Oxford Economic Papers, 71(2), 2019, 344–363
doi: 10.1093/oep/gpy032
Advance Access Publication Date: 31 August 2018

OXFORD

The macroeconomic effects of official debt restructuring: evidence from the Paris Club

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Abstract

We study 422 episodes of official sector debt restructuring and their macroeconomic effects, using a novel data set of Paris Club treatments. We find that while official sector debt relief can significantly affect growth and external performance, the magnitude and direction of these effects critically depend on the restructuring terms offered by official creditors. Growth is 5% higher five years after a restructuring when nominal debt relief is provided. Underlying this difference in performance is an increase in investment following nominal debt relief but not Net Present Value (NPV) relief, and a reduction on the fiscal deficit after NPV debt relief not observed in the case of nominal debt relief. Our study also suggests that the official sector faces a trade-off between the objectives of stimulating growth and promoting external rebalancing when designing debt relief. Countries receiving NPV debt relief are likely to show a sustained improvement of their external balance, while those receiving nominal debt relief are not.

JEL classifications: C53, F33, F34, H62, H63.

1. Introduction

The literature on sovereign debt restructurings has extensively studied restructuring episodes involving private creditors. However, little systematic evidence has been produced on the characteristics and implications of debt restructurings involving official creditors.[1] This is remarkable given that official creditors have historically played a fundamental role in the resolution of sovereign debt crises, as highlighted by Das *et al.* (2012) and IMF (2013), and visually described in Fig. 1. In fact, readers only need to consider the recent events involving official claims in Iceland, Argentina, Greece, or Ukraine to grasp the importance of the issue and the need to further deepen our understanding regarding these episodes.

1 See Das *et al.* (2012), Reinhart and Trebesch (2016), Forni *et al.* (2016), or Marchesi and Masi (2017).

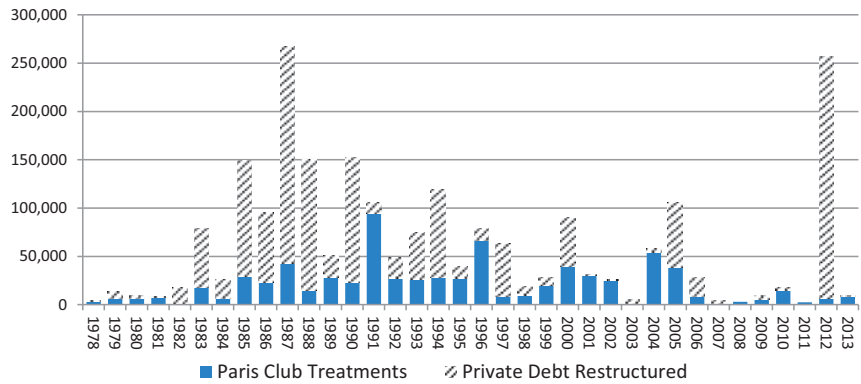

Fig. 1. Evolution of sovereign debt restructurings: Paris Club treatments vs. Private sector involvement. *Source*: Paris Club, Cruces and Trebesch (2013).

In this paper we contribute to filling this gap by exploring the data set of Paris Club debt restructuring deals presented in Cheng *et al.* (2016), which contains all agreements concluded between 1956 and 2015. We go beyond the descriptive statistics and stylized facts presented in Cheng *et al.* (2016), and use local projection techniques (Jordà, 2005) to uncover the macroeconomic effects of restructuring official sector debt.

Our analysis contributes to the narrow, but growing, literature on official sector debt relief.[2] Using data for the period 1980–1998, Easterly (2002) finds that debt relief to Highly Indebted Poor Countries (HIPC) often resulted in increased indebtedness, paradoxically. With a gravity model, Rose (2005) documents a negative effect of official debt restructuring on trade.[3] However, Martinez and Sandleris (2011) find no effect on trade coming from official sector debt relief after controlling for debt relief with private creditors. Arteta and Hale (2008) find that episodes involving official creditors damage debtor countries' access to capital markets more than those involving private creditors. Das *et al.* (2012) present evidence of serial defaulting, showing that official sector debt restructuring has been widespread both in time and across countries. Reinhart and Trebesch (2016) study the effects of official debt relief for European nations during the 1930s, and the private debt relief for Latin American countries via the Brady Plan in the 1990s. Using a difference-in-difference approach to study the effects of the Brady Plan, Reinhart and Trebesch (2016) conclude that debt restructuring is more beneficial for growth when it provides nominal debt relief than when relief is delivered in Net Present Value (NPV) terms (i.e. through

2 Regarding debt restructuring offered by private creditors, the literature is ample. Wright and Tomz (2005) and Gelos *et al.* (2011) focus on the effect of sovereign defaults on the conditions of market access. Borensztein and Panizza (2009) present a widely cited compilation on the costs of sovereign default. Borensztein and Panizza (2009) look at the effect on reputation. Cruces and Trebesch (2013) study sovereign market access after a private-sector involvement (PSI) using a database on haircuts. They find that larger haircuts predict harder market access. In turn, Asonuma and Trebesch (2016) study the different dynamics created by pre-emptive and post-default restructurings. A handful of recent papers deal with the output costs of private sector debt restructuring: Forni *et al.* (2016), Asonuma *et al.* (2016), Kuvshinov and Zimmermann (2016), and House *et al.* (2017).

3 He finds that following debt restructuring, trade falls by 8% of GDP.

maturity extensions or interest rate reductions). This paper is also closely related to Forni *et al.* (2016) and Marchesi and Masi (2017), who study the impact of Paris Club agreements on growth as well. Forni *et al.* (2016) observe that debt relief has the largest growth impact for countries that exit restructuring with relatively low debt levels.[4] In turn, Marchesi and Masi (2017) compare the growth effects of private and official sector debt restructuring, and find that while private sector restructuring has a negative effect on growth, official sector debt relief can foster long run growth.

