	(0.553)
Economic liberalization	-0.429	-0.504	-0.663	-16.36***	-15.46***	-16.99
	(1.614)	(1.649)	(0.494)	(0.787)	(1.051)	(1408)
Move to autarky	-14.52***	-13.72***	-16.95	-0.38	-0.156	0.556
	(2.055)	(2.446)	(1672)	(8.083)	(7.545)	(0.945)
Exchange rate depreciation shock	0.327	0.243	0.622	-0.377	-0.525	-1.001
	(3.276)	(3.187)	(0.528)	(3.198)	(3.192)	(0.651)
Exchange rate appreciation shock	-1.568	-1.651	-2.050**	0.502	0.627	0.396
	(3.391)	(3.542)	(0.797)	(0.451)	(0.464)	(0.413)
Death of leader	-6.583	-8.199	-8.521***	-0.604	-0.596	-0.688
	(45)	(43.97)	(2.97)	(17.23)	(12.78)	(0.585)
Tenure at leader death	0.564	0.755	0.780***	0.0603	0.036	0.0384
	(3.603)	(3.504)	(0.217)	(1.07)	(1.339)	(0.035)
Real percapita GDP growth	-0.0228	-0.0266	-0.028	-0.0466*	-0.0442	-0.0334
	(0.034)	(0.038)	(0.029)	(0.026)	(0.03)	(0.023)
Rest of world growth	-0.0013	0.0007	-0.0004	0.0029**	-0.0002	0.0015
	(0.001)	(0.002)	(0.003)	(0.001)	(0.0009)	(0.001)
POLITY2 score	-0.0943	-0.1	-0.104**	-0.135**	-0.0993	-0.0775**
	(0.098)	(0.12)	(0.045)	(0.057)	(0.063)	(0.032)
Conflict	0.574	0.754	0.879**	0.61	0.485	0.618*
	(1.029)	(1.237)	(0.41)	(0.512)	(0.493)	(0.359)
Observations	809	809	809	1271	1271	1271
Number of countries	20	20	20	31	31	31
Log-Likelihood	-224.336	-208.909	-188.301	-383.260	-325.098	-286.618

Note: (1) and (4) baseline regressions. (2) and (5) with decade fixed effects. (3) and (6) with year fixed effects. Bootstrapped standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 10: Panel fixed effects - dropping perfect predictors

	Positive jumps			Negative jumps		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Democratization	2.344***	2.584***	2.973***	0.194	-0.204	-0.311
	(0.384)	(0.402)	(0.452)	(0.369)	(0.410)	(0.425)
Move to autocracy	-0.061	0.702	0.766	-0.782	-0.968*	-0.890
	(0.613)	(0.632)	(0.671)	(0.484)	(0.515)	(0.544)
Economic liberalization	-0.298	-0.304	-0.441			
	(0.438)	(0.465)	(0.498)			
Move to autarky				-0.250	-0.002	0.810
				(0.594)	(0.740)	(0.927)
Exchange rate depreciation shock	0.290	0.228	0.711	-0.508	-0.608	-1.053*
	(0.474)	(0.505)	(0.537)	(0.505)	(0.553)	(0.638)
Exchange rate appreciation shock	-1.087**	-1.149**	-1.389**	0.530*	0.595*	0.401
	(0.518)	(0.537)	(0.598)	(0.285)	(0.347)	(0.412)
Death of leader	-0.695	-1.013	-0.953	0.715	1.134	0.971
	(0.878)	(0.890)	(1.046)	(0.665)	(0.761)	(0.810)
Tenure at leader death	0.159***	0.213***	0.241***	0.019	-0.003	-0.002
	(0.034)	(0.038)	(0.040)	(0.025)	(0.029)	(0.030)
Real percapita GDP growth	-0.031	-0.037	-0.043	-0.058***	-0.048**	-0.038
	(0.025)	(0.026)	(0.029)	(0.021)	(0.023)	(0.024)
Rest of world growth	-0.001	0.001	0.001	0.003***	-0.000	0.001
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
POLITY2 score	-0.096***	-0.098**	-0.104**	-0.147***	-0.105***	-0.096***
	(0.034)	(0.038)	(0.042)	(0.027)	(0.031)	(0.032)
Conflict	0.513	0.648*	0.740*	0.616**	0.442	0.534
	(0.334)	(0.355)	(0.389)	(0.294)	(0.327)	(0.349)
Observations	809	809	809	1271	1271	1271
Number of groups	20	20	20	31	31	31
Log-likelihood	-235.72	-222.85	-202.33	-400.24	-332.51	-239.96

Note: (1) and (4) baseline regressions. (2) and (5) with decade fixed effects. (3) and (6) with year fixed effects. Bootstrapped standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 11: "Extreme policies" on smooth growth

	Linear model on smooth growth - pooled OLS	Linear model on smooth growth - panel fixed effects
Democratization	-0.245 (0.372)	-0.439 (0.394)
Move to autocracy	0.252 (0.440)	0.477 (0.561)
Economic liberalization	0.981*** (0.242)	1.088*** (0.274)
Move to autarky	-0.0970 (0.629)	0.729 (0.704)
Exchange rate depreciation shock	-0.942*** (0.284)	-0.553 (0.355)
Exchange rate appreciation shock	-0.0620 (0.221)	-0.390 (0.293)
Death of leader	0.424 (0.455)	0.720 (0.648)
Tenure at leader death	-0.0163 (0.0274)	-0.0586 (0.0362)
Rest of world growth	0.0088*** (0.0009)	0.009*** (0.0009)
POLITY2 score	-0.0308* (0.016)	-0.0019 (0.041)
Developing country	-1.358*** (0.209)	
Ldc	-1.435*** (0.343)	
Conflict	-1.270*** (0.383)	-1.631*** (0.494)
Constant	1.733*** (0.221)	0.673*** (0.232)
Observations	3653	3653
R-squared	0.071	0.049

Note: Bootstrapped standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 12: "Smooth policies" on growth jumps

	(1)	(2)	(3)	(4)
	Positive jumps – pooled	**Positive jumps – panel fixed effects**	**Negative jumps – pooled**	**Negative jumps – panel fixed effects**
Polity2	-.040**	-.023	-.024	-.078
	(.016)	(.136)	(.015)	(.106)
Diffpolity2	.096***	.125	.010	.020
	(.027)	(.077)	(.015)	(.041)
Openness	-.012**	-.034	-.006***	-.001
	(.005)	(.041)	(.002)	(.033)
Exchange rate change	-.0004	.031	-.067	-.048
	(.039)	(.127)	(.187)	(.934)
Leader_death	.905	-6.860	-.422	-.621
	(.758)	(68.350)	(.623)	(24.022)
Leader death * tenure	.099***	.632	.010	.025
	(.030)	(5.625)	(.039)	(.679)
Growth	.001	-.032	-.025	-.037
	(.021)	(.043)	(.016)	(.024)
Developing country	.739***		-.263	
	(.250)		(.240)	
LDC	-1.462***		-18.008***	
	(.410)		(.453)	
Conflict	.881***	.913	.414*	.454
	(.277)	(1.309)	(.245)	(.684)
Constant	-2.799		-3.172	
	(6.610)		(7.737)	
N	3751	825	3751	1300
Groups		20		31
Pseudo R2	.133		.234	
Log Likelihood		-213.109		-303.251

Note: Bootstrapped standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. *Growth* is yearly real per capita GDP growth; *openness* is the ratio of the sum of exports and imports over GDP at current prices. *Diffpolity2* is the 5-year difference in the polity2 index. Growth and openness data are taken from the Penn World Table, version 6.1. The polity2 score is taken from the Polity2 dataset.

Table 13: Propensity scores estimation

	(1)	(2)	(3)	(4)
	Democratization	**autocracy**	**opening**	**closing**
Economic liberalization	0.427***	-0.122		
	(0.0803)	(0.118)		
Move to autarky	-0.170	-0.080		
	(0.201)	(0.198)		
Exchange rate depreciation shock	0.867***	0.976***		-0.216*
	(0.087)	(0.098)		(0.122)
Exchange rate appreciation shock	-0.538***	0.020		-0.396**
	(0.118)	(0.161)		(0.195)
Death of leader	0.0067	-0.019**		-0.071**
	(0.007)	(0.009)		(0.032)
Tenure at leader death			-0.095	
			(0.101)	
Real percapita GDP growth		-0.0002		-0.020***
		(0.005)		(0.006)
Rest of world growth	-0.001***	-0.0008***		
	(0.0003)	(0.0003)		
POLITY2 score			0.079***	0.033***
			(0.003)	(0.005)
real per capita GDP		-0.0001***		
		(0.00001)		
Change in the real exchange rate			0.0006	
			(0.0004)	
Conflict	0.2833			0.458***
	(0.089)			(0.096)
Constant	-0.636***	-0.353***	-0.499***	-1.193***
	(0.051)	(0.067)	(0.027)	(0.043)
Observations	2928	2679	3143	2199
Pseudo R2	.062	.156	.155	0.058
Log-likelihood	-1510	-1023	-1763	-747.4

Note: Bootstrapped standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 14: log likelihood tests for unmatched and matched samples

	Treatments							
	Democratization		Autocracy		Opening		Closing	
	(1)		(2)		(3)		(4)	
	Pseudo R2	Log-likelihood test	Pseudo R2	Log-likelihood test	Pseudo R2	Log-likelihood test	Pseudo R2	Log-likelihood test
Unmatched	0.062	198.92	0.156	378.51	0.155	645.62	0.058	91.25
Matched	0.001	1.33	0.007	8.96	0.000	1.05	0.003	1.97

Table 15: ATT estimation

Outcome	Treatments						
	Propensity score matching (kernel matching, Normal density)				Simple diff-in-diff		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Democratization	Move to autocracy	Economic liberalization	Move to autarky	Appreciation shock	Depreciation shock	Leader death
Positive jump	0.029***	0.022**	0.007	0.018	0.393	-0.338	0.454
	(0.008)	(0.011)	(0.005)	(0.012)	(1.69)	(0.764)	(1.603)
Negative jump	-0.022***	0.008	0.002	0.056***	0.097	-0.263	-0.397
	(0.008)	(0.011)	(0.009)	(0.019)	(0.553)	(0.871)	(1.262)
N Treated	699	450	1191	257	352	397	204
N Control	2196	1591	1863	1846	2608	2616	3196

Note: Bootstrapped standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 16: Studying the sequence of reform

Outcome	Treatments			
	(1)	(2)	(3)	(4)
	Opening after democratization	**Democratization after opening**	**Democratization after closing**	**Opening after move to autocracy**
Positive jump	-0.041 (0.018)**	0.009 (0.015)	0.052 (0.059)	0.016 (0.030)
Negative jump	-0.032 (0.011)***	-0.015 (0.017)	-0.043 (0.037)	-0.047 (0.015)***
N. Treated	180	140	40	73
N. Control	408	1014	124	317

Note: Bootstrapped standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 17: Program evaluation - single reforms

Outcome	Treatment			
	Propensity score matching (kernel matching, Normal density)			
	(1) Democratization	**(2) Move to autocracy**	**(3) Economic liberalization**	**(4) Move to autarky**
Positive jump	0.037*** (0.013)	0.009 (0.011)	0.005 (0.005)	-0.020*** (0.003)
Negative jump	-0.013 (0.012)	-0.006 (0.011)	0.016 (0.011)	0.040* (0.020)
N Treated	345	327	782	182
N Control	2143	1423	1863	1825

Bootstrapped standard errors in parenthesis.

* significant at 10%; ** significant at 5%; *** significant at 1%

Note: Bootstrapped standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 18: summary of results

	Booms				Crises			
	Pooled logit	**Multinomial logit**	**Panel FE**	**Program Evaluation**	**Pooled logit**	**Multinomial logit**	**Panel FE**	**Program Evaluation**
Democratization	1.687***	1.283***	2.973***	0.037***	-0.174	-0.441	-0.311	-0.013
	(0.301)	(0.260)	(0.452)	(0.013)	(0.345)	(0.354)	(0.425)	(0.012)
Move to autocracy	-0.709	-0.921	0.532	0.009	-0.775	-0.288	-0.890	-0.006
	(57.610)	(3.478)	(0.671)	(0.011)	(0.751)	(0.348)	(0.544)	(0.011)
Economic liberalization	-0.339	-0.338	-0.441	0.005	-17.78***	-33.800***		0.016
	(0.674)	(1.230)	(0.498)	(0.005)	(0.478)	(2.027)		(0.011)
Move to autarky	-18.10	-33.851***		-0.020***	0,275	-0.289	0,5625	0.040*
	(22.79)	(1.982)		(0.003)	(2.407)	(4.674)	(0.927)	(0.020)
Exchange rate depreciation shock	-0.368	-0.384	0.494	-0.338	-0.593	-0.576	-1.053*	-0.263
	(0.474)	(0.418)	(0.537)	(0.764)	(0.400)	(0.358)	(0.638)	(0.871)
Exchange rate appreciation shock	0,433	0,095	-1.389**	0,273	0.662***	0.755***	0,278	0.097
	(0.830)	(1.630)	(0.598)	(1.69)	(0.255)	(0.229)	(0.412)	(0.553)
Death of leader	-0.874	-0.585	-0.953	0.315	-0.325	-0.224	0.674	-0.397
	(0.733)	(0.509)	(1.046)	(1.603)	(0.666)	(0.613)	(0.810)	(1.262)

Chapter 2: Contagious effect in growth structural breaks

Deana Gabriele

Abstract

Previous work (Deana and Gamba, 2008) underlines the country specific determinants of structural breaks in long run growth. Nothing was said about the possibility of a contagious effect. In this paper I try to identify the presence of a contagious effect and through which channels it works: geography, trade flows or economic dimensions. Interesting are the results: a structural breaks abroad increases the probability that a similar event occurs and that trade is the main channel for negative shock, while geography is a key determinant only for positive breaks.

