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The Greek Debt Exchange: An Autopsy

Jeromin Zettelmeyer (European Bank for Reconstruction and Development)
Christoph Trebesch (University of Munich)
Mitu Gulati (Duke University)

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The Greek Debt Exchange: An Autopsy

Jeromin Zettelmeyer
Christoph Trebesch
Mitu Gulati*

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Abstract

This paper analyses the Greek debt restructurings of 2012 and puts them into the context of the broader Greek crisis and the history of sovereign defaults. We describe how a crisis management approach that initially focused on avoiding a debt restructuring at almost any cost morphed into the largest sovereign debt exchange operation in history, followed only 9 months later by a buyback of over half of the newly issued bonds. We analyse the distributional consequences of the exchange for creditors and the Greek government and the legal techniques that were used to achieve high creditor participations, and distil lessons for future restructurings in Europe. Our main finding is that the aggregate creditor haircut of the March/April exchange was 58-65 per cent, considerably lower than the numbers reported in the press, but still enough to warrant considerable debt relief for Greece, in the order of 44 to 53 per cent of GDP. By offering the same package for all bonds regardless of maturity, the exchange resulted in a very unequal distribution of losses, ranging from close to 80 per cent on very short term bonds to no haircut at all on Greece's longest dated bond. Further novelties were the legal technique used (retroactive collective action clauses and a seniority upgrade), and the very high portion of cash transferred to creditors (financed by the EFSF). We find that although Greece could have done better by negotiating the terms of the December 2012 buyback rather than conducting it at market prices, the buyback was no "boondoggle", achieving debt relief of 6-11 per cent of GDP. We conclude that although the restructurings were successful in achieving deep debt relief in an orderly manner – no small feat – their timing and design left money on the table and raise questions about crisis management in Europe. Looking forward, the techniques used in Greece are unlikely to work as a template, indicating the need for a more systematic approach to future sovereign debt restructurings.

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I. INTRODUCTION

This paper studies a central episode of the European debt crisis: the restructuring and near-elimination of Greece's sovereign bonds held by private investors, comprising a face value of more than 100 per cent of Greek GDP. After a €200 billion debt exchange in March/April 2012 and a buyback of a large portion of the newly exchanged sovereign bonds in December, the amount of Greek bonds in the hands of private creditors was down to less than €30 billion – just over one-tenth of where it had stood in April 2010, when Greece lost access to capital markets.

The Greek debt exchange can claim historic significance in more than one respect. It set a new world record in terms of restructured debt volume and aggregate creditor losses, easily surpassing previous high water marks such as the default and restructuring of Argentina 2001-2005. It was the first major debt restructuring in Europe since the defaults preceding World War II – defying statements by European policy makers, issued only months earlier, who had claimed that sovereign defaults were unthinkable for EU countries. It also was a watershed event in the history of the European crisis, plausibly contributing both to its expansion in the summer of 2011 and to its eventual resolution (as we will argue in this paper). Finally, it occupies a special place in the history of sovereign debt crises – along with the Brady deals, for example, and with the 2000 Ecuador restructuring – by introducing a set of legal innovations which helped to engineer an orderly debt exchange, overcoming the collective action problem facing Greek and EU policy makers as they sought to restructure a large amount debt dispersed among many private creditors.[1]

The present paper gives an account of the background, mechanics, and outcomes of the Greek restructuring. Beyond the basic historical narrative, we focus on three questions.

First, what were the distributional implications of the restructuring – both the main exchange, and the end-2012 debt buy-back? We answer this question by computing the impact of the restructuring on the present value of expected cash flows both in the aggregate and bond-by-bond. The results confirm that the exchange resulted in a vast transfer from private creditors to Greece, in the order of €100 billion in present value terms; corresponding to 50 per cent of 2012 GDP (this is *net* of the costs of recapitalising Greek banks to offset losses incurred through the restructuring). But we also show that the "haircuts" suffered by creditors on average were considerably lower than the 75 per cent widely reported in the financial press at the time of the debt exchange, namely, in the order of 59-65 per cent, depending on which methodology is applied. Furthermore, these losses were not equally distributed across creditors, with much higher present value losses on bonds maturing within a year (75 per cent or more), and much lower losses on bonds maturing after 2025 (less than 50 per cent. Finally, we show that notwithstanding a significant rise in bond market prices in anticipation of the December 2012 buy back, the operation did result in some debt relief for Greece, although this was small both due to the voluntary approach that was chosen and the small scale of the operation.