As highlighted by Cruces and Trebesch (2013) in the context of debt restructuring of privately-held sovereign debt (PSI), a limitation in previous studies (see, for instance Forni *et al.*, 2016) is the absence of information regarding the features of Paris Club treatments. Forni *et al.* (2016) mainly focus on the restructuring of privately-held claims; Paris Club agreements are represented by a simple dummy variable. Instead, Marchesi and Masi (2017) use information on the amount of debt treated. However, as discussed in Cheng *et al.* (2016), the volume of claims involved in a restructuring does not reflect the magnitude of debt relief provided. Our characterization of Paris Club treatments is richer, as our data include not only information on the timing and volume exchanged, but more importantly on the extent of nominal debt and NPV relief provided by official creditors. The latter is crucial as it allows us to study the macroeconomic effects of different restructuring strategies.[5]

We show three sets of key results in our paper. First, Paris Club treatments overall can have a significant impact on economic growth. This result, in line with Marchesi and Masi (2017), confirms the positive effect of official debt restructuring on economic growth. Second, we show that the growth effect of debt restructuring depends on restructuring approaches, i.e. either nominal debt relief was offered or restructuring only involved NPV treatment. Our empirical study shows that the growth effect is stronger when the debt treatment included a nominal debt reduction. Remarkably, such agreements lead, on average, to 5% higher GDP growth after five years. By contrast, Paris Club treatments carrying only NPV relief have a more uncertain impact on growth. In fact, the difference in growth patterns between debt restructuring offering nominal debt reduction and NPV relief is statistically significant for low levels of NPV relief. This result extends the findings by Reinhart and Trebesch (2016) that nominal debt relief generates higher growth than NPV relief to the restructuring of official claims. Finally, we also dig into the channels that lead to faster growth following nominal debt relief. We observe that investment rebounds strongly following nominal debt relief while countries receiving only NPV relief conduct a more stringent fiscal policy (likely contractionary in the short-run).[6] This is also in line with Arslanalp and Henry (2005), who argue that debt relief could encourage investment in countries facing a debt overhang.

According to our results, from the perspective of resolving a debt overhang problem, nominal haircuts are the most effective tool. In fact, our findings suggest that it is the only restructuring approach that guarantees a significant reduction in debt stocks in the short term. In this way, our findings reconcile those in Easterly (2002), who observed a lack of

4 From a technical perspective, Forni *et al.* (2016) tackle endogeneity concerns using a difference-in-difference strategy. In addition, as in Kuvshinov and Zimmermann (2016), Forni *et al.* (2016) reduce selection biases using a matching estimator.

5 In addition, when compared with Marchesi and Masi (2017) who study 85 restructuring episodes, our data set contains 422 events, a significantly larger number of episodes.

6 See Jordà and Taylor (2016).

Table 1. Evolution of Paris Club terms of treatment

	Number of Agreements	Countries	Amount Treated (billion US$)	Nominal Relief (billion US$)	Nominal Relief % Amount Treated	NPV Relief	Agreements per Country
Ad Hoc	33	25	238.9	53.5	22.4	–	1.3
Classic	165	58	153.9	0.0	0.0	0%	2.8
Toronto	28	20	6.1	0.0	0.0	33%	1.4
Houston	35	21	72.0	0.0	0.0	0%	1.7
London	26	23	8.6	0.0	0.0	50%	1.1
Naples	47	33	31.6	8.4	26.7	67%	1.4
Naples 50%	6	4	3.1	0.2	5.7	50%	1.5
Lyon	7	5	6.0	0.9	15.1	80%	1.4
Cologne	39	32	24.2	6.0	24.9	90%	1.2
HIPC Exit	36	36	36.8	24.0	65.3	98%	1.0
Total	422	86	581.2	93.1	16.0		4.9

Source: Authors' calculations.

sustained reduction in debt stocks following official sector debt relief. We explain that this is likely the outcome of debt restructuring involving only NPV measures. In addition, we document the soft-spot of this success story. Our results show that countries not receiving nominal debt relief are more likely to have a sustained external sector rebalancing, underlined by significantly larger trade surpluses following debt restructuring. From a policy perspective, our results support the idea that when designing a solution to a debt overhang problem, the official sector faces a trade-off between the objectives of stimulating economic growth and promoting external rebalancing.

The rest of the paper is structured as follows. Section 2 introduces the data set and presents a set of new stylized facts. Section 3 outlines our empirical methodology. Section 4 presents the empirical results to unveil the causal impact of official sector debt relief on the debtors' economic performance. Section 5 discusses how we deal with potential endogeneity issues and presents additional robustness checks. Finally, Section 6 concludes.

2. Data

As detailed in Das *et al.* (2012) and Cheng *et al.* (2016), the Paris Club is an informal forum, hosted by the French Treasury in Paris, where creditor governments have conducted debt-rescheduling negotiations with sovereign debtors in a coordinated manner since 1956. In this paper, we use the data set described in Cheng *et al.* (2016), which contains 422 Paris Club restructuring episodes.[7] For each Paris Club agreement, our data set contains the following information: the signing country, the date of the agreement, the total amount of debt treated, the nominal relief provided (if any), and the terms of the agreement. As described in Cheng *et al.* (2016), the terms applied by the Paris Club have evolved overtime, accommodating to the changing objectives of the creditors. Different terms of agreement imply different degrees of nominal and/or net-present-value debt relief, as summarized in Table 1.

7 As detailed in Cheng *et al.* (2016), the database was collected from the Paris Club website.

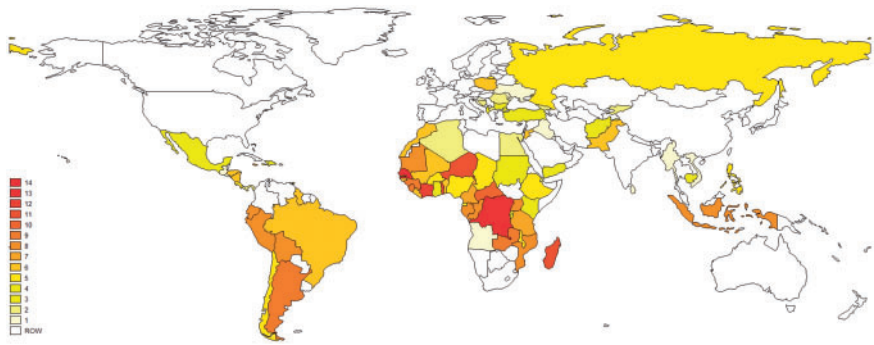

Fig. 2. Countries having received debt restructurings with the Paris Club.
Source: Authors' calculations.

In order to analyse the macroeconomic effects of these events, we need to complement Paris Club events with some macroeconomic and financial variables, which only exist on a yearly basis. We thus transformed the event-based Paris Club information in Cheng *et al.* (2016) to a yearly database, which reduced the absolute number of restructurings to 413, as some events occurred within a same year.[8] In order to control for the effects of restructurings offered by private creditors, we also merged our Paris Club data set with data from Cruces and Trebesch (2013) and Asonuma and Trebesch (2016).