1. Introduction

In the last decades, countries experimented large negative swings in growth series, and often these events occurred in closer years. This can suggest the presence of a sort of contagious effect. The existence of this effect, and how it eventually works, is not clear.

Previous literature (Deana and Gamba 2008; Hausmann, Pritchet and Rodrick 2004) underlines the role of institutions and economic policy in breaks of long run growth, while nothing was done to explore the possibility of contagious effect in general, and the role played by other countries. This work tries to fill this gap. Starting from Deana and Gamba (2008) results on structural breaks, detected with Bai and Perron methodology, I implement them exploring possible links and channels with other countries and getting some interesting and significant results.

I regress break indicator on political, policy and shock variables both of country specific and of weighted neighbors. I try different specifications for the weight given to abroad countries: I adopt a geographic and economic principles, to explore all possible channels linking different countries. Each of different weight suggests possible channels of transmission of structural breaks. To avoid problems due to unknown variables affecting contemporaneously the probability of a break in different countries, I use the predicted values of structural breaks abroad, estimated in Deana and Gamba (2008). The main findings are that the previous results are confirmed, and the breaks are affected by what happens in other countries.

The trade flows is the main channel through the negative breaks can affect the abroad probability of a similar shock, while geographical proximity matters for contagious effect of positive break.

Section 3 describes how the independent variables of neighbor countries are constructed, and the different weights used. In section 4 I provide the dataset composition, and some descriptive statistics on the dependent variables employed. Section 5 describes the results of my regressions, based on different weights of abroad variables. Section 6 concludes.

2. Detecting in growth series

The intuition behind my analysis is that there is not a single trend in growth series for a given country, but "multiple regimes" can be detected. These "regimes" are associated with different average growth across time. Deana and Gamba (2008) identify these structural breaks in lung run growth, using Bai and Perron (1998, 2003) methodology. It minimizes the global sum of squared residuals of the model resulting from the split of a series according to the detached breaks. Implementing a Monte Carlo experiment, Jones and Olken (2007) test the performance of this procedure on small samples. Over a time span of 40 years, allowing for autocorrelation and structural mean shifts of different sizes, the methodology developed by Bai and Perron is "conservative in detecting breaks, capturing only major accelerations and collapse".

Deana and Gamba (2008) adopt this methodology to detect breaks in the growth series of all countries in the Penn World Table with at least 20 observations. They detected 71 breaks, 29 positive and 49 negative, for 183 country growth series: the breaks occurred in both developing and developed countries in all continents as shown in Table A.

Once identified the breaks, Deana and Gamba use different econometric methodology to identify the determinants. Starting from their results of panel analysis, I implement them taking into consideration the effects of other countries on the probability to have a negative breaks. In this way I try to address the question (i) if a break abroad can affect the country probability of experimenting the same event, (ii) if the same determinants of a country break has a role in for others, and (iii) through which channels they work.

3. Methodology

To evaluate the possible contagious effect on the probability of a negative break, I start from the baseline probit regression of Deana and Gamba (2008):

$$y_{i,t} = \beta_1 democratizazion_{i,t} + \beta_2 autocracy_{i,t} + \beta_3 liberalization_{i,t} + \beta_4 autarky_{i,t} + \beta_5 appreciation_{i,t} + \beta_6 depreciation_{i,t} + \beta_7 leader\_death_{i,t} + \beta_8 death * tenure_{i,t} + \gamma Z_{i,t} + \epsilon_{i,t}$$

where the dependent variable is the break indicator of positive and negative structural breaks, estimated with Bai and Perron methodology, and its regressed on political and economic determinants.

To appoint the main question of this paper, I follow different steps. First of all, since I believe in the previous specification, adding other explanatory variables I expect that the determinants don't change their significant level and the magnitude of their coefficients. This means that the previous results are robust and confirmed, even if the additional variables may highlight other possible determinants of structural breaks.

In a first step I use the predicted value of breaks abroad:

$$predicted\ break_{i,t}\_w_{i,t} = \sum_{j \neq t}^{T} predicted\ break_{j,t}\_w_{i,t}$$

where $predicted\ break_{i,t}\_w_{i,t}$ is the estimated variable for structural shock of a country *j* at time *t*, and $\omega_{j,t}$ is the country specific weight. I construct two different variables, one for positive breaks and one for negative ones: *Estimated Positivebreak_w* and *Estimated Negativebreak_w*. The estimated values came from the baseline regression: I use them, instead of the value of the break (a dummy variable). These variables catch only the country specific components of a break, not considering unknown determinants. In this way my results are not biased by the presence of any common factors affecting the probability of positive and negative breakdown not caught by my specification (eg oil shock, green revolution or internet revolution): they could lead to endogeneity and contemporaneous problems. .

5.1 Different weights

Constructing the abroad variables, both for positive and negative breaks, I use different principles for the weights: geographically, trade and economic dimensions. Highlighting different aspects, these principles can be possible transmission channels of the contagious effect.

As first step I restrict the analysis to neighbor countries following the COW (Correlates of War) proximity dataset. If the borders of a country *j* are within 150 kilometers from any *i*'s borders, I define country *j* neighbor to *i*, and $\omega_{j,t}$ is equal to 1, otherwise 0. According to this definition of neighboring, Italy is closed to France, Switzerland, Slovenia Libya, Austria, Albania, Greece and Tunisia, and only these states can have effects on its probability of a negative shock. In this way I don't give different weight to each country, but I just suppose that only the geographical neighbors matter: the mobility cost increase with distance, and that it can inhibit the exchange of people, ideas and goods between different countries. I try different specification for the threshold distance, getting consistent results. At the end I chose 150 kilometers as measure since a lower one should drop many observations. Indeed, choosing an other threshold for distance (ex. 25 kilometers), islands like Australia, New Zealand or Cuba should not have any neighbor countries, reducing the sample. In this way the maximum number of neighbors is 29, while only two countries, Australia and New Zeland, have only 1 neighbor.

In a second moment I shift from a “proximity” measure based on geography to another one based on the trade exchange, taken by COW dataset on trade: it reports the trade flows, imports and exports, of a country with all others. The underline assumption

is that trade between two countries can be considered a good proxy for the links connecting them: not only in terms of exchange of goods and people, but also for innovations and ideas. These could be possible channels through which the probability of negative break can be influenced. Therefore geographical proximity doesn't take into account that countries can be closed each others for political reasons, without any type of exchange or link: even if separated by a great physical distance, almost until eighties West Europe was considered closer to USA than East Europe. In this specification $\omega_{j,t}$ is equal to the ratio between the sum of imports and exports of country *j* with *i*, over the total trade of country *i*: it should catch the relative importance in trade flows of country *j* for *i.*

As weight I finally use the ratio of economy dimension of country *j* over *i.* It takes into consideration the dimension of the economy of a countries, and its relative importance. A bigger county should have a greater role than a smaller one over the economy of a country: I can suppose that a break in Haiti has a very small effect on the probability of USA of experimenting a break, while the contrary could be.

Figures 1-2 show the different behaviors of the variable *negative_breaks_w* according to different weights. In Figure 1, when the geographical principle is considered, just the neighbors' shock matters, taken value 1. In Figure 2 all the breaks get a positive value, but with a very different weight according to the relative importance of bilateral trade flows

4. Dataset construction

I start from the breakpoints estimated through Bai and Perron methodology, reported in Table A. I construct two dummy variables that assume value 1 in the five-year interval centered around the year when a break has been detected, otherwise zero. One dummy captures a positive break, the other a negative one in the long run economic growth. I use Deana and Gamba (2008) 's probit regression as baseline: the break variables constructed are regressed on political, economic and external covariates, to evaluate their impact on the probability of experiencing a positive or negative shock.

Economic variables are based on exchange rate change, as reported in Penn World Table: they are defined as dummy variable that takes value 1 whenever the change in the exchange rate with respect to the preceding 5 year falls in the upper decile of the changes experienced by all countries. In the same way, a negative shock in the exchange rate if the 5 year change falls in the lowest decile. The political shock variable is taken from Jones and Olken (2002): it is a dummy variable taking value 1 in the four years following the death of a political leader if it is due to exogenous factors (accident, age or illness). This dummy is also interacted with the regime length, the years that the leader had been in power.

Economic policy variables are related to the Sachs and Warner (1995) index: it tries to capture the changes in the level of economic openness to trade. It combines structural features and macroeconomic environment. Two dummies variable are created, taking value 1 in the first five years of transition towards, respectively, “openness” or “autarky”.

Finally a set of political regime variables is added, based on the Polity IV dataset (Jaggers and Marshall, 2007). Two of them distinguish positive and negative regime change, defined as either a three unit 5-year change in the *polity2* variable or a regime interruption: they take value 1 in the period of regime change, towards democracy or autocracy. One more variable takes into account the degree of democratization, and it is the *polity2* score value. Based on COW conflict dataset, *Conflict* is a dummy variable taking value 1 if the country is involved in an internal or external conflict, otherwise 0.

Since I am interesting to the negative structural breaks, I take into account those countries that experimented at least a negative or a positive shock. After cleaning the dataset, I get two different sub samples: they are composed by 1271 observations from 31 countries for negative breaks sample, and 809 observation from 20 countries for positive jumps.

Starting from these I construct a new set of variables, taking into consideration what happens abroad: these new variables are weighted for neighboring, trade flows and economy dimension, as previously described. To build up the variables weighted with geographical proximity I use the direct contiguity dataset of COW: it records the possible contiguity relationship of a country with the others, according to four different distance threshold. I take the data for trade flows by Cow dataset on trade. it reports the value of imports and exports for each dyad of countries having trade exchange across time. The economy dimension data come from the Penn World Tables.

5. Results

I start from the baseline regression, where only the country specific variables are used, and subsequently I add the constructed ones with different weights. This allows me to rule out some theoretical problems. Therefore I can easily compare the results with my starting equation: this is why the first equation reported in each table of results is the baseline equation.

In table 1 I take into consideration only the neighbor countries: this allow to estimate the role of geography and if the there is a contagious effect between neighbor countries. Column 1 puts in evidence that a negative break in a bordering country increases the probability of a negative shock, while a positive event doesn't matter. In columns 2 and 3 I explore the eventually channels through which the contagious can spread out between bordering countries: matching geography with trade and economy dimension, the results are any more significant. Between neighbor countries bilateral trade and the ratio of GDP do not matter. On the other way, the probability of a positive break is affected by a positive shock in a neighbor countries (column 4) even if it is weighted for trade (column 5), while it is not for economy dimension (column 6). These results suggest that the positive shocks are affected by similar events in neighboring , and trade more than the GDP is a channel of transmission between closed countries.

Enlarging the analysis to all countries (table 2), not only to the bordering ones, I get different results: a negative break abroad increases the probability of a similar event in a country (column 1). Column 2 and 3 report the results for weighted variables: the coefficients are positive and significant. Both bilateral exchanges and economy

dimension are contagious channels. Shifting the analysis to the positive breaks, I reports that only a positive shock abroad has a role (column 4), even if it loses explanatory power once I control for weighted variables (column 5 and 6).

Summing up positive breaks are affected by what happens in neighboring countries: geography proximity and trade are the main channels through which the shocks spread out. On the other hand the probability of a negative break in a country is influenced only by the presence of a similar event broad: in this case the geography does not matter, but only the relative importance in trade and of economy respect to the country affected by the shock.

It is important underline how the country specific determinants stay constant in significant level and magnitude of the coefficients in all different specifications. This means that the conclusions of the previous work are not affected, and even if I control for possible contagious effect.

6. Conclusions

The specific country determinants of breaks in long run growth were well explored in previous work (Deana Gamba 2008). Nothing was said about possible contagious effect of structural shocks. This paper tries to fill this gap, showing how the countries are no isolated islands, but linked among them: the events in one of them affect the others. Weighting for different measures, geography, trade and economic dimension, I put in evidence that the presence of structural breaks in a country *i* affect the probability of a shock in long run growth in *j*: breaks in long run growth abroad

increase the probability of a similar event. The results show different reactions of positive and negative shocks to abroad breaks. For positive breaks the key channel is geography: only the neighbor countries affects the probability of a jump in log run growth, even if trade an important channel. On the other hand, negative breaks are affected by breakdowns abroad through trade and economic dimension: what matter is the relative importance of trade and economy, and not the geographical proximity.