[1] For details on these episodes, see Cline (1995, on the Brady deals) and Sturzenegger and Zettelmeyer (2007, on Ecuador and other emerging market restructurings after the Brady deals). Reinhart and Rogoff (2009) and Cruces and Trebesch (forthcoming) provide broader historical perspectives.

Second, how was the free rider problem addressed, i.e. the incentive of each creditor not to participate while hoping that all other bondholders accept? As in most debt exchanges, free riding was a concern for Greece: with the possible exception of one or two Greek banks, no single creditor was so large as to make its participation an essential condition of the exchange; and while several creditors were banks or other regulated institutions that could be "leaned on" by the official sector this was not true for many others. We show that unlike most previous distressed debt exchanges, potential free riders were *not* arm-twisted into participation using more or less veiled default threats directed at potential holdouts. Instead, the Greek authorities relied on a mix of carrots and sticks embedded in the exchange offer itself. The main stick was a series of bond amendments approved by a majority of creditors that made the restructuring legally binding on all holders of local-law bonds. The main carrot was an unusually high cash pay-out: creditors received more than 15 per cent of the value of their old bonds in cash-like short-term EFSF bonds. A further carrot consisted of legal and contractual terms that gave the new bonds a better chance of surviving future Greek debt crises than the old ones. Ironically, these "carrots" may have turned out to be particularly appealing because market commentary thought it unlikely that Greece's proposed debt restructuring, even if it succeeded, would be the last one. In this situation, most potential holdouts opted for the bird in hand rather than the two in the bush.

Third, what are the implications of the Greek restructuring for the management of future European debt crises? We focus on two aspects of this question: *when* European crisis countries may want to restructure – drawing on both the Greek experience and broader considerations – and *how* they may want to restructure. In this context, we briefly take up the issue of whether there should be a treaty-based European Sovereign Debt Restructuring Mechanism along the lines of previous statutory proposals in this area (see Rogoff and Zettelmeyer, 2002, for a survey).

In answering these broader questions, we are limited by the fact that the Greek crisis constitutes but one episode in the long history of sovereign crisis (albeit a particularly important one); that we mostly take an ex-post view of the crisis; and that we focus on the debt restructuring rather than giving a complete account of the crisis. In particular, we analyse neither the causes of the Greek crisis nor its management except as relates to the debt restructuring. Hence, when we take an overall view on the debt restructuring, we do so based not just on the analysis in this paper but also based on the sovereign debt literature and its standard tools, such as debt sustainability analyses conducted at the time. And while we hope that the Greek case will whet the reader's appetite for some of the big questions surrounding sovereign debt – including on why government's usually repay their debts, or on whether and when debt restructurings are optimal not just for the debtor country but also from the perspective of creditors and other countries that may be – we will generally need to refer her to the broader literature for complete answers.[2]

[2] For recent surveys of the literature see Panizza et al. (2009), Wright (2011), Das et al. (2012), Wright and Tomz (2013) and Aguiar and Amador (forthcoming). On the issue of optimal defaults, see Grossman and Van Huyck (1988) and Adam and Grill (2012). Conditions under which there may be a rationale for IMF-type bailouts to attempt to avoid a default are studied by Jeanne et al. (2008). On the origins the European Sovereign Debt crisis, see Lane (2012).

The paper is for the most part organised chronologically. In the section that follows, we describe the background to the 2012 restructuring: The May 2010 EU/IMF programme with Greece, and the July 2011 decision to restructure in principle (euphemistically referred to as "private sector involvement," or PSI). We also briefly analyse the implications of the restructuring proposal agreed by Greece and the IIF at that time. We then turn to the main act of the Greek restructuring: the March-April 2012 debt exchange, which is the main focus of this paper. Next, we analyse the last act (for now), the December 2012 bond buy-back. We conclude with an outlook on what the Greek restructuring has taught us for the on-going and future debt crises in Europe.

II. FROM THE 2010 BAILOUT TO THE JULY 2011 PSI PROPOSAL

The Greek debt crisis began in October 2009, when the newly elected government of George Papandreou revealed that the country had understated its debt and deficit figures for years. The projected budget deficit for 2009, in particular, was revised upwards from an estimated 7 per cent to more than 12 per cent (it eventually ended up at 15.6 per cent). This set the stage for months of further bad economic news, which eroded market confidence in Greece and its debt sustainability and resulted in a number of rating downgrades, first by Fitch, then by S&P and Moody's. As the situation continued to deteriorate, Greek sovereign bond yields continued to rise, until spreads over German bunds shot up from 300 to almost 900 basis points during April, effectively excluding Greece from access to bond markets. Faced with an imminent rollover crisis, the Greek government had no choice but to turn to Eurozone governments and the IMF.