There are in total 93 countries in our database. From these, 86 had at least one restructuring with Paris Club creditors. Figure 2 illustrates the geographical location of these countries and the distribution of the number of Paris Club restructurings, ranging from 1 to a maximum of 14 events per country. There are seven countries included in our database which never had an agreement with the Paris Club. These countries are included because they had at least one event of privately-held sovereign debt (PSI) restructuring. Table A.1 in the online appendix lists all countries in our data set and for each country indicates the years of debt treatment by official or private creditors

We complemented our data set with information on the income level and a number of macroeconomic and fiscal variables from all countries included in our sample. These variables, which are used in the existing literature on debt defaults, include nominal GDP, real GDP growth, total public debt, investment, fiscal balance and the trade balance. They were extracted from the World Bank's World Development Indicators and the International Monetary Fund's International Financial Statistics, and cover the period 1960–2015. Table 2 presents the statistics of the key dependent variables we look at in our empirical analysis to uncover the macroeconomic and fiscal impact of debt restructuring after we have controlled for the availability of data for our baseline regressions.[9]

8 The information from these nine events is not lost but aggregated annually.

9 We note that, due to the lack of observations for some HIPC countries in the earliest part of the sample, our panel is unbalanced.

Table 2. Summary statistics—dependent variables used in regressions

Variables	Mean	Standard deviation	Min	Max	Nb of observations
Real GDP growth (%)	3.61	5.62	−69.81	91.61	1,820
Public debt annual growth (%)	−1.04	18.24	−139.8	155.7	1,792
Investment annual growth (%)	7.84	24.38	−149.13	283.26	1,815
Fiscal deficit/GDP (%)	3.08	5.84	−40.34	61.14	1,733
Trade balance/GDP (%)	−7.4	15.25	−202.73	43.69	1,624

Source: Authors' calculations.

3. Methodology: local projections

Understanding the macroeconomic effects of sovereign defaults is not an easy task (see Forni *et al.*, 2016 or Kuvshinov and Zimmermann, 2016), because defaults are endogenous to countries' economic circumstances, thus complicating the task of extracting the structural effects that debt-restructuring events may have. Previous studies have often relied on dynamic panels to address this concern (see Arteta and Hale, 2008 or Marchesi and Masi, 2017). Instead, Kuvshinov and Zimmermann (2016), following Jordà and Taylor (2016), measure the effects of debt restructuring by estimating impulse-response functions (IRFs) using 'local projections' (Jordà, 2005). Kuvshinov and Zimmermann (2016) argue that this technique is more suitable because it explicitly controls for the endogenous feedbacks inherent to the dynamic relation between debt restructuring and the macroeconomic context in which they occur.[10] This methodology, which provides a flexible alternative to vector autoregression (VAR) approaches, allows us to directly project the behaviour of our variables of interest to the signing of a treatment with the Paris Club, by computing estimates of the h-step ahead cumulative average treatment effect on the variable under study. In practice, local projections are regression-adjusted difference-in-difference estimates that collapse the time series information in a pre- and a post-period for each step ahead.[11]

For the above reasons, we study the impact of Paris Club restructuring on economic outcomes by estimating local projections. In our basic linear specification, the responses of our variables of interest to a debt restructuring at horizon h is obtained from the following equation:

$$\Delta Y_{i,t+h} = \alpha_{i,h} + \beta_h PC_{i,t} + \Phi_h(L)\Delta Y_{i,t-1} + \Psi_h \Delta X_{i,t-1} + \mu_{i,t,h} \quad (1)$$

where $\Delta Y_{i,t+h} = Y_{i,t+h} - Y_{i,t+h-1}$ for $h \geq 0$, and $\Delta Y_{i,t+h}$ represents the accumulated change in the variable under scrutiny at time $t + h$. The lag polynomial $\Phi_h(L)$ represents two lags.[12] $PC_{i,t}$ represents a dummy for the signing of a Paris Club treatment and $X_{i,t-1}$ covers

10 See also Asonuma *et al.* (2016) and Forni *et al.* (2016).

11 Comparing local projections, a standard structural VAR and a dynamic simulation, Owyang *et al.* (2013) find that results are similar for the first 16 periods. For longer horizons, local projections tend to produce significant oscillations. Since we focus on the short to medium term, we can safely disregard this drawback.

12 Our choice of two lags is motivated by what appears to be customary in the literature (see Asonuma *et al.*, 2016). In Section 6 we assess the robustness of this choice by presenting the results using a four lag specification.

the following set of lagged controls: GDP growth, government debt, inflation, fiscal deficit, world GDP growth, and a set of country dummies ($\alpha_{i,h}$).

Every equation, for each h, is estimated using a standard ordinary least squares approach. We use robust Driscoll and Kraay (1998) standard errors to correct for potential heteroskedasticity, autocorrelation in the lags and error correlation across panels.[13]

3.1 Disentangle agreement-specific features

Similar to what has been observed for restructuring involving privately-held sovereign debt (PSI) (Reinhart and Trebesch, 2016), Paris Club treatments could have different macroeconomic effects, depending on the specific features of the agreement reached and the underlying circumstances of the country requesting the treatment.

To study this possibility and capture these potentially heterogeneous effects of different Paris Club debt treatments, we assign each episode to one of a set of mutually-excluding restructuring strategies (bins). The assignment of the episodes to specific bins is done on the basis of the features of the agreements whose effect we want to study. Following this approach, we test the effects of official debt relief in two dimensions: (i) whether nominal debt reduction was offered; and (ii) how large is the size of the NPV relief provided.[14]

Whether a particular restructuring included nominal debt reduction is immediately observable in our data set. Within the sample of events that did not provide nominal relief, we further separate the events that received a NPV relief superior to 50% of total debt treated ('High NPV') and those whose NPV relief is below ('Low NPV').

To calculate the non-linear effects of interest, we upgrade our original model to include interaction terms, through which we can separately estimate the effects of each restructuring approach (as represented by the corresponding bin). Thus, our new estimation strategy is based on the following equation:

$$\Delta Y_{i,t+h} = \alpha_{i,h} + \sum_{k=1}^{K} \beta_h^k (PC_{i,t} \cdot D_{i,t}^k) + \Phi_h(L)\Delta Y_{i,t-1} + \Psi_h \Delta X_{i,t-1} + \mu_{i,t,h},$$

where $D_{i,t}^k$ is each of the K mutually exclusive groups of Paris Club treatments. $D_{i,t}^k$ takes the value one if the restructuring experienced by country i and time t featured the characteristic of interest k. As before, $PC_{i,t}$ represents our Paris Club dummy. $X_{i,t-1}$ covers the same set of controls we included in the previous estimation.

We build the IRFs from the β_h^k coefficients (where we assume $D_{i,t}^k = 1$). Finally, we test the statistical significance of the differences between the two restructuring approaches by comparing the statistical significance of the pair-wise differences of these coefficients, $\beta_h^i - \beta_{k,h}^j$.