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Table A: Estimated break points

Positive breaks

countrypwt	year	countrypwt	year
Bangladesh	1973	Iran	1981
Belgium	1958	Ireland	1994
Botswana	1966	Japan	1959
Burkina Faso	1966	Korea, Republic of	1962
Cameroon	1993	Luxembourg	1983
China	1978	Mauritius	1960
Ecuador	1971	Mexico	1995
Egypt	1975	Mozambique	1986
El Salvador	1983	Papua New Guinea	1991
El Salvador	1991	Philippines	1986
Equatorial Guinea	1995	Portugal	1966
Guatemala	1955	Thailand	1955
Guatemala	1987	Thailand	1986
Haiti	1991	Tunisia	1967
Indonesia	1967		

Total positive breaks: 29
Asia 8
Africa 10
South America 7
Europe 4
Develpoing countries 20
Developed countries 9

Negative breaks

countrypwt	year	countrypwt	year	countrypwt	year
Austria	1974	Hungary	1979	Poland	1980
Belgium	1974	Indonesia	1996	Portugal	1973
Brazil	1980	Iran	1976	Romania	1985
Cameroon	1987	Italy	1974	South Africa	1981
Congo, Dem. Rep.	1974	Jamaica	1972	Spain	1974
Cote d'Ivoire	1979	Jamaica	1976	Sweden	1970
Ecuador	1977	Japan	1970	Switzerland	1973
Egypt	1970	Japan	1991	Thailand	1995
Egypt	1980	Mexico	1981	Tunisia	1972
El Salvador	1978	Mozambique	1973	Venezuela	1970
Equatorial Guinea	1974	Nicaragua	1977	Zambia	1964
Finland	1973	Papua New Guinea	1994	Zimbabwe	1976
France	1973	Philippines	1956		
Greece	1973	Philippines	1981		
Guatemala	1980	Poland	1977		

Total positive breaks: 42
Asia 8
Africa 11
South America 9
Europe 14
Develpoing countries 24
Developed countries 18

Figure 1A: Neighbor negative breaks

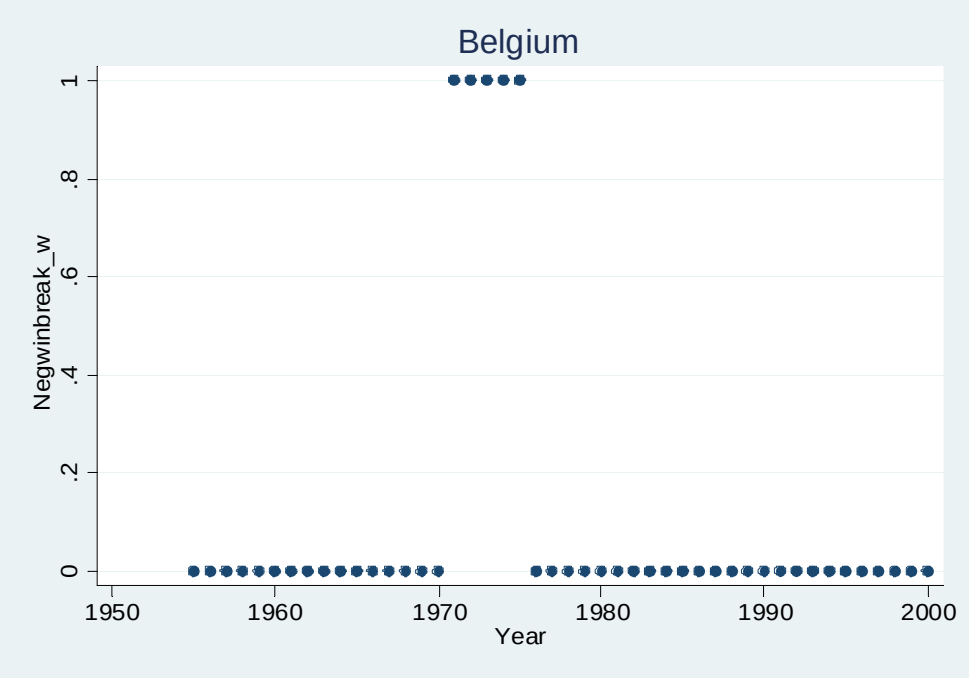


Figure 1B: Neighbor negative breaks weighted with distance

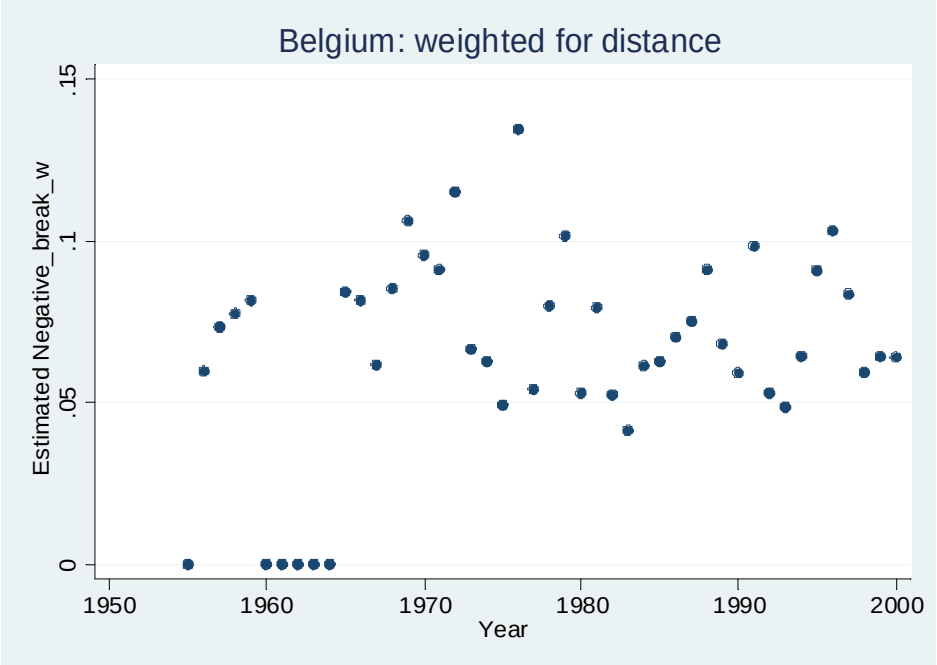


Figure 2A: Negative breaks of all countries

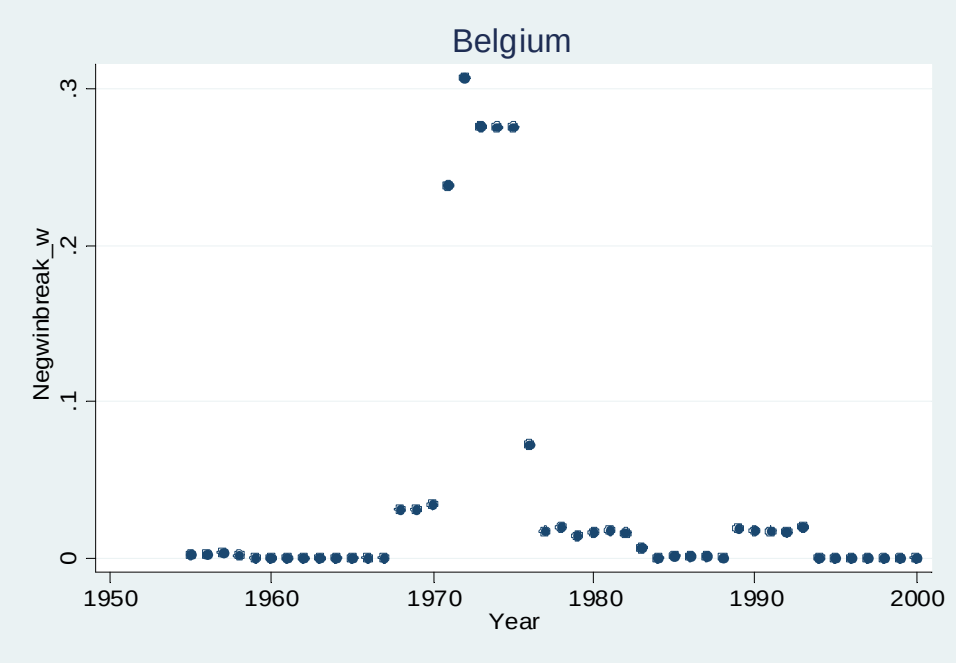


Figure 2B: Negative breaks of all countries weighted for tradeflows

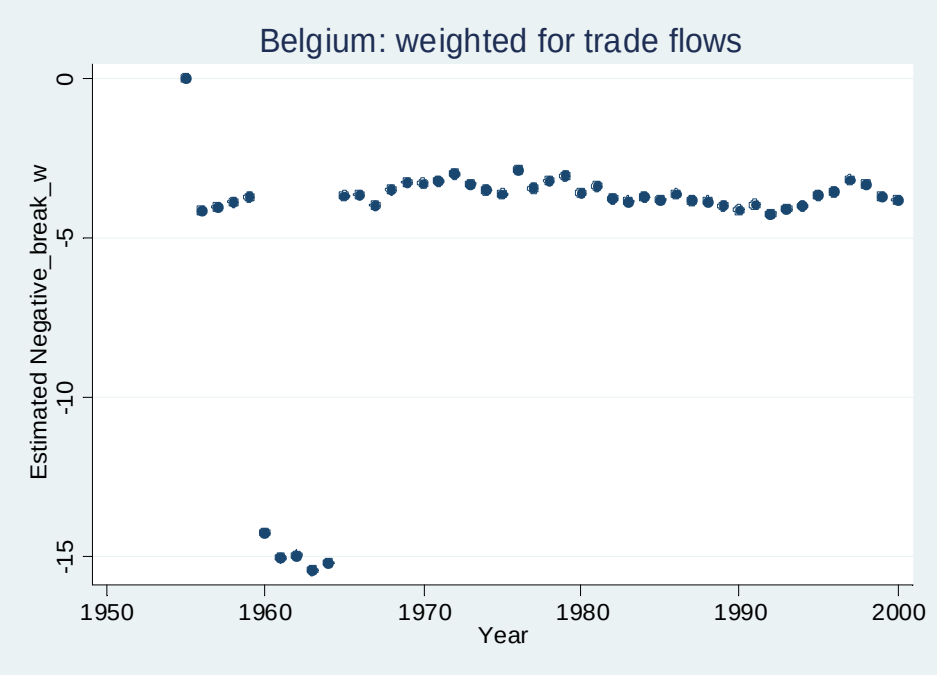


Table 1: contiguity

	Negative break				Positive break			
	Baseline regression	no weights	trade flows	economy dimension	Baseline regression	no weights	trade flows	economy dimension
		(1)	(2)	(3)		(4)	(5)	(6)
Democratizazion	0.21	0.019	0.052	0.067	2.258*	2.362**	2.392**	2.357*
	(0.538)	(0.662)	(0.539)	(1.649)	(1.237)	(0.979)	(1.133)	(1.290)
Move to autocracy	-0.992	-0.732	-0.788	-0.721	-0.273	-0.125	-0.163	-0.018
	(2.149)	(3.075)	(0.703)	(1.659)	(4.547)	(5.488)	(3.892)	(5.466)
Liberalization	-16.36***	-14.718***	-1,107.140	-15.666***	-0.429	-0.537	-0.417	-0.523
	(0.787)	(1.014)	(873.726)	(0.754)	(1.614)	(1.409)	(0.622)	(1.864)
Move to autarky	-0.38	-0.372	-0.470	-0.419	-14.52***	-15.853***	-16.322***	-15.524***
	(8.083)	(8.339)	(10.809)	(8.144)	(2.055)	(1.880)	(2.126)	(2.216)
Exchange rate depreciation shock	-0.377	-0.158	-0.306	-0.414	0.327	0.263	0.349	0.158
	(03.198)	(3.466)	(0.788)	(4.521)	(3.276)	(3.422)	(4.535)	(5.894)
Exchange rate appreciation shock	0.502	0.508	0.480	0.639	-1.568	-1.514	-1.712	-1.353
	(0.451)	(0.381)	(0.366)	(0.419)	(3.391)	(4.304)	(4.202)	(4.325)
Death of leader	-0.604	-1.154	-0.911	-0.810	-6.583	-6.854	-6.939	-5.926
	(17.23)	(1.968)	(1.412)	(17.273)	(45)	(37.490)	(46.390)	(60.878)
Tenure at leader death	0.0603	0.089	0.076	0.069	0.564	0.586	0.584	0.520
	(1.07)	(1.660)	(1.486)	(0.916)	(3.603)	(2.700)	(3.801)	(5.370)
Real per capita GDP growth	-0.0466*	-0.047*	-0.050*	-0.052*	-0.0228	-0.029	-0.032	-0.028
	(0.026)	(0.025)	(0.028)	(0.027)	(0.034)	(0.034)	(0.036)	(0.033)
Rest of world growth	0.0029**	0.002**	0.003*	0.003**	-0.0013	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Polity2 score	-0.135**	-0.128**	-0.132***	-0.129**	-0.0943	-0.095	-0.089	-0.084
	(0.057)	(0.057)	(0.043)	(0.064)	(0.098)	(0.079)	(0.094)	(0.093)
Conflict	0.61	0.500	0.439	0.441	0.574	0.646	0.671	0.590
	(0.512)	(0.518)	(0.394)	(0.592)	(1.029)	(1.007)	(2.016)	(0.931)
Estimated Positivebreak_w		0.478	-30.333	-4.230		1.703*	83.855*	1.837
		(2.707)	(67.911)	(18.921)		(0.801)	(40.879)	(30.319)
Estimated Negativebreak_w		0.055*	0.619	-7.15		-0.004	.0144	802
		(0.027)	(0.498)	(10.35)		(0.018)	(0.1685)	0.193
Observations	1271	1246	1246	1246	809	802	802	802
Number of countries	31	31	31	31	31	20	20	20
LL	-383.260	-369.1	-374.1	-375.2	-208.9	-218.8	-215.9	-216.5