Despite initial German resistance, a three-year rescue package was agreed on May 2nd 2010. It amounted to €80 billion in EU loans and a further €30 billion of IMF credit, and was to be paid out in tranches until 2012, conditional on the implementation of a fiscal adjustment package of 11 percentage points of GDP over three years, and structural reforms meant to restore competitiveness and growth. One week later, Eurozone leaders agreed on further rescue measures, particularly the creation of the European Financial Stability Facility (EFSF) with a lending capacity of €440 billion for troubled sovereigns, and the ECB's "secondary market purchase programme" to stabilise sovereign bond yields in secondary markets. Initially, markets rallied, spreads fell sharply. However, market scepticism soon returned, particularly after Moody's downgraded Greece in mid-June, citing "substantial macroeconomic and implementation risks associated with the programme." By July, spreads again began to exceed 800 basis points.

In October of 2010, the debt crisis in Europe reached a watershed at the trilateral Franco-German-Russian Summit in Deauville, when the President Sarkozy and Chancellor Merkel called for a permanent crisis resolution mechanism in Europe "comprising the necessary arrangements for an adequate participation of the private sector". Although it referred not to the handling of the on-going European crisis but to a European crisis resolution framework that was to replace the EFSF in 2013, the "Deauville statement" was widely interpreted as an official signal that sovereign debt restructuring would henceforth be acceptable in European Union countries. The result was a sharp widening of the bond spreads of peripheral European countries. In this

setting, the prospects of a quick return of Greece to international capital markets by early 2012 – as envisaged in the May programme – looked increasingly unlikely.

Notwithstanding market scepticism, Greece's adjustment programme was broadly on track until early 2011, with a fiscal consolidation of about 5 per cent of GDP during 2010. In light of a deepening recession and growing domestic opposition to the programme, however, fiscal adjustment became stuck in the first half 2011, at a time when the overall and primary deficit were still in the order of 10 and 5 percentage points, respectively, sovereign debt stood at over 140 per cent of GDP, and output was expected to continue to decline at a rate of 3-4 per cent for the next two years. Most worryingly, structural reforms that were supposed to restore growth in the medium term were delayed, and reform implementation was weak. An IMF review ending on June 2, 2011 and published in mid-July hence concluded that Greece's outlook "does not allow the staff to deem debt to be sustainable with high probability", and all but ruled out a return to capital markets until the end of the programme period in mid-2013. Unless the official sector was prepared to offer additional financing in the order of €70-104 billion (depending on the timing of the assumed return to capital markets), some form of "private sector involvement" (PSI) was unavoidable, even if one took a benign view of Greece's debt sustainability.[3]

On June 6th, 2011, German Finance Minister Wolfgang Schäuble wrote a letter to the ECB and IMF proposing "to initiate the process of involving holders of Greek bonds … through a bond swap leading to a prolongation of the outstanding Greek sovereign bonds by seven years."[4] Shortly afterwards, a group of major French banks issued the first detailed proposal on how a Greek bond rescheduling might look like (see Kopf, 2011). The French proposal already contained many of the elements that would ultimately be part of the March 2012 exchange, namely a large upfront cash payment, a 30-year lengthening of maturities, and a new GDP-linked security as sweetener. Importantly, however, it only targeted bonds maturing in 2011-14, and it did not foresee any nominal debt reduction (face value haircut). From the perspective of the German government, this proposal was not sufficient, and talks about the form of PSI went on until the extraordinary EU summit on July 21, 2011.[5]

Immediately after the summit, Euro area heads of government and the Institute of International Finance (IIF) – representing major banks and other institutional investors holding Greek bonds – each issued statements that together amounted to a new financing proposal for Greece, consisting of an official sector commitment and a private sector "offer":

First, the official sector (EU and IMF together) promised financing in the amount of €109 billion. Since only about €65 billion of the original €110 billion May 2010 package had been disbursed up to that point, this amounted to additional official financing of €64 billion over and above the original commitment. The EU portion of the new financing was to be delivered through EFSF loans with longer maturities – between 15 and 30 years – and lower interest rates than the loans disbursed so far. A

[3] IMF Country Report No. 11/175.
[4] See http://www.piie.com/blogs/realtime/?p=2203
[5] See Financial Times, July 6, 2011, "Schäuble presses case for bond swap." http://www.ft.com/cms/s/0/f2d96d3a-a7de-11e0-a312-00144feabdc0.html)

maturity extension for the bilateral EU loans that had already been disbursed was also promised.

Second, 39 financial institutions