13 We also used a cluster robust estimator of variance as a robustness check to our baseline results. The baseline results remain unchanged.

14 There are both theoretical and empirical justifications to our decision to separate restructuring episodes according to the NPV relief they provided. On the empirical front Trebesch and Zabel (2016) have show that such a distinction is important to understand the effects on growth of PSI. For theoretical work allowing for NPV-dependent effects, see Arellano *et al.* (2013) and references therein.

3.2 Narrative identification

A common concern in the literature analysing the effects of debt restructuring is the ability of deliver causal claims, for instance because defaults are endogenous to countries' macroeconomic circumstances in ways the analyst can not control for. Analogous to what is done in the literature on fiscal and monetary policy shocks, one way to overcome identification concerns is to look only at default events that can be regarded as exogenously determined.[15] Similar to Reinhart and Trebesch (2016), given that creditor countries' political factors were a main driver of the timing and form of debt restructurings by the Paris Club, we think there is scope to argue that our ordinary least square (OLS) estimates do not suffer from endogeneity concerns. This assertion is based on the fact that, in most cases, Paris Club treatments were not approved because of an economic crisis, but either as part of a multilaterally concerted restructuring process of the debt of less-developed countries (i.e. countries under HIPC or Multilateral Debt Relief Initiative, Brady Plan, or Baker plan) or as a result of the political priorities of creditor countries (Evian cases, most of which have coincided with a political transition, the most clear case being that of Iraq after the first Gulf War). As such, Paris Club treatments were not a response to idiosyncratic shocks. This narrative identification strategy is particularly powerful for HIPC countries (part of the Millennium Development Goals).[16] We take advantage of the fact that both timing and terms of Paris Club treatments were driven by creditor countries' social forces and political pressures, which make our shocks 'exogenous' to short-run dynamics in debtor countries, to claim that our econometric results do not suffer from endogeneity problems.[17]

4. Empirical analysis

In this section, we will present our baseline empirical results following the regression specified in eq. (1). As explained in our empirical strategy in Section 3, we will first present the macroeconomic effect of debt restructuring on GDP and public debt growth before exploring different economic channels: investment, trade balance and fiscal balance. Moreover, each time, we will both look at Paris Club events altogether and the heterogeneity by restructuring terms (i.e. whether nominal debt relief is offered and the size of NPV relief in the absence of nominal debt reduction).

Our baseline empirical results on GDP and debt growth are presented in Fig. 3.

4.1 Growth perspective

First, we look at the overall real GDP growth after any kind of official debt relief episode, as it is shown in Fig. 3(a). Within the graph, our point estimates are represented by the blue solid line. Darker and lighter grey areas around it represent the 95% and 90% confidence

15 For instance, Reinhart and Trebesch (2016) look at collectively orchestrated restructurings, such as war debt restructuring episodes in the 1930s for advanced economies, or the Brady plan in the 1980s for Latin American countries. Forni *et al.* (2016) use a similar approach and consider private debt restructuring events following a Paris Club agreement as exogenous.

16 As we develop in detail in Cheng *et al.* (2016), while certain criteria were selected to determine which countries could participate in the HIPC initiative, the process was initiated as a result of the pressure exerted by developing nations' civil society.

17 Moreover, a multi-staged process was designed to implement the HIPC initiative (Cheng *et al.*, 2016).

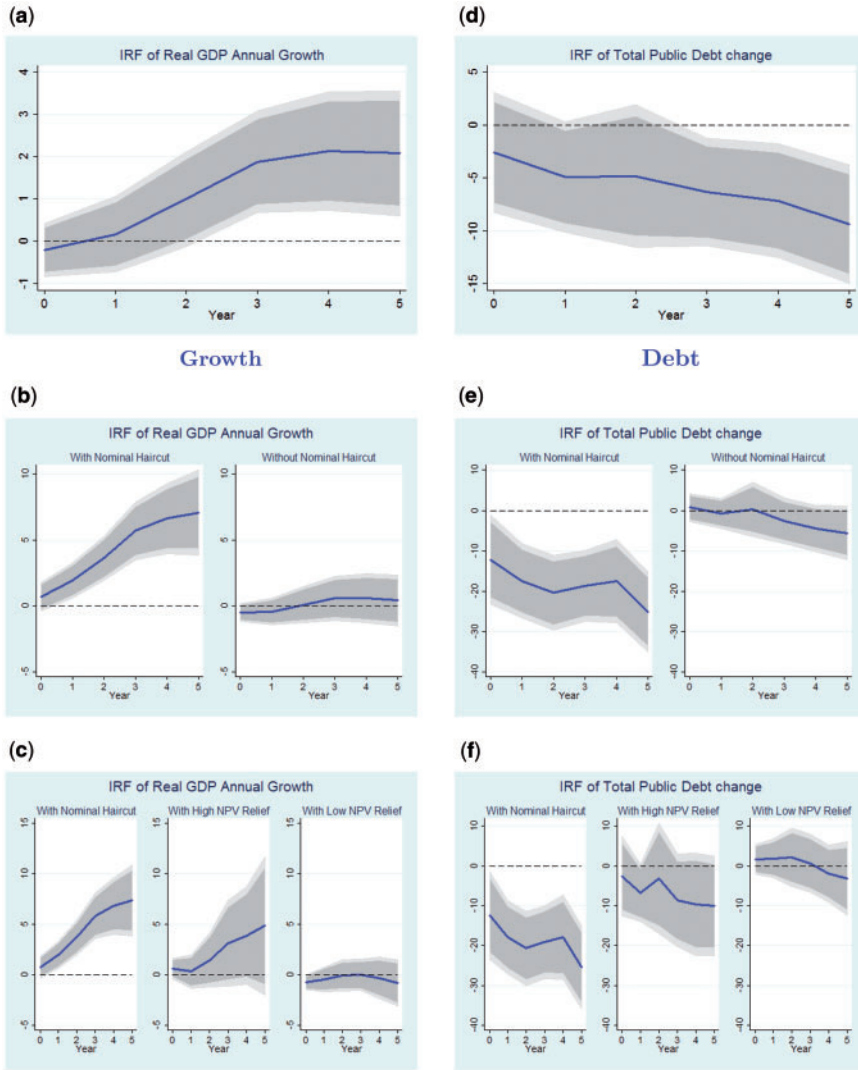

Fig. 3. Baseline results—Growth and Debt

bands, respectively. Similar to the findings in Marchesi and Masi (2017), after the first two years, in which no significant effect is observed, we find an increasingly positive effect in real growth. By the third year real GDP growth is over 1% point higher, and it increases to 2% after five years.