Bootstrapped standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 2: all countries

	Negative break				Positive break			
	Baseline regression	no weights	trade flows	economy dimension	Baseline regression	no weights	trade flows	economy dimension
		(1)	(2)	(3)		(4)	(5)	(6)
Democratizazion	0.21	-0.160	-0.020	0.086	2.258*	2.356*	2.275*	2.201*
	(0.538)	(0.595)	(0.539)	(0.509)	(1.237)	(1.229)	(1.190)	(1.282)
Move to autocracy	-0.992	-1.010	-0.843	-0.793	-0.273	-0.055	-0.315	-0.159
	(2.149)	(2.699)	(5.656)	(0.872)	(4.547)	(5.398)	(4.405)	(4.481)
Liberalization	-16.36***	-14.449***	-5,833.119**	-16.737***	-0.429	-0.670	-0.289	-0.606
	(0.787)	(0.940)	(2,519.081)	(1.110)	(1.614)	(2.750)	(1.429)	(1.640)
Move to autarky	-0.38	-0.159	0.244	-0.389	-14.52***	-16.341***	-15.766***	-13.918***
	(8.083)	(7.673)	(12.257)	(8.030)	(2.055)	(2.090)	(1.873)	(1.999)
Exchange rate depreciation shock	-0.377	-0.351	-0.109	-0.395	0.327	0.197	0.476	0.087
	(03.198)	(3.862)	(5.252)	(3.773)	(3.276)	(2.991)	(2.896)	(4.315)
Exchange rate appreciation shock	0.502	0.633	0.698*	0.612	-1.568	-1.468	-1.601	-1.250
	(0.451)	(0.413)	(0.397)	(0.417)	(3.391)	(2.877)	(3.056)	(8.647)
Death of leader	-0.604	-0.630	-0.747	-0.555	-6.583	-7.423	-7.004	-5.448
	(17.23)	(13.307)	(0.992)	(25.200)	(45)	(46.626)	(42.974)	(52.349)
Tenure at leader death	0.0603	0.062	0.069	0.059	0.564	0.635	0.576	0.487
	(1.07)	(1.993)	(0.159)	(1.902)	(3.603)	(3.828)	(3.363)	(4.836)
Real per capita GDP growth	-0.0466*	-0.030	-0.036*	-0.055**	-0.0228	-0.029	-0.019	-0.032
	(0.026)	(0.029)	(0.022)	(0.026)	(0.034)	(0.035)	(0.040)	(0.038)
Rest of world growth	0.0029**	0.007***	0.002	0.003**	-0.0013	-0.004**	-0.002	-0.002
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Polity2 score	-0.135**	-0.137**	-0.131**	-0.130***	-0.0943	-0.103	-0.093	-0.065
	(0.057)	(0.067)	(0.057)	(0.048)	(0.098)	(0.103)	(0.091)	(0.105)
Conflict	0.61	0.453	0.402	0.569	0.574	0.756	0.590	0.491
	(0.512)	(0.405)	(0.433)	(0.544)	(1.029)	(1.078)	(1.636)	(0.776)
Estimated Positivebreak_w		1.373	15.369	-0.919		0.653*	-9.036	-17.682
		(2.379)	(27.708)	(3.100)		(0.362)	(22.230)	(23.673)
Estimated Negativebreak_w		0.003*	0.438***	-1.359		-0.001	0.0595	3.298
		(0.002)	(0.143)	(3.071)		(0.002)	(.0981)	(13.608)
Observations	1271	1246	1271	1246	809	809	809	809
Number of countries	31	31	31	31	20	20	20	20
LL	-383.260	-345.2	-367.5	-363.8	-208.9	-218.9	-222.1	-214.0

Bootstrapped standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Chapter 3: Democracy and Social Welfare

Deana Gabriele

Abstract

Up to now the literature on the consequences of democracy has concentrated on the economic growth, while the link between democracy and Social Welfare is no well-researched despite the importance to understand this topic. Recent works lead to controversial results without being able to answer the question if democracy reduces or not the inequality. I suggest a new approach, based on two relevant dimensions, the history and the actual level of democracy: a panel analysis on the role of the democratic stock and the present level of democracy should give a positive contribute to solve this dilemma. The results show a strong relationship for both contemporary levels of democracy and a historical stock measure of democracy with Social welfare measures. Even if both are significant over the entire sample, the first one matters in autocratic countries, while the historical dimension matters in a democratic environment.

1. Introduction

From the Roman to the present era, authors have usually assumed that democratic institutions perform policies more favorable to the needs and interests of less advantaged people than non democratic. The logic of this idea is that popular participation in government should empower the poor and, as consequences, should lead the government to take more into account their needs and interests.

Since in the past decades the world assists to a spread out of democracy, as a large number of countries have seen the introduction of democratic institutions, we expect to assist an increase in the living condition of the poorest: this not always occurred. Several studies argue that there is not a robust correlation between the regime type and various measures of Social Welfare (McGuire 2004, Ross 2005; Shandra et al. 2004). Therefore these studies are supported by a strong anecdotal evidence: many of the most significant increase in the welfare over the past centuries have occurred in non democratic regimes (e.g. in the East Asian and in communist countries), while in many democratic countries have been characterized by persistent disparities and high level of poverty (e.g. India, South Africa and Latin American countries).

Can we yet argue that democracy plays a role, and there is a difference between democratic and not democratic countries for the Social Welfare?

First of all I try to identify a possible measure of Social Welfare. Section 3 describes this process.

Section 4 presents my approach, based on two dimensions of democracy: it is the present value and its history. The first concerns the present environment. The second concerns the idea that citizens learn to “use” democracy, to cherish and respect it as method of government and to catch all the opportunities, but also a consolidation of values and norms: democracy needs time to consolidate and spread out all its positive aspects. It's a slow process in which the stock of civil and social assets is accumulated over time in a “stock of democracy”. Empirically I argue that this “democratic stock” is accumulated from its own experience or from neighboring countries' one.

To evaluate the role of these two measures on Social Welfare, I implement a panel analysis where the main dependent variable is the Infant Mortality Rate, as measure of the outcome of the Social Welfare. To role out possible endogenous problems for the democratic stock, I create a variable that take into consideration a weighted measure of the neighbor democratic stock. These data are discussed in Section 5, in which I also describe how th concept of democratic capital is operationally constructed.

In Section 6 I present my estimates. The results suggest that both the present value of democracy and its historical measure play a positive role for the Social Level. In a more specific analysis, I show that in an autocratic country what it is significant is how it is non democratic in the present, while for those countries that have democratic institutions, history matters. Finally I take into consideration other possible variables as measure of Social Welfare. Results are described in section 7.

2. Literature Review

In the last decade a wide literature has tried to identify the possible effects of democracy: the authors particularly have concentrated on the effects of democracy on economic growth, getting controversial results, while the relationship between welfare and democracy was underrated.

Up to now now the literature has not solved the question about the effects of democracy on economic growth: it is enormous and equivocal, showing that democracy has either a negative effect on GDP growth or no overall effect. Authoritarian regimes have experimented a rapid growth at least as democratic, while democracy may have same indirect effects, as greater stability. In a comprehensive survey of this literature in economics, Brunetti (1997) concludes “Considering the evidence of this survey, it can be safely stated that there is no clear relationship between democracy, at least as measured in these studies, and economic growth”. Rather than analyzing all the literature, I mention same works representing the overall results of the research in this field.

- Levine & Renelt (1992) show that democracy is not a robust determinant of growth in cross-national regression
- Barro (1996) shows in a decade average panel regression that democracy has a “weakly negative” effect on growth
- Przeworsky & Limongi (2000) study annual panels and argue that there is no real difference in growth between dictators and democrats

- Taveres & Wacziarg (2001) use a model to examine many channels through which democracy might influence growth, finding same negative effects and same positive but conclude that the "overall effect of democracy on economic growth is moderately negative"

Democracy has at least two positive effects on social and economic policies. First, the democratic process allows for the eviction of the bad leaders: authoritarian leaders have few checks, while democracy has more, and finally regular free election allow to evict leaders who hurt economy. Then, democracy involve in its decision-making process more actors, and this allow to take in consideration more economic options and to choose the fittest one. Therefore the extension and protection of properties rights and basic freedom generate the security of expectations necessary to motivate citizens to work, save, invest …, increasing at the same time the flow of information and opportunities breaking down the privileges. The pessimistic view underlines how in a newly democratic country, high citizens' expectations lead rapidly to an high levels of government spending, reducing surplus for investment. Therefore democracy should be less able to resist special interest groups' redistributive demands and rent-seeking pressure, since they can ensure founds and support for the elections, while an autocratic regime, not responding to the citizens, can have the force to implement those unpopular policies necessary to speed up the economy.

The econometric evidence shows that the negative effects balance the positive, so that the *net* effect of democracy on growth over the last five decades is negative or null. Starting from these results some authors affirm that democracy is "bad" news for economic performance, and that it's a luxury only for the richest countries. Persson and

Tabellini (2006) try to explain this different results with the timing of the economic and political reform.

The literature that investigates the consequences of democracy used a wide range of methodology:

- Cross-country analysis. It is the easiest and most used, where democracy is treated as a direct and immediate cause: the level of democracy in time *t* is thought to influence growth performance in the following years.
- Some works use a "duration model" to identify the effects of the duration of a regime measured in years (Grier and Munger 2006), finding moderate positive effects of democracy on growth. They take into consideration not only the level of democracy, but the duration of a regime, measured as the years between a change in the polityIV: usually a change in a regime is a jump of 3 units in the *polity2* score. It's an arbitrary definition of regime change
- A difference in difference and propensity score approach: it take into account the transition in the democracy, that is usually defined arbitrary as a gap of 3 units in PolityIV (Person and Tabellini 2007). Evaluate the change in the variable before and after the events identified.

These results and the skeptical idea on the role of democracy, or its variation level, on growth are based on the questionable assumption that democracy is treated as a direct and immediate cause: the level of democracy in time *t* is thought to influence growth performance in the following years. I criticize this assumption: if democracy has a role for economic performance, it's depend on the country's history as well as its

current status: the events occurred in the past can have a contemporaneous effect, they can influence the today economic performance. Democracy should be considered as accumulated stock over year rather than the level of democracy in a particular year. Gerring et other (2005) follow this path, defining the stock of democracy as the discounted sum of the level of democracy over time, finding that its has a positive and significant effect on the economic growth.

While the literature on the effects of democracy on growth is wide and the topic is well explored, even if there is not consensus on the results, few authors spend efforts on the consequences of democracy on inequality and Social Welfare in general. This topic is usually explored with the same econometric methodology used for the relationship between democracy and growth, so it is affected by the same problem of identification democracy as a direct and immediate cause. Theory suggests (median voter and voting model) that enlarging the number of subjects involved in the decision-making process, there should have a more redistributive policy and a reduction in inequality, but the results not confirm this idea.

Mulligan, Gill and Sala-i-Martin (2002, 2003) investigate the relation between democracy and Social Security and public policies. Following the voting model and Tabellini (1992) they find that the dimension of Social Security programs varies according to economic and demographic factors. Therefore they found only a little and partial effect of democracy on the size of Social Security budget: democracies and nondemocracies are equally likely to have social security program. Li and al. (1998) report that countries with greater civil liberties have a lower level of income inequality. Sylwester (2002) finds a negative relation between changes in income inequality and

both level of democracy as in the degree of democratization. Gradstein et al. (2001), questioning the existence of such simple relationship, add culture and ideology as control variable: if these are intrinsically egalitarian, the democratization process results only marginal further reduction in inequality. According to the median theory, the theory suggests that a democratic country should lead to different program design, increasing Social Security Budget.

Therefore in the literature on democracy and Social Welfare there is not a consensus on the casual relation, where Barro (1999) and Miller (1996) sustain that inequality influences the stability and the probability that a democracy takes place. While in Engerman and Sokoloff (2002) inequality is determined by the factor endowments and by initial conditions in the early histories of the colonies (seen as land and natural resources relative to labor, human capital and political influence) and only in a second step inequality influences democracy, even if the reverse causality can not ruled out.

3. Measuring the Social Welfare

Most of the works in international development focus on economic growth, using as measure of the progress the per capita domestic product (GDP). The GDP measure has many advantages as measure, being widely available for a large time spam and or all countries. On the other hand it catches the mean income in country with different

income distribution. As consequences the poor status can be different in countries with the same GDP level or growth. Therefore the growth is not directly related with the poverty, given that the GDP's increasing can be monopolized by few, the elite or those who can catch the opportunities given by the economic growth, leaving unaffected large fraction of the society. For this reason a country per capita GDP is not a good measure of human welfare of the most poor in a society. For these reasons some authors concentrate their attention on the share of GDP devoted to Social Welfare, getting ambiguous results. McGuire (2005) and Ross (2005) put in evidence how the amount of money allocated on health not automatically benefits the poor, while Anand and Ravillion (1993) find no robust empirical connection between the level of public spending on education and literacy rates cross nationally. The money allocated for the purposes of health, education and general welfare may be monopolized be the elite clientèles, appropriates by the bureaucrats, or simply stolen, making public policies inefficient. Ross (2005) sustains that democracies may sustain the budget of middle and upper income groups but not the poor. Under these conditions, an increase in the government Social spending would allow middle and upper income groups to switch from private to public services, leaving low income groups unaffected, not rising the use of critical goods and services. The World Bank (1997:59) reports that only 10% of public founds reached below median recipients in South Asia. Deolalikar (1995) finds that children of upper income groups benefited from government health program more than children of poor households.