Next, we turn to comparing restructuring strategies including nominal debt relief to those without. The results are shown in Fig. 3(b). The figure shows that there is a marked difference in growth dynamics following nominal relief and NPV-based relief. Following nominal debt relief, real growth is significantly higher already one year after the treatment. This positive effect increases to 5% positive by the fifth year after the restructuring. These results are significant at the 95% confidence level. On the contrary, the events associated

Table 3. Real GDP growth—nominal haircut vs high/low NPV: standard errors in parentheses

	Steps					
	0	1	2	3	4	5
Nominal—High NPV	−0.0798	0.9522	1.5138	1.8080	0.9660	0.5664
	(0.6551)	(0.9251)	(1.5789)	(2.5450)	(3.1473)	(4.4722)
Nominal—Low NPV	1.5477	2.2961	3.7616	6.0943	6.5760	7.2681
	(0.6495)	(0.9344)	(1.2177)	(1.4309)	(1.9734)	(2.2420)

Source: Authors' calculations.

with debt reduction in NPV terms do not generate significant post-restructuring effect on growth.

Finally, we study whether the size of NPV relief matters for the effects on growth. The result is shown in Fig. 3(c). To further understand whether there is a difference between high NPV and low NPV events relative to the restructuring involving nominal relief, we tested the statistical difference between a nominal haircut on the one hand and high or low NPV relief respectively on the other. To recall the definition, high NPV relief is defined as a NPV relief superior to 50% of the total debt treated. The results of these statistical tests are shown in Table 3. We find that nominal debt relief generates a stronger real GDP growth than a restructuring using only low NPV relief measures. This result is statistically significant with a confidence interval of 95%. However, the difference in terms of real GDP growth between a nominal haircut and high NPV relief is not statistically significant.

4.2 Debt trajectory

Given that official debt relief aims to address unsustainable debt levels, we are also interested in how public debt behaves after a restructuring event with the Paris Club. In fact, although one of the drivers of official sector debt relief is to help debtor countries manage and reduce their debt stocks (see Das *et al*., 2012), Easterly (2002) finds that official sector debt relief does not lead to a sustained reduction on the debt stocks of of treated countries.[18]

Figure 3(d) shows that, when all episodes are considered together, government debt only decreases significantly (with a 95% confidence) three years after the restructuring takes place. According to our local projection estimates, annual change in the public debt to GDP ratio is 10% lower after five years.

When we disentangle nominal debt reductions from debt restructuring without nominal debt relief, we observe in Fig. 3(e) that, as expected, annual change in government debt decreases on impact (by 10%) and is a 30% lower after five years, following nominal debt relief. In comparison, in line with the findings in Easterly (2002), there is no statistically significant debt reduction following episodes of NPV debt relief.

18 Our use of nominal debt is not without drawbacks, especially when the aim is to assess sustainability. As highlighted in Dias *et al.* (2014), using net-present-value measures of public debt may have some advantages in the presence of long maturity loans at non-market rates. Such measures, however, also require to use (potentially) arbitrary discount factors, whose choice can have dramatic effects on the NPV value of the debt stock. For that reason, we decided to stick to the more standard nominal definition.

Table 4. Public debt growth—nominal haircut vs high/low NPV: standard errors in parentheses

	Steps					
	0	1	2	3	4	5
Nominal—High NPV	−10.5896 (8.0196)	−10.2405 (5.6119)	−16.8436 (7.7078)	−11.7252 (7.7744)	−9.2626 (8.5611)	−16.3065 (8.3465)
Nominal—Low NPV	−14.2524 (6.0907)	−18.5900 (5.1340)	−21.3580 (5.8573)	−19.6185 (6.1369)	−16.5568 (6.4285)	−22.3920 (6.8314)

Source: Authors' calculations.

Finally, we examine if the size of the NPV relief matters for the dynamics of debt stocks. Table 4 shows that a nominal haircut unambiguously generates a lower debt level after restructuring than both high and low NPV relief, although the difference presents a stronger statistical significance for low NPV relief episodes.

4.3 Drivers of the growth response

In this subsection we try to answer the question of what are the drivers of the heterogeneous dynamics of growth following different approaches to official sector debt restructuring documented on the previous paragraph. We focus on the main channels also identified in the empirical literature. Namely, we focus on investment, external performance and fiscal performance.[19] Our empirical results are shown in Figs 4–6.

4.3.1 Investment Public debt is often claimed to be responsible of crowding out private investment (Huang et al., 2016). For that reason, a natural starting point to examine the effect of debt restructuring on growth is the changes in the countries' investment dynamics. The IRFs detailing the performance of investment following restructuring of official claims can be found in Fig. 4(a–c).

We observe that investment growth dynamics track those of output growth. As shown in Fig. 4(b), there is a clear divergence in the dynamics of investment growth following nominal debt relief and NPV relief. Only in the first case there is a significant increase in investment. When we look at the effect of investment of using different degrees of NPV relief, we observe that the most damaging effect comes from episodes where the degree of NPV relief is low. In these situations, if anything, investment reacts negatively. We also notice that high NPV debt relief operations bring a great deal of uncertainty into the performance of investment but, on average, the effect is non-significant.

4.3.2 External performance Another main driver of economic growth, especially following crises, is the country's external sector (Edwards, 1993). In order to assess the

19 It is important to note that our results do not imply that the fiscal performance we document is an endogenous policy choice resulting from the restructuring. Instead, we notice that, for as long as the program remains on track, the path for fiscal policy was pre-determined within the conditionality associated to IMF program that accompanies every Paris Club treatment. Given our goal, all that matters is that differences in the fiscal stance (even if not a government active choice) can help us understand the growth dynamics observed.