As alternative measure I suggest mortality statistics, which are widely, easily cross nationally comparable. They also are very sensitive to the status of the least

advantaged, since most of variation in mortality rate observable from population to population can be linked to the status of poor [ex: USA].

Between the mortality statistics I choose the infant mortality rate (IMR), defined as the number of children who perish during the first year of life, per one thousand live births. This statistics is widely available and characterized by a high variance across countries and time. Infant Mortality is a key measure of overall social welfare: it is typically concentrated in the lowest quantile (Gwatkin 2004). The IMR serves as a window on the health and nutritional status of young children and pregnant women, and on more besides. It influences overall life expectancy: an higher infant mortality rate influences negatively the life expectancy and it affects women decisions and their opportunities. Since child can die for a wide range of reason, the IMR is also affected by such factor as racial disparity, access to adequate and safe food, national health policies, air pollution, sanitation, access to drink water and other conditions hard to measure among the poor. Therefore a new cohort of babies was born every year, making the chosen variable very sensitive to new socioeconomic circumstances and to the changes in social service delivery. For all these reasons we can consider IMR as good proxy for the level of social welfare.

Talking about infant mortality, we should consider the characteristics of this measure: not only it cannot go below 0, being lower bounded, but also an equal increment cannot be interpreted as representing equal policy achievements. A country with a very high IMR can get an improvements with a small amounts of found, while at a low rates the improvements in the mortality rates is much more costly: for these

reason I transform infant mortality rates into logarithm form (taking the natural log of IMR).

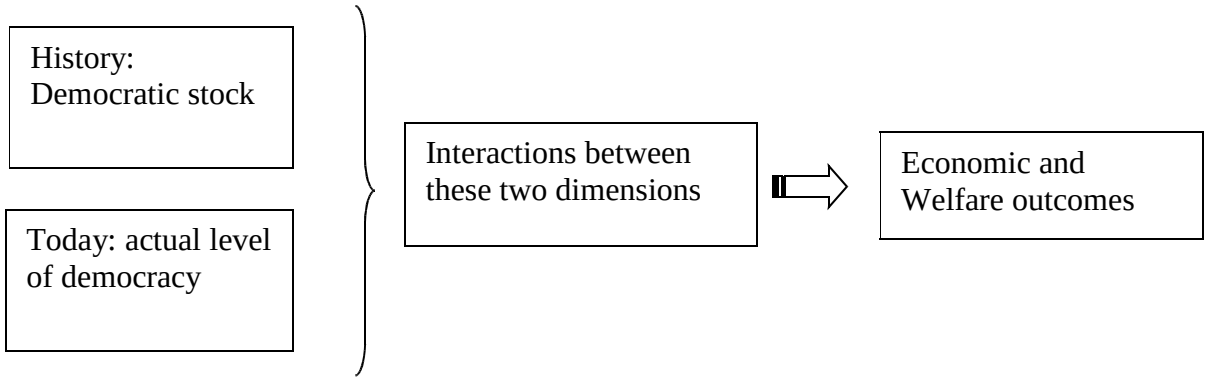
4. Two dimensions of democracy: history and present

Why do countries with the same level of democracy have a so different economic or social welfare performance? Why do countries with a comparable history in terms of democracy experiment a so wide range of social outcomes?

Until today literature takes into consideration separately two potential elements as determinants of the consequences of democracy: the level of democracy reached and the history of the country, as the length of a regime or the concept of democratic stock, but both these approaches have limits. The first one, taking into consideration just the level, assumes that the democracy has an immediate effect: it's enough identify if a regime is democratic or not to understand which consequences have on the economy and to identify clearly its effects. The second evaluates the history's dimension of a country, looking not only on the contemporaneous level of democracy, but also the previous one: Gerring and others (2006) and Tabellini (2006) define in a different way the same concept of stock of democratic capital, as an amount of capital that each country accumulate over time, depending on the different history: by definition this new variable, as needs time to be accumulated, needs time to show the effects on the economy.

I believe that the democracy influences the economy and social welfare through two channels: the history, as democratic stock accumulated over time, and the contemporaneous level of democracy: both are important since they work in a different way and affect different aspects of the same problem, and only the interpretation of the interaction of these two dimensions can allow us to understand the real consequences of democracy. The underline assumption is that these two variables work and represent different characteristics of a country. The democratic stock is a variable for all the capabilities potentially usable that a country had accumulated over time. On the other hand the present value of democracy is the way through which these accumulated potentialities can be expressed. Higher is the democratic level of a country and the free hand of the citizens, better the accumulated potentialities can be expressed and used.

Figure 1-4 show how can be misleading taking into consideration one at time these two dimensions: countries with the same level of both Democratic Stock and Democratic Level get different outcomes, either I consider the economic development and a Social Welfare measure. I suggest that the answer can be found analyzing both these measures at the same time, and not separately how the literature did .



A non democratic country, with a higher level of democratic stock, will act in a different way from an equally non democratic country, with a lower level of democratic stock, since it has accumulated a different amount of capabilities: difference in the importance given to the property rights, in the expectation for who hold offices, in the feeling to be part of a society and to be represented.

If the democratic stock accumulated is important, it's true that it needs a positive environment to act and give positive results at each level of the society. The present level of democracy, captured by the balance of powers and the presence of checks, can influence the way the accumulated experience acts, but it cannot nullify its presence: it can multiply or reduce its effects.

1) Actual level of democracy in a country:

   a) allows to the accumulated stock of democracy to act at different level of the society without constrictions

2) Democratic stock:

   b) is a proxy for the potentialities of a countries, accumulated in the democratic periods: values, procedures and all those positive customs usually put to use in democratic regimes.

The interaction of these two key variables, democratic stock and actual level of democracy, is the challenge that the research should face to understand and solve the question of consequences of democracy.

5. Data

5.1 Democratic Stock

Thinking democracy per se can immediately influence the economic performance is just a “chimera”: as each process democracy needs time to spread out between the different levels, and its effects today are a product of their histories. This process requires a consolidation of democracy, and tit is necessary that citizens accept and respect it as a form of government. Time is a crucial variable to allow to the positive effects of democracy to take place and spread out through the society: longer a country remains democratic, greater it will be the accumulated stock of capital, and the effects on the economic outcomes will be greater.

Democracy is not easy to measure: talking about democracy we image a country where elections are regular and open to all citizens, where the suffrage is broad and there are not discrimination; the sovereignty is hold by elected officials; the different power are split among different bodies and political liberties are extensive and guaranteed. The question is how to catch these characteristics, since they cannot be easily and unequivocally measured.

I use thePolity2 variable constructed by PolityIV dataset as main democracy variable: it contains coded annual information on regime and authority characteristics for all independent states (with a greater population than 500,000) , covering the years 1800-2004. It measures how an “authority patterns” is institutionalized in a given country. This index takes into account six different aspects of political institutions, like the executive is selected, the degree of checks on executive power and the form of political competition.

Since I am interested not only on the difference degree of democracy among different countries, but also in the differences of duration, I construct a measure of democratic stock starting form Polity2 variable, but adding the time dimension and the accumulation process of democratic stock.

Using as variable Polity IV, an index between -10 and +10, I sum over time, giving a lower weight for the years far from today.

$$DC_{i,t} = \sum_{s=2002}^{t} 0.99^{s-t} \alpha_{i,t}$$

where $\propto_{i,t}$ is the polity value for a specific country in a specific year. t is between 1900 and 2004.

The underline idea of this measure of the stock of democracy is the sum over year of the value of polity IV, as proxy for the democratic level of each country.

I think that, even if the past has a role, to determine the today's effects of democratic stock, the most recent level of democracy plays a greater role. I don't suggest that the past doesn't matter, but that the time reduces the effects, and for this reason I add a discounted factor for past experiences: the past counts, but less than the present. According to this measures, the variable gets a great variability across countries and time. Some nations have a large negative democratic stock, not having experimented any democratic regime or having had long authoritarian regime, like Iran or China. Others, like Australia or USA, having been always democratic, accumulated a large stock of positive democratic stock. Yet others, such as Mozambique or Argentina, have experimented transitions and have accumulated a limited stock of democratic capital: figures 5 and 6.

5.2 Endogeneity problems

This work is based on the assumption that the democratic stock affects the social welfare, and in this particular case the infant mortality rates. If it is not verified this assumption could lead to endogeneity problem: the IMR can influences the level of democracy and the stock of democracy accumulated over time. To avoid these problems I lag the polity2 score, and, following Persson and Tabellini 2006, I use as proxy for the democratic stock the one of the neighbor country. Unlike the two authors that use the distance, I weight for the ratio of the openness measured as the sum of imports and exports with a given country over the total of openness. I prefer to weight the democratic experience with a trade measure than one taking into account the distance between the two countries: I think it can catch better the "proximity" (e.g USA and Europe, a great physical distance separated them, but they have an higher level of trade exchange and "cultural proximity").

The main idea is that the regime in a country is influenced by the neighbor democratic level, and the greater this influence is, the bigger the links between they are, and trade can be used as proxy for them. A country closed to the neighbor has not an exchange about policies and priorities, and more in general on ideas, and it cannot have an advantage from democratic neighbors.

Specifically, for country *i* and year *t*, we define:

$$DC\_w_{i,t} = \sum_{j \neq i} 0.99^{s-t} \alpha_{j,t} \omega_{i,t}$$

Where $\alpha_{j,t}$ is the *polity2* value in country *j* in year *t* and the weight $\omega_{i,t}$ measures the links between the country *j* and *i*. It is the ratio between the sum of imports and

exports of country *j* and *i*, over the total trade of country *i*: it's catch the relative importance in trade flow of country *j* for *i* .

Following Cow dataset, the neighbor countries for *i* are chosen as those within 100 kilometers away from state *i's* borders. According to this definition of neighboring, Italy is closed to France, Switzerland, Slovenia Libya, Austria, Albania, Greece and Tunisia. I tried different neighboring definition(25 and 50 kilometers), getting closed democratic stock levels. I prefer to use a more "generous" definition of proximity, since it should capture the influence between two countries, and not only a geographical dimension.

Figure 3 illustrates the time path of neighbor democratic capital in two countries, Chile and Belgium. According the the spread of democracy in the last decade (Huntington 1991), the two variables have a common path over time. However, according to the greater stability of democratic regime in Europe in the last fifty years, Belgium has a fixed behavior over time, while Chile hasn't: the latter is closer, and influenced by many political transitions occurred in Latin America (Table 7).

5.3 Data

My panel data set is based on annual data for as many countries as possible over the years 1960-2002 It is composed by 3215 observations of 91 countries (Table B): the countries composing the data set are not homogeneous, for economic, political and regional provenience.

The dependent variable is the Infant Mortality Rate and its source is the World Development Indicator 2003. As political independent variable I use the *Democratic_stock*, previously defined, as measure of historical importance of democratic experience, and the *polity2* variable, the source is PolityIV project, as measure of the actual level of democracy. I control for the square of *polity2* variable, *polity2^2*, to take into consideration any non linearities in the relations between dependent variable and polity2 score.

Therefore I include same covariates, that can affect in different way the dependent variable but that can be considered exogenous with respect to it. The source for economic variables, per capita income, economic growth and public spending, is the Penn World Tables. These variable should capture a higher level of income disposable to be spent on food, housing, health care and other basic needs, which should reduce under-5 mortality, and the availability of more resources for health spending and for social services provided by the government.

I use data from WDI 2003 for female illiteracy, *luf_int*, a good proxy for the education level of the mother and as consequence for the role of women in the society: both these dimensions are important determinants for the infant mortality rate. Female education affects both the frequency and effectiveness which other social services (immunization, trained attendance at birth, sanitation) are used. Starting from the Cow (Correlates of War) dataset I create a dummy variable, *conflict*, that identifies if a country is involved or not in a conflict in a year. To roll out any problems related to the high persistent of my dependent variable, I add as control its lagged value, *lag_IMR*: it should catch the presence of a trend, that otherwise could distort my results.

To check the consistency of the results, I use two other possible Social Welfare outcomes measures: the fertility rate and the illiteracy rate of adult population. Both these variable come from World Development Indicator 2003, but they are composed by a lower number of observation, and they cover a reduced number of countries than the Infant Mortality Rate (3128 observation and 91 countries for the illiteracy rate and 2011 and 61 countries for the fertility rate).

If the democratic stock and actual level of democracy work in different way, they should have different behavior according to the regime type's characteristics. To explore deeply the relation between my variables, I divide the sample in different subsamples, according to the country's regime. First of all I split between the democratic (polity2 value greater than 0) and autocratic countries, then I take into account if a country have never been democratic or not into its history (if it has never had a polity2 score positive), or if it have experimented any transition from a regime type to another (Table B).

6. Results

Principal hypothesis concerns the possible effects of contemporaneous democracy (a level variable) and democratic history (a stock variable) on infant mortality rates. The first results (table 1, columns 1 and 2) shows how on the entire sample these two variable works in the same expected way: an increase in the actual level of democracy,

the *polity2* variable, or in the stock of democracy, reduces the infant mortality rates significantly. More developed countries have a lower level of infant mortality rates, and this effect is not lead by an higher level in the government spending, but it's a pure income effect, due to an higher disposable income. These results are consistent and robust If I Control different specifications in the panel analysis, and adding time dummies.

However it can be interesting to understand how these two measures of democracy affect the dependent variable in sub-samples. The countries experimenting an autocratic regime could have different behaviors from the democratic ones. First of all I divide the sample between democratic and not democratic countries (columns 3-6), according to a positive or negative (and equal to 0) value of the polity2 score. The threshold of 0 for *polity2* is a generous definition of democracy, but it is chosen in the literature because many large changes in the *polity2* are clustered around 0, and can be easily implemented. Taking into consideration the democratic countries, the democratic stock variable stays significant, while the democratic level is not any more. This suggests that in a democratic framework the present level of democracy is not any more important, but the democratic history of a country is: the set of values and rules "stocked" in the past that now can be freely expressed. On the contrary, if I consider only the non democratic countries, the democratic stock is not significant, while the *polity2* is significant and consistent: the role of the history, in an autocracy is not important, since the authoritarian environment does not allow to the stock of democracy to express all its potentialities. In a non democratic country what it is of weight is how much the regime is autocratic.

Instead of dividing the sample in democratic and not democratic countries, now I distinguish between those countries that have always been democratic (*polity2* positive in the entire time spam), the ones have never been and those experimented a transition (columns 7-12). I get the same results: the infant mortality rate in the democratic country is reduced by an higher level of democratic stock, while for those who have never been democratic or experimented a transition, the IMR is influenced significantly only by the presence value of *polity2* and the history doesn't matter.

I the results are confirmed If taking into consideration the endogeneity problems, and use the weighted democratic stock of neighbor as proxy for the country democratic history and the lagged value of the *polity2* (Table 2). The history and actual level works have different behaviors. The first matters in the democracy, reducing the infant mortality rates, the second matters in non democratic country, working into the same way

Table 3 reports the results for two different measures of Social Welfare, choosing to check the robustness of my conclusions. Even if the coefficients are less significant, I can say that they are consistent with the previous results, showing a different behavior of the historical and present dimension of democracy, according to the regime types.

Finally table 4 shows that the non linearity of polity2 score is not significant and it does not affect the results, that they stay consistent and robust over different subsamples specifications.

7. Conclusion

Infant mortality rates has been employed as measure for Social Welfare, but no persistent relationship with democracy has been discovered (McGuire 2004, Ross 2005). I suspect that these null findings are due to data set construction and democracy definition problems. These authors us a cross section analysis or a five-year panels, reducing the sample size of their analysis. Therefore they measured democracy as a dichotomous (democracy\authoritarian) rather than a continuous concept: these works give us strong reasons to think that differences in the degree of democracy level have strong effects on Social Welfare.

This paper finds a strong relationship between Social Welfare, measured by infant mortality rate, and democracy, measured in both its dimensions, history and actual level. The nature of this relationship is not unambiguous, its depends on the interaction between the two dimensions of the democracy: the results show how the effects of history depend on the actual level of freedom in a society. In the democratic country, where the environment allows to the skills accumulated over time to spread out, the democratic stock affects positively the Social Welfare, reducing the infant mortality rates. On the other hand the history has no impact if it is limited by the non democratic environment, and only the level of actual democracy plays a role in the reduction of the infant mortality rates.

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Figure 1

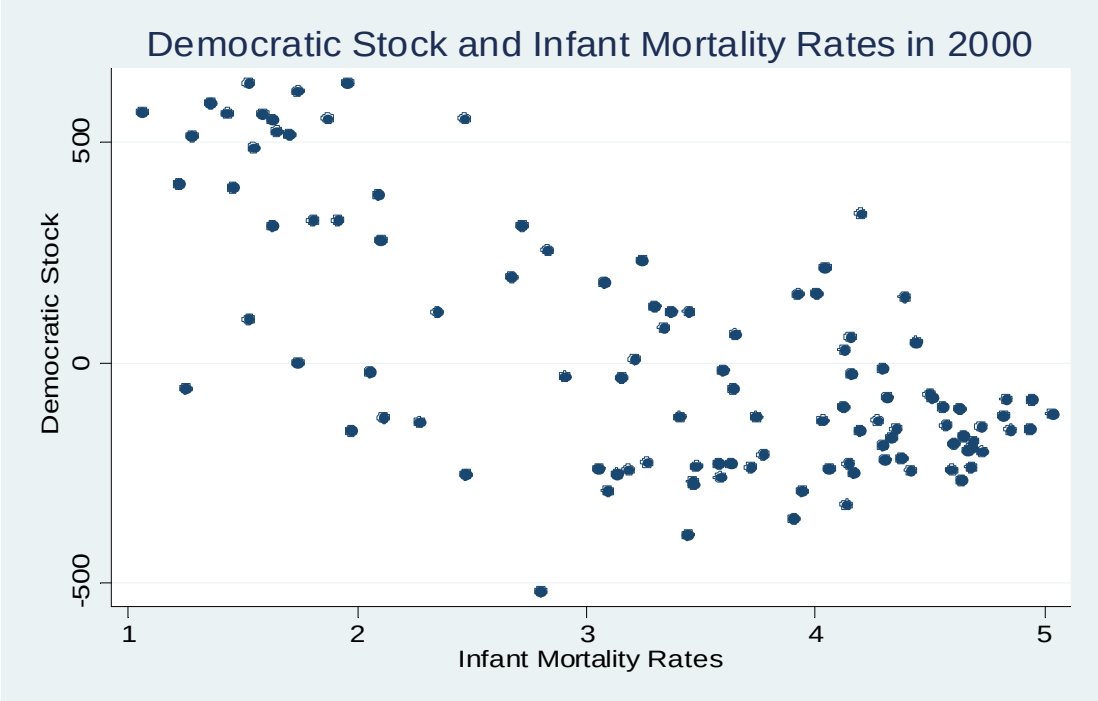

Figure 2

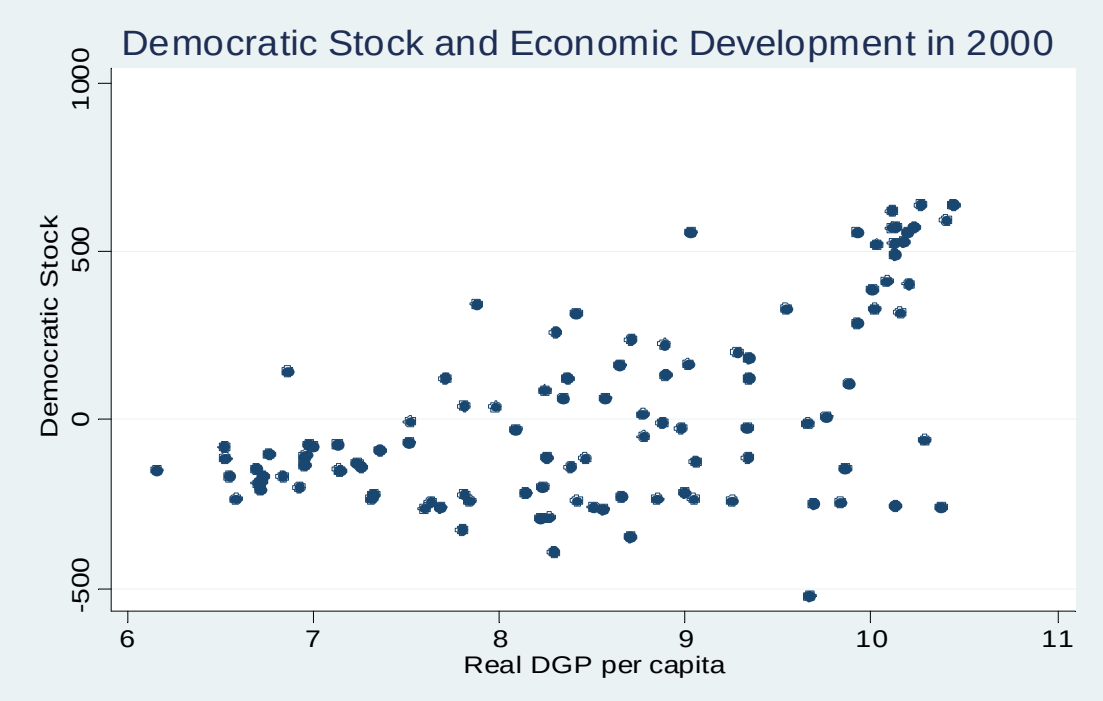

Figure 3

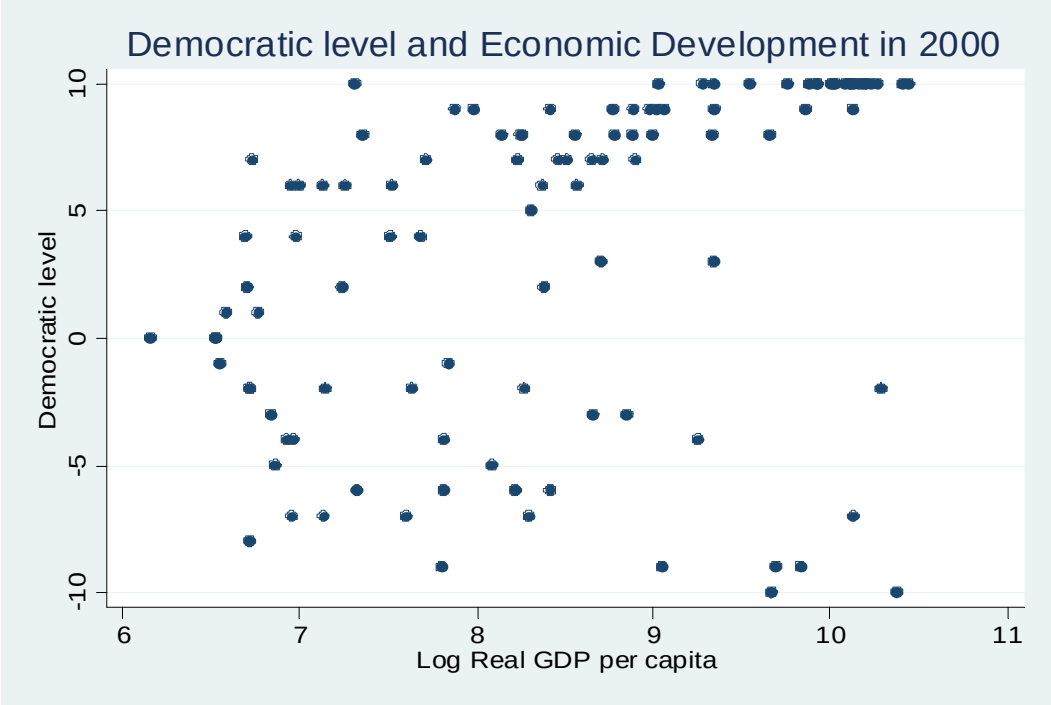

Figure 4

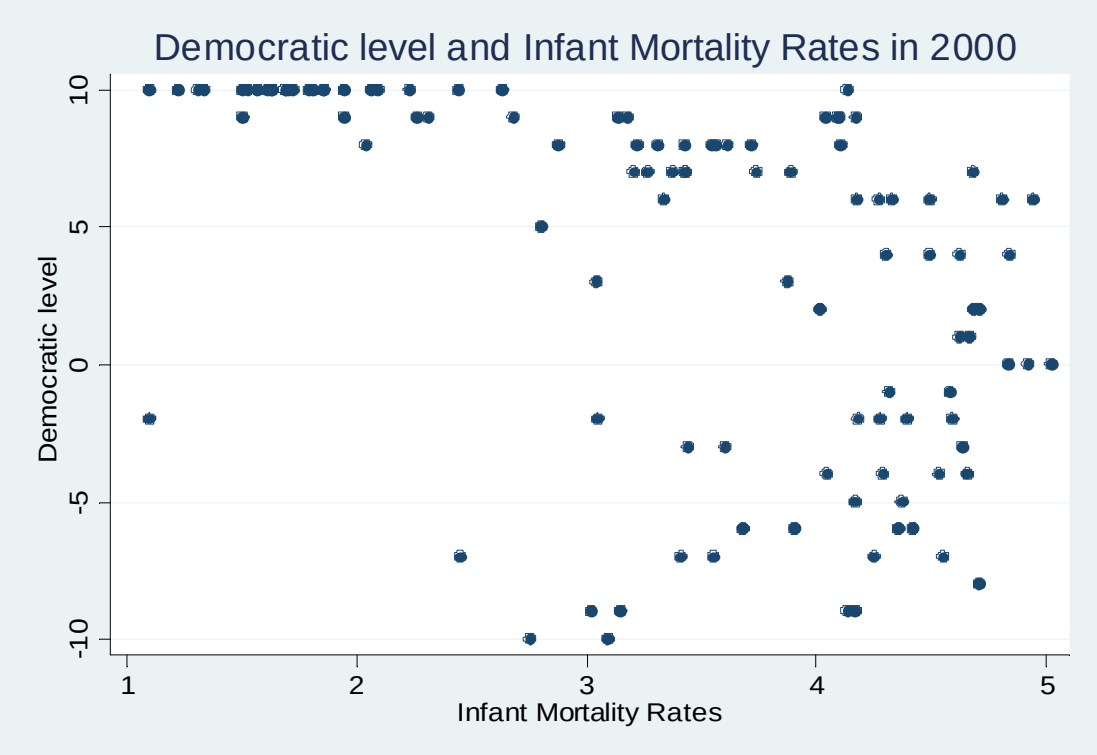

Figure 5

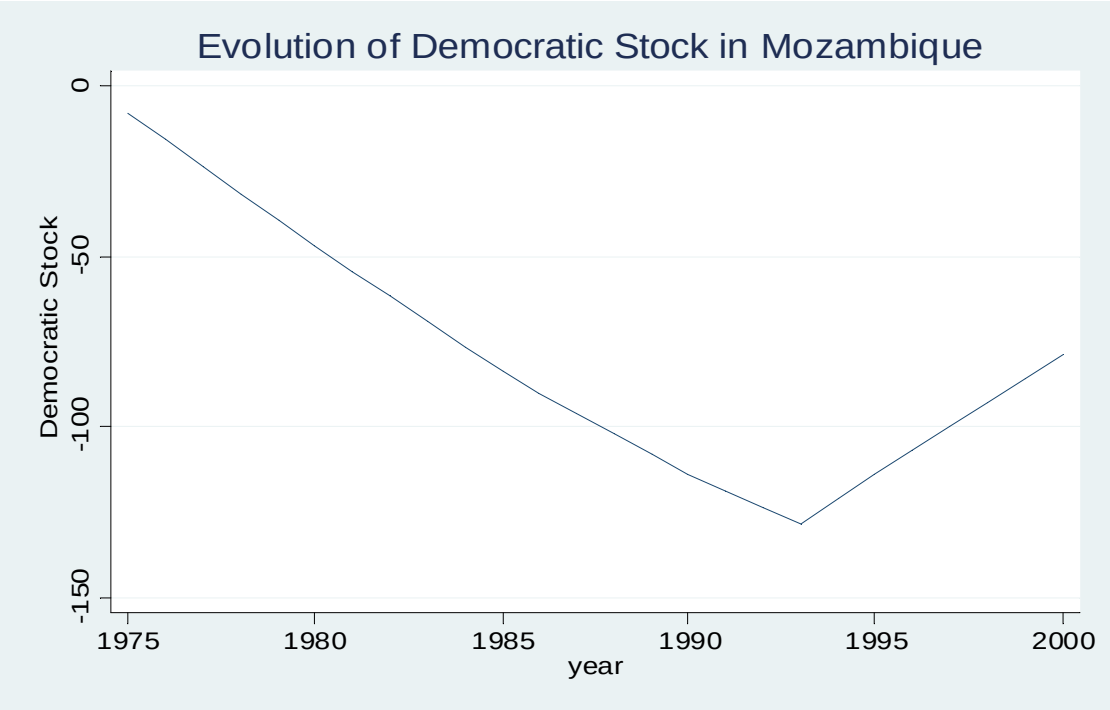

Figure 6

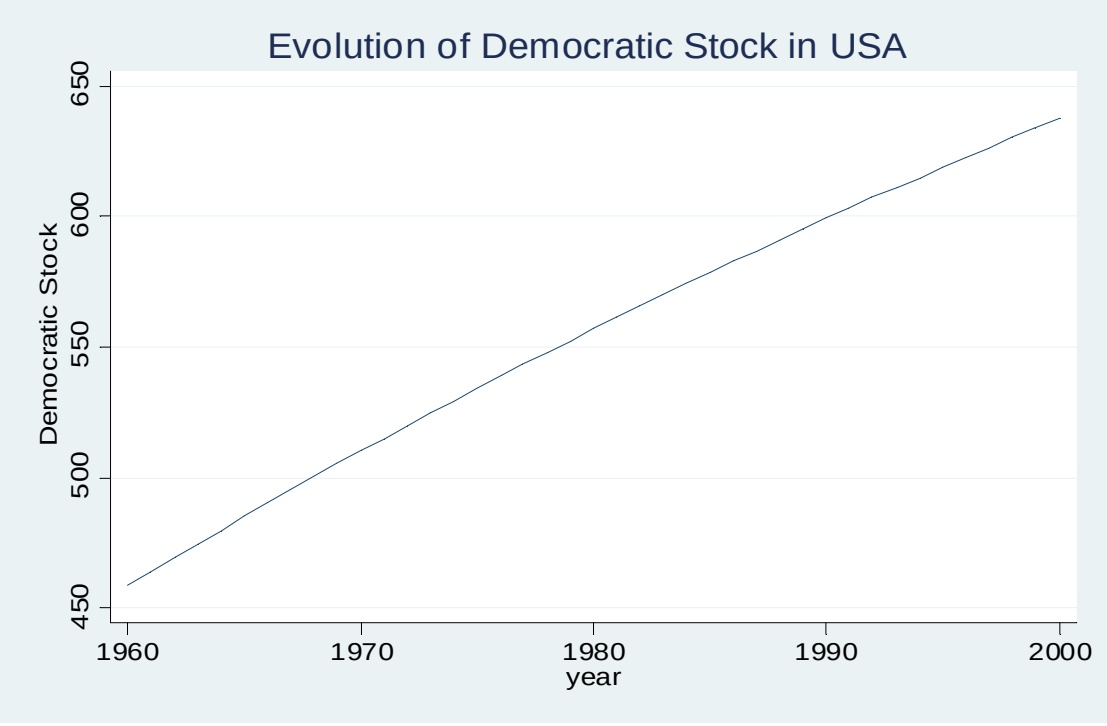

Figure 7: Foreign Democratic Capital in Chile and Belgium

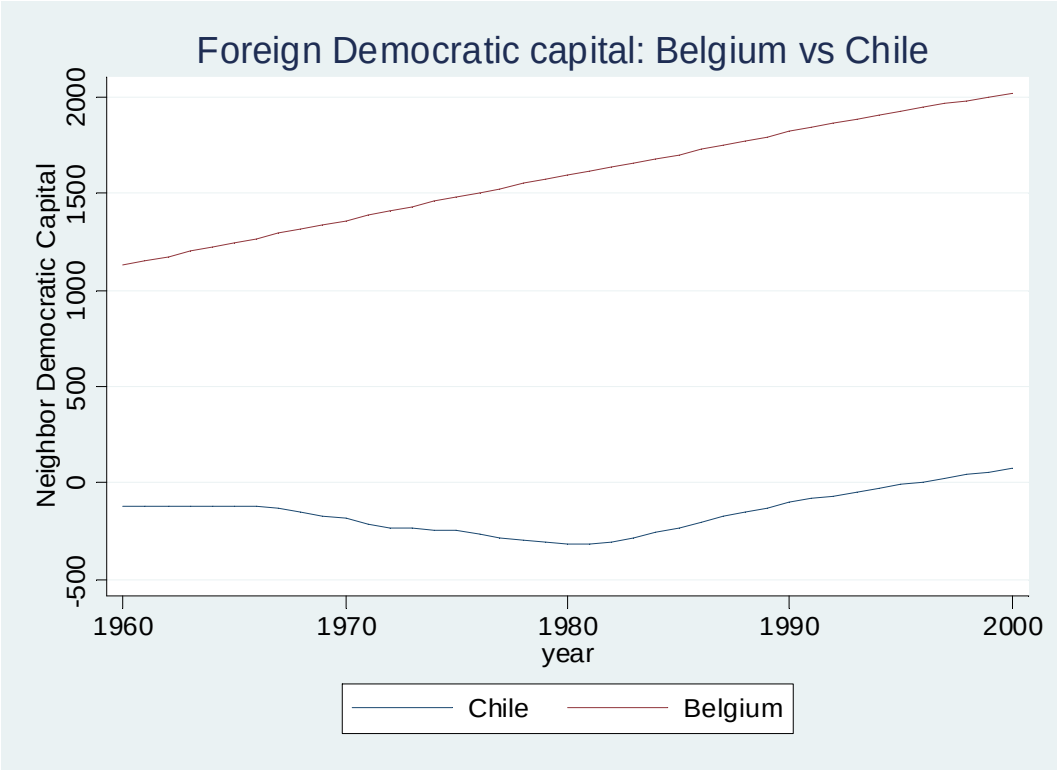

Table A: Correlation between Polity2 and measures of Democratic stock

	Polity2	Democratic stock	Neighbor Democratic Stock
Polity2	1		
Democratic stock	0.7022	1	
Nighbor Democratic Stock	0.4876	0.6737	1

Table B: lenght of each countries time series

country	starting year	ending year	sample lenght	country	starting year	ending year	sample lenght
United States of America	1960	2000	41	Liberia	1993	2000	8
Canada	1960	2000	41	Sierra Leone	1970	2000	31
Haiti	1970	2000	31	Ghana	1960	2000	41
Dominican Republic	1960	2000	41	Togo	1960	2000	41
Jamaica	1962	2000	39	Cameroon	1960	2000	41
Mexico	1960	2000	41	Uganda	1963	2000	38
Guatemala	1960	2000	41	Kenya	1963	2000	38
Honduras	1960	2000	41	Burundi	1990	2000	11
El Salvador	1960	2000	41	Rwanda	1970	2000	31
Nicaragua	1960	2000	41	Mozambique	1975	2000	26
Costa Rica	1960	2000	41	Zambia	1964	2000	37
Panama	1993	2000	8	Zimbabwe	1970	2000	31
Colombia	1960	2000	41	Malawi	1966	2000	35
Venezuela	1960	2000	41	South Africa	1965	2000	36
Ecuador	1960	2000	41	Lesotho	1993	2000	8
Peru	1960	2000	41	Botswana	1970	2000	31
Brazil	1960	2000	41	Swaziland	1993	2000	8
Bolivia	1960	2000	41	Algeria	1963	2000	38
Paraguay	1960	2000	41	Tunisia	1961	2000	40
Chile	1960	2000	41	Sudan	1993	2000	8
Argentina	1960	2000	41	Iran	1960	2000	41
Uruguay	1960	2000	41	Turkey	1960	2000	41
United Kingdom	1960	2000	41	Iraq	1970	2000	31
Ireland	1960	2000	41	Egypt	1975	2000	26
Netherlands	1960	2000	41	Syria	1961	2000	40
Belgium	1960	2000	41	Jordan	1960	2000	41
France	1960	2000	41	Israel	1960	2000	41
Switzerland	1960	2000	41	Kuwait	1993	2000	8
Spain	1960	2000	41	Bahrain	1993	2000	8
Portugal	1960	2000	41	China	1975	2000	26
Poland	1970	2000	31	Taiwan	1960	2000	41
Austria	1960	2000	41	South Korea	1960	2000	41
Hungary	1970	2000	31	Japan	1960	2000	41
Italy	1960	2000	41	India	1960	2000	41
Greece	1960	2000	41	Pakistan	1960	2000	41
Cyprus	1970	2000	31	Bangladesh	1973	2000	28
Finland	1960	2000	41	Sri Lanka	1960	2000	41
Sweden	1960	2000	41	Nepal	1960	2000	41
Norway	1960	2000	41	Thailand	1960	2000	41
Denmark	1960	2000	41	Malaysia	1963	2000	38
Gambia	1975	2000	26	Singapore	1965	2000	36
Mali	1960	2000	41	Philippines	1960	2000	41
Senegal	1960	2000	41	Indonesia	1960	2000	41
Benin	1970	2000	31	Australia	1963	2000	38
Mauritania	1990	2000	11	New Zealand	1960	2000	41
Niger	1960	2000	41				

Total observations	3215
Total number of countries	91

Table C: Composition of different sub-samples

	Observations	Countries
All sample	3215	91
Democracy	1795	73
Autocracy	1420	63
Always democracy	1087	28
Always autocracy	441	18
Experimented transition	1687	45

Table 1: Democracy and Infant Mortality Rates

	all sample		democratic countries		autocratic countries		always democratic		never democratic		changing regime	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
lag_IMR		0.8042***		0.8521***		0.6569***		0.8160***		0.6944***		0.8264***
		(0.0299)		(0.0372)		(0.0469)		(0.0408)		(0.0659)		(0.0425)
luf_int	0.0123***	0.0025***	0.0104**	-0.0002	0.0069**	0.0028*	0.0037	-0.0017*	0.0031	0.0033	0.0098**	0.0021***
	(0.0025)	(0.0006)	(0.0051)	(0.0010)	(0.0033)	(0.0014)	(0.0065)	(0.0010)	(0.0096)	(0.0044)	(0.0039)	(0.0008)
growth	-0.1543	-0.0219	-0.4786**	-0.1060**	-0.1166	-0.0438	-0.3545*	-0.0905**	-0.0345	-0.0101	-0.0655	-0.0124
	(0.1249)	(0.0278)	(0.216)	(0.0420)	(0.1196)	(0.0423)	(0.2044)	(0.0457)	(0.1929)	(0.0776)	(0.243)	(0.0608)
rgdpch	-0.0001***	-0.0000***	-0.0001***	-0.0000	-0.0001***	-0.0000**	-0.0001***	-0.0000	-0.0001**	-0.0000	-0.0001***	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
kg	0.0013	-0.0000	0.0103*	0.0009	0.0027	0.0010	0.0086	0.0020	-0.0041	0.0000	0.0005	-0.0011
	(0.0033)	(0.0010)	(0.0055)	(0.0013)	(0.0042)	(0.0018)	(0.0059)	(0.0014)	(0.0085)	(0.0046)	(0.0045)	(0.0011)
conflict	0.0174	0.0020	-0.0264	0.0027	0.0301	-0.0008	-0.0482	0.0029	0.1312**	-0.0021	0.0069	0.0065
	(0.0450)	(0.0156)	(0.0651)	(0.0230)	(0.0359)	(0.0224)	(0.0299)	(0.0125)	(0.0660)	(0.0481)	(0.0681)	(0.0234)
polity2	-0.0129***	-0.0024**	-0.0146	-0.0035	-0.0188***	-0.0047*	0.0330	-0.0008	-0.0617**	-0.0120*	-0.0128***	-0.0020**
	(0.0035)	(0.0009)	(0.0170)	(0.0038)	(0.0071)	(0.0027)	(0.0372)	(0.0092)	(0.0302)	(0.0063)	(0.0034)	(0.0010)
dem_stock	-0.0012***	-0.0002**	-0.0025***	-0.0004**	0.0010	0.0003	-0.0038***	-0.0008***	0.0007	-0.0001	-0.0005	-0.0001
	(0.0004)	(0.0001)	(0.0009)	(0.0002)	(0.0006)	(0.0003)	(0.0009)	(0.0002)	(0.0017)	(0.0014)	(0.0005)	(0.0001)
Constant	3.8116***	0.8895***	4.0659***	1.5008***	4.0078***	1.6603***	4.1995***	1.5901***	3.9052***	1.0299	3.9790***	0.7554
	(0.1554)	(0.2673)	(18.82327)	(0.4566)	(0.2604)	(0.3769)	(0.4932)	(0.4705)	(0.8255)	(0.6372)	(0.2898)	(0.4939)
Error term	fe	fe	fe	re	fe	fe	fe	fe	fe	fe	fe	fe
Time dummy	no	no	no	no	no	no	no	no	no	no	no	no
Observations	3215	3130	1795	1692	1420	1340	1087	1059	441	428	1687	1643
Number of countries	91	91	73	73	63	63	28	28	18	18	45	45
R-squared	0.631	0.874	0.750	0.839	0.377	0.669	0.871	0.854	0.372	0.694	0.532	0.853
LL	-322.6	1432	67.65	1286	-89.70	374.1	333.1	896.5	-145.5	23.11	-228.1	758.8

Bootstrapped standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 2: Democracy and Infant Mortality Rate. Democratic stock weighted

	all sample		democratic countries		autocratic countries		always democratic		never democratic		changing regime	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Lag_IMR		0.9173***		0.8629***		0.6596***		0.8728***		0.6898***		0.8266***
		(0.0149)		(0.0316)		(0.0476)		(0.0381)		(0.0649)		(0.0427)
luf_int	0.0116***	0.0010***	0.0154***	0.0003	0.0105***	0.0038***	0.0174***	-0.0000	0.0091	0.0043	0.0099**	0.0022***
	(0.0025)	(0.0003)	(0.0049)	(0.0009)	(0.0028)	(0.0013)	(0.0053)	(0.0015)	(0.0070)	(0.0032)	(0.0040)	(0.0008)
growth	-0.1473	-0.0199	-0.6039**	-0.1237***	-0.1422	-0.0506	-0.5246**	-0.0959*	-0.0371	-0.0046	-0.0376	-0.0067
	(0.1201)	(0.0129)	(0.2230)	(0.0456)	(0.1271)	(0.0497)	(0.2560)	(0.0568)	(0.1919)	(0.0786)	(0.2346)	(0.0560)
rgdpch	-0.0001***	-0.0000**	-0.0001***	-0.0000	-0.0001***	-0.0000*	-0.0001***	-0.0000	-0.0001**	-0.0000	-0.0001***	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
kg	-0.0003	-0.0006	0.0028	-0.0004	0.0020	0.0008	-0.0031	-0.0002	-0.0052	-0.0000	0.0001	-0.0011
	(0.0038)	(0.0005)	(0.0076)	(0.0016)	(0.0036)	(0.0018)	(0.0097)	(0.0018)	(0.0079)	(0.0045)	(0.0048)	(0.0012)
conflict	0.0283	0.0186	-0.0120	0.0059	0.0340	-0.0012	0.0032	0.0169	0.1185**	-0.0096	0.0112	0.0075
	(0.0453)	(0.0118)	(0.0662)	(0.0218)	(0.0311)	(0.0225)	(0.0448)	(0.0150)	(0.0582)	(0.0491)	(0.0706)	(0.0229)
polity2	-0.0138***	-0.0003	-0.0069	-0.0018	-0.0185**	-0.0047*	0.0388	-0.0010	-0.0585**	-0.0124*	-0.0133***	-0.0021**
	(0.0036)	(0.0006)	(0.0138)	(0.0037)	(0.0077)	(0.0028)	(0.0357)	(0.0077)	(0.0281)	(0.0164)	(0.0036)	(0.0010)
dem_stock	-0.0002**	0.0000	-0.0003***	-0.0001***	0.0000	-0.0000	-0.0003**	-0.0001**	-0.0002	-0.0001	-0.0001	-0.0000
	(0.0001)	(0.0000)	(0.0001)	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0006)	(0.0003)	(0.0001)	(0.0000)
Constant	3.8934***	0.4348***	3.9007***	1.5766***	3.6631***	1.5955***	3.6830***	1.3130**	3.2478***	0.8725*	4.0057***	0.7092
	(0.1622)	(0.1095)	(0.2633)	(0.4711)	(0.2199)	(0.3953)	(0.4375)	(0.5836)	(0.7002)	(0.5078)	(0.3024)	(0.4453)
Error term	fe	fe	fe	fe	fe	fe	fe	fe	fe	fe	fe	fe
Time dummy	no	no	no	no	no	no	no	no	no	no	no	no
Observations	3215	3130	1795	1692	1420	1340	1087	1059	441	423	1687	1642
Number of countries	91	91	73	71	63	63	28	28	18	18	45	45
R-squared	0.618	.	0.750	.	0.369	.	0.817	.	0.376	.	0.531	0.531
LL	-376.2		67.65		-98.53		143.4		-144.2		-229.6	-229.6

Bootstrapped standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3: Democracy and other measures of Social Welfare

	all sample		democratic countries		autocratic countries		always democratic		never democratic		changing regime	
	(1) Illiteracy rate	(2) Fertility rate	(3) Illiteracy rate	(4) Fertility rate	(5) Illiteracy rate	(6) Fertility rate	(7) Illiteracy rate	(8) Fertility rate	(9) Illiteracy rate	(10) Fertility rate	(11) Illiteracy rate	(12) Fertility rate
lag dep var	0.9148***	0.8963***	0.9026***	0.8660***	0.8797***	0.8572***	0.9047***	0.7661***	0.8911***	0.8361***	0.9060***	0.8982***
	(0.0116)	(0.0154)	(0.0162)	(0.0324)	(0.0254)	(0.0256)	(0.0194)	(0.0792)	(0.0383)	(0.0697)	(0.0185)	(0.0226)
luf_int	-0.0026***	0.0093***	-0.0029**	0.0076**	-0.0013	0.0113***	-0.0006	-0.0036	-0.0019	-0.0002	-0.0029***	0.0093***
	(0.0005)	(0.0018)	(0.0012)	(0.0031)	(0.0012)	(0.0030)	(0.0015)	(0.0071)	(0.0028)	(0.0053)	(0.0008)	(0.0028)
growth	0.0109	-0.0823*	0.0313	-0.1477	-0.0036	-0.0177	0.1375**	-0.1595	-0.0240	0.0533	0.0041	-0.1509***
	(0.0189)	(0.0461)	(0.0502)	(0.1153)	(0.0309)	(0.1040)	(0.0595)	(0.2486)	(0.0485)	(0.1938)	(0.0396)	(0.0510)
rgdpch	0.0000	0.0000**	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	0.0000	-0.0000	0.0000	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0001)	(0.0000)	(0.0000)
kg	0.0029***	-0.0025**	0.0031**	-0.0045	0.0024	-0.0017	0.0031**	-0.0010	0.0038	0.0017	0.0026**	-0.0039**
	(0.0009)	(0.0012)	(0.0013)	(0.0030)	(0.0018)	(0.0015)	(0.0013)	(0.0065)	(0.0031)	(0.0028)	(0.0013)	(0.0017)
conflict	-0.0065	0.0262	-0.0024	-0.0493	-0.0129	0.0726**	-0.0097	-0.0200	-0.0187	0.0788	-0.0093	0.0146
	(0.0100)	(0.0175)	(0.0089)	(0.0310)	(0.0184)	(0.0333)	(0.0084)	(0.0342)	(0.0331)	(0.0786)	(0.0147)	(0.0180)
polity2	-0.0014*	-0.0027**	0.0013	-0.0031	0.0044	-0.0071**	0.0024	0.0100	-0.0043*	-0.0341**	-0.0022***	-0.0019**
	(0.0007)	(0.0011)	(0.0026)	(0.0055)	(0.0042)	(0.0035)	(0.0097)	(0.0211)	(0.0022)	(0.0167)	(0.0009)	(0.0009)
dem_stock	-0.0002***	-0.0001*	-0.0001*	-0.0006	-0.001	0.0003	-0.0000	-0.0032***	-0.0006	0.0025*	-0.0004	-0.0000
	(0.0001)	(0.0001)	(0.0000)	(0.0004)	(0.0015)	(0.0004)	(0.0002)	(0.0008)	(0.0006)	(0.0013)	(0.0013)	(0.0001)
Constant	0.1743**	0.5800	0.1001	1.5190	0.0399	1.2674	-0.8928*	3.0760	0.4844	0.5811	0.1024	1.1312***
	(0.0798)	(0.3576)	(0.4007)	(0.9421)	(0.2839)	(0.7174)	(0.5037)	(2.1760)	(0.5028)	(1.3643)	(0.3468)	(0.4177)
Error term	fe	fe	fe	re	fe	fe	fe	fe	fe	fe	fe	fe
Observations	3128	2011	1692	748	1338	1178	1059	294	424	361	1645	1356
Number of countries	91	62	71	45	63	52	28	9	18	14	45	39
R-squared	0.936	0.955	0.935	0.958	0.926	0.925	0.932	0.965	0.947	0.925	0.935	0.962
LL	1822	282.7	1557	142.7	591.2	156.8	960.8	38.63	239.4	-16.12	754.1	331.2

Bootstrapped standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: Democracy and Infant Mortality Rates. Non linearities

	all sample	democratic countries	autocratic countries	always democratic	never democratic	changing regime
	(1)	(3)	(5)	(7)	(9)	(11)
lag_IMR	0.8041***	0.8517***	0.6535***	0.8163***	0.6944***	0.8265***
	(0.0278)	(0.0377)	(0.0514)	(0.0455)	(0.0664)	(0.0431)
luf_int	0.0025***	-0.0005	0.0026*	-0.0017	0.0033	0.0021***
	(0.0006)	(0.0009)	(0.0015)	(0.0012)	(0.0045)	(0.0008)
growth	-0.0222	-0.1197***	-0.0430	-0.0906*	-0.0112	-0.0108
	(0.0279)	(0.0418)	(0.0468)	(0.0487)	(0.0882)	(0.0605)
rgdpch	-0.0000***	-0.0000	-0.0000**	-0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
kg	-0.0000	0.0008	0.0008	0.0021	0.0000	-0.0011
	(0.0010)	(0.0013)	(0.0019)	(0.0014)	(0.0049)	(0.0011)
conflict	0.0021	0.0037	-0.0006	0.0032	-0.0021	0.0056
	(0.0153)	(0.0217)	(0.0231)	(0.0118)	(0.0516)	(0.0224)
polity2	-0.0024***	0.0198	0.0071	-0.0211	-0.0167	-0.0021**
	(0.0009)	(0.0160)	(0.0079)	(0.1188)	(0.0695)	(0.0010)
polity2^2	0.0000	-0.0020	0.0014	0.0015	-0.0004	-0.0002
	(0.0002)	(0.0013)	(0.0009)	(0.0080)	(0.0060)	(0.0002)
dem_stock	-0.0003**	-0.0004**	0.0003	-0.0008***	-0.0001	-0.0001
	(0.0001)	(0.0002)	(0.0003)	(0.0002)	(0.0008)	(0.0001)
Constant	0.8914***	1.5755***	1.6992***	1.6468***	1.0265	0.7505
	(0.2631)	(0.4576)	(0.4021)	(0.6324)	(0.7638)	(0.4812)
Error term	fe	fe	fe	fe	fe	fe
Time dummy	no	no	no	no	no	no
Observations	3215	1795	1420	1087	441	1687
Number of countries	91	73	63	28	18	45
LL	1432	1289	375.8	896.7	23.11	759.2

Bootstrapped standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Conclusions

Positive structural breaks in long run growth are affected by changes towards democracy and autocracy, while the chances of negative shocks are decreased by liberalization and growth crises abroad. Some determinants matter for positive breaks, others do for negative ones, without any symmetric framework: the same policies or events can have an impact on some economic episodes, while their opposite not. In the same way there is not a common path through which democracy impacts on social welfare: its historical dimension has a positive effect on the standard of living of poorest in democratic countries, the contemporary degree of democracy matters in autocracy. The most important finding is that democracy, as other determinants, has not a linear impact on economy and social welfare: it depends on the environment in which it acts.