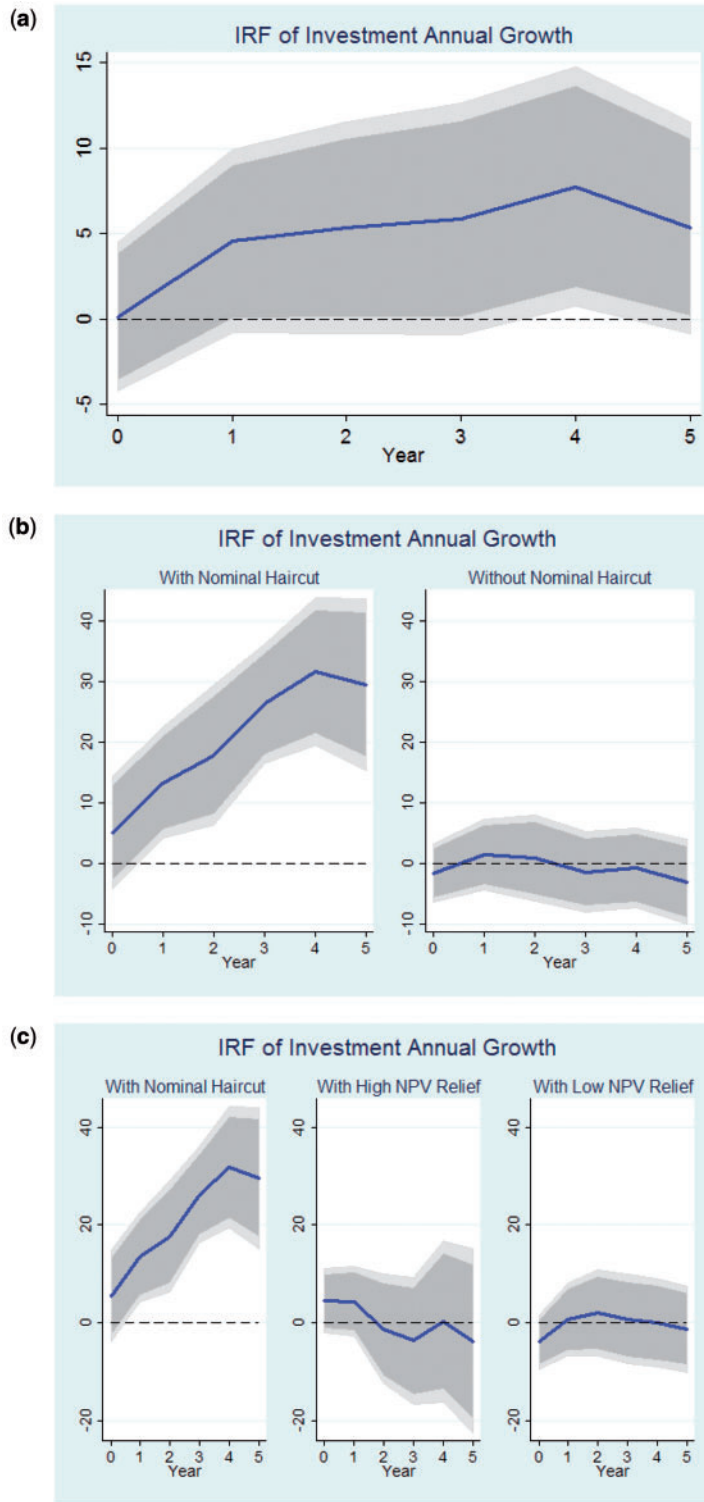

Fig. 4. Baseline results—Growth channels—Investment

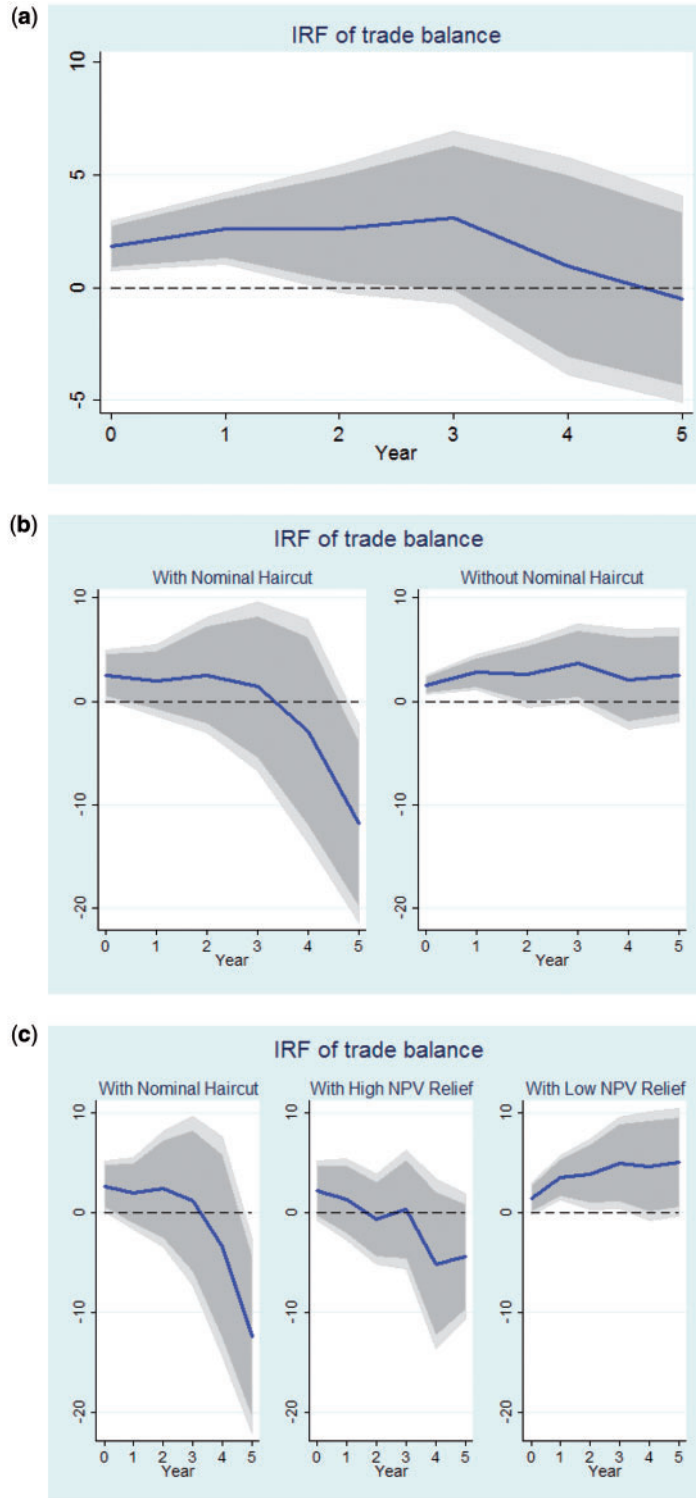

Fig. 5. Baseline results—Growth channels—Trade balance

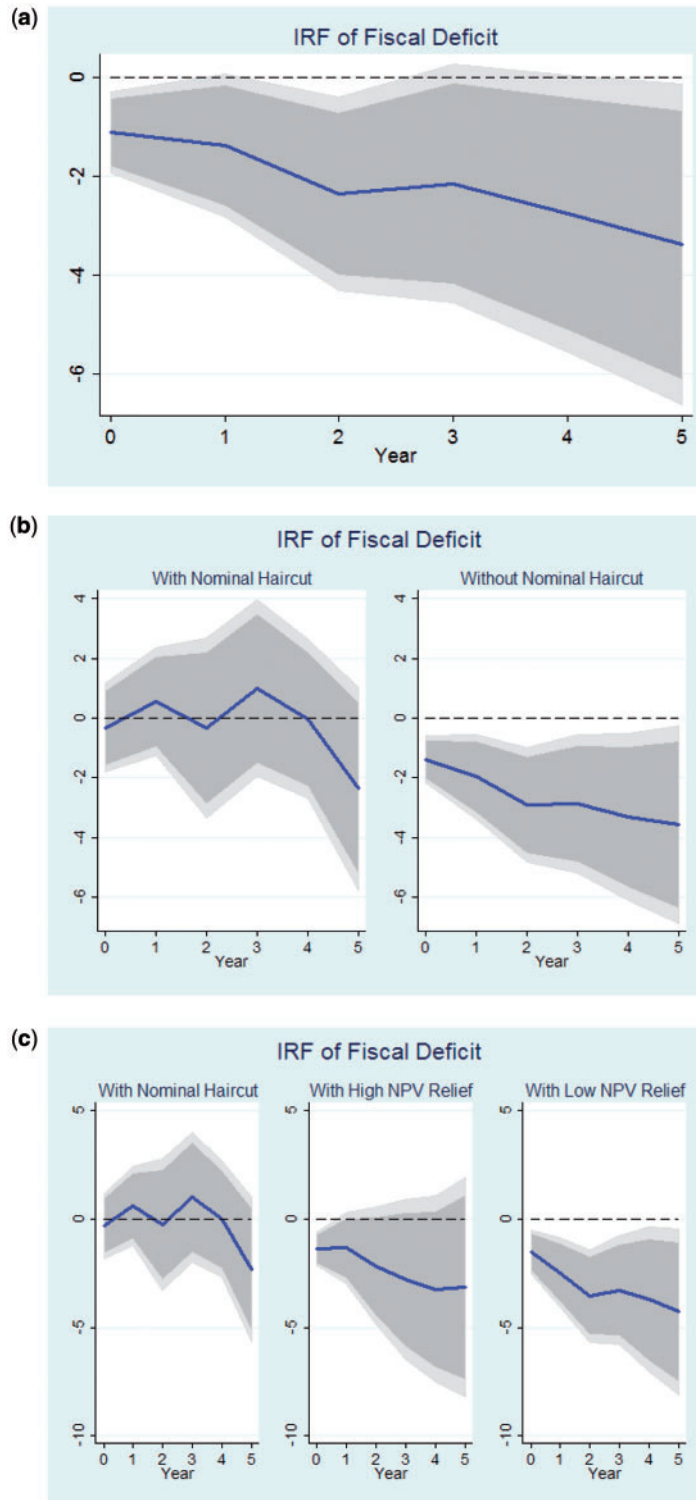

Fig. 6. Baseline results—Growth channels—Fiscal deficit

performance of external sector following debt restructuring with official creditors, we examine the trajectory of countries' trade balance. The IRFs for this variable are shown in Fig. 5(b).

The first observation to highlight is that following episodes of nominal debt relief there is a negative reaction of the trade balance, which becomes significant after three years. Instead, we observe a positive and significant reaction of the trade balance following NPV relief. These findings extend those on the existing literature on official debt restructurings, which so far had not differentiated the type of debt treatment when studying the effect of debt restructuring on trade (Rose, 2005; Martinez and Sandleris, 2011). Our results extend the intuition presented in Asonuma *et al.* (2016), who show that differences in the restructuring approach followed vis-à-vis private creditors are fundamental to understand the effects on trade to the restructuring of official claims.

4.3.3 Fiscal performance Once we understand the implications of official debt relief for investment and international trade, we turn to examine whether there are differences in fiscal policy stances across restructuring strategies. The full sample in Fig. 6(a) shows a continuous improvement of the fiscal deficit (a negative number corresponds to a fiscal surplus), which is statistically significant and reaches almost 4% five years after the restructuring.

However, the fiscal deficit behaves very differently depending on the restructuring approach offered. According to Fig. 6(b), following nominal debt relief there is not a significant change in the fiscal stance. Instead, certainly as part of the conditionality package accompanying the IMF progam, the fiscal deficit decreases significantly following episodes of NPV debt relief. In line with the findings in Owyang *et al.* (2013), our reading of these results is that the lower fiscal deficits registered following NPV relief operations have output costs.

5. Endogeneity and other robustness checks

In the literature analysing the restructuring of privately-held sovereign debt, authors often concern with identification. Commonly discussed potential problems include reverse causality and omitted variables. For example, it could be that current or past growth drives both future growth and the timing and form of the debt restructuring operation (Kuvshinov and Zimmermann, 2016), leading to a spurious correlation between the former two. As a result, our baseline OLS estimates could be driven by other country characteristics rather than by the effect of the debt relief operation.[20]

In addition to the narrative identification we have used in order to justify the validity of our baseline estimates, the literature presents two other alternatives to achieve identification. One possibility, explored by Asonuma and Joo (2017), is to use creditor's GDP growth as an instrument. The rationale for this approach is that, when creditors are risk averse, their preference for restructuring will be affected by economic conditions at home. While this argument may be fitting for debt restructuring involving the private sector, it seems second order for official creditors, who are not revenue maximizing agents. Alternatively, based on the work by Jordâ and Taylor (2016), a few papers have applied

20 Moreover, the terms of official sector restructuring are tied to some macroeconomic aspects of debtor countries by construction (see Cheng *et al.*, 2016).

Augmented Inverse Probability Weighting (AIPW) techniques (Asonuma *et al.*, 2016, Forni *et al.*, 2016, Kuvshinov and Zimmermann, 2016 or Marchesi and Masi, 2017). These techniques reduce the likelihood of endogeneity due to observable characteristics.

As a first step, we tried to follow Asonuma and Joo (2017) and used creditor countries' economic growth as an instrument for the Paris Club restructuring episodes. We used various lags of average real GDP growth in G7 countries as instruments. Unfortunately, the performance of the instruments was not good, as none of them came significant in the first step.[21] As a result, in the rest of this section, we describe the results from implementing the AIPW correction. As detailed below, AIPW results in Table 5 are very consistent with those obtained under our baseline estimates.

5.1 Augmented inverse probability weighting

Although our narrative of the timing and evolution of Paris Club deals attributes the exogeneity of our analysis to political factors and social pressures that are common to all debtor countries having received a restructuring, we acknowledge that endogenity can still stem from the fact that the Paris Club terms a country receives depends on the development stage of the country, characterized by some macroeconomic variables with clearly defined thresholds (e.g., HIPC countries share similar economic and development characteristics, such as GDP *per capita*, defined by the World Bank).

In order to deal with that concern, we follow the approach in Jordà and Taylor (2016), Forni *et al.* (2016) and Kuvshinov and Zimmermann (2016), and use an AIPW estimator. As detailed in Jordà and Taylor (2016), the AIPW estimator corrects potential biases that

Table 5. AIPW—first step regression

	Paris Club Treatment (t)			
	Coeffient	Standard Error	Coeffient	Standard Error
GDP Growth (t-1)	−0.00237	0.00174	−0.00133	0.00164
GDP Growth (t-2)	−0.00289	0.00167	−0.00235	0.00157
Government Debt to GDP (t-1)	−0.00031	0.00045	0.00001	0.00043
Government Debt to GDP (t-2)	0.00111	0.00045	0.00067	0.00041
Paris Club Treatment (t-1)	−0.09451	0.02392	−0.01877	0.02299
Paris Club Treatment (t-2)	0.03055	0.02359	0.10797	0.02252
Fiscal Deficit (t-1)	−0.00180	0.00214	−0.00167	0.00199
Fiscal Deficit (t-2)	−0.00028	0.00215	−0.00004	0.0020
Inflation (t-1)	0.00006	0.00002	0.00006	0.00002
Inflation (t-2)	−0.00001	0.00002	−0.00001	0.00002
Investment (t-1)	−0.00012	0.00034	−0.00031	0.00032
Investment (t-2)	−0.00038	0.00031	−0.00059	0.00030
Year Dummies	Yes		No	
Country Dummies	Yes		No	
Observations	1,820		1,820	
R-squared	0.142		0.142	

Source: Authors' calculations.

21 For that reason, we decided not to report the results.

could emerge because specific characteristics affect both the likelihood of a debt treatment and economic growth, by assigning a greater weight to observations that are less likely to be associated with official sector debt restructuring. The objective of this re-weighting is to replicate a distribution where restructuring events occur randomly (as opposed to being triggered by measurable features). We implement the scheme in two steps. In the first one, we regress our official restructuring indicators against a set of lags of all the macroeconomic variables included in the analysis. In a second step, using the weights obtained from the first step, we re-run our local projections.

The results from the first step, allowing us to re-weigh the observations while estimating the local projections, are presented in Table 5. Column 1 presents the results from a saturated model including not only two lags of all the macroeconomic variables we focus on in this paper, but also year and country specific fixed effects. The third column presents the results from a simpler model not including time and spatial dummies. The results show that, in fact, there seems to be some degree of selection on observables, as some of the coefficient have a significant (rightly signed) coefficients.[22]

The results from our AIPW-corrected local projections are presented together with other robustness in the online appendix (Figs A.1 to A.5). Figure A.1a presents the results for GDP growth. While these results show that the difference in growth dynamics between nominal and high NPV is not significant, they indicate that nominal debt relief is the only strategy that is expected to raise growth, in average. In turn, Fig. A.2a describes the different dynamics of public debt. The results are again consistent with those obtained in the baseline. Nominal debt relief is the only approach capable of delivering a significant and lasting reduction in debt stocks. Finally, Fig. A.3a, Fig. A.4a and Fig. A.5a look at the potential drivers of these differential responses of output growth. Once again, we observe that investment only reacts positively and significantly following nominal debt restructuring episodes. Instead, the different behaviour of fiscal policy is not evident any more, despite the point estimates still point towards a more significant adjustment of the fiscal stance following NPV operations. Last but not least, we still find a significant difference in the dynamics of the external sector. As in our baseline, we observe that NPV relief operations are accompanied by a less negative external balance.

5.2 Other robustness checks

As is customary in the literature, we proceed with various additional robustness checks. First, we include a control for the occurrence of private sector debt relief. Second, we re-estimate the model using the sub-sample of HIPC countries. Third, we increase the number of lags in our local projections from two to four. The results from these exercises are presented in the online appendix as well (Figs A.1 to A.5).[23]

We note three additional findings. First, for all of our robustness the results on investment look even clearer than in the baseline. Second, contrary to Martinez and Sandleris (2011), when we include PSI, we do not see the effect of official debt relief disappear.

22 As in Jordà and Taylor (2016) to guarantee that our results are as robust as possible, we use the saturated model in order to obtain the weights used in the second step.

23 We performed additional (unreported) robustness exercises such as reducing the number of countries in the sample to those having faced at least once the Paris Club, allowing for robust errors and, including year dummies instead of global factors. All of them delivered very similar results.

Finally when we focus on the HIPC subsample, the trade dynamics look different. In this case, there is no significant improvement on the trade balance following NPV debt relief.

6. Conclusion

Does debt restructuring help a country facing a debt overhang fare better? Both academics and policy makers have tried hard to find a clear answer, but the question still remains open-ended. For one thing, the macroeconomic effects of debt restructuring depend on a large number of factors: the type of creditors, initial macroeconomic conditions, the terms offered, the length of negotiations, whether fresh cash accompanied debt restructuring, to name a few.

Our paper brings new evidence using data from the Paris Club, the major platform for sovereign debt restructuring with official creditors. Using local projections and a narrative identification strategy, we find that Paris Club treatments can have a significant impact on economic growth, debt stocks and the countries' external performance. As expected, the terms of official debt restructuring matter very much. Only those restructurings that carry a nominal haircut seem to unambiguously raise the economic prospects in debtor countries. Remarkably, such agreements lead, on average, to 5% higher GDP growth after five years. By contrast, Paris Club treatments carrying only NPV relief have no positive impact on growth. However, these countries receiving NPV treatment are more likely to experience an external re-balancing afterwards than those receiving a nominal haircut.

From a policy perspective, our results suggest that official sector creditors need to carefully think about the approach to take when designing a debt restructuring, given the trade-offs associated with different restructuring terms. The objective of such an exercise—for immediate boost of economic growth or for external re-balancing—will likely guide the choice of Paris Club creditor countries. This is also probably why pursuing these objectives simultaneously has historically proved to be a difficult task.

Supplementary material

Supplementary material is available online at the OUP website. This comprises an online appendix, the data, and the replication files.

Acknowledgements

We thank T. Asonuma, A. Bassaneti, A. Gelpern, D. Lombardi, L. Martinez, C. Reinhart, C. Trebesch, J. Zettelmeyer and seminar participants at Glasgow University, Banca d'Italia, Bank of England, European Central Bank, Bank of Spain, Inter-American Development Bank, Asian Development Bank Institute, China Academy of Social Sciences, DebtCon2 and European Stability Mechanism for their comments. S. Gutierrez, J. E. Mosquera, M Picarelli and A. Di Chiara provided superb research assistance. The views herein are the authors' and do not reflect those of the Inter-American Development Bank or the European Stability Mechanism.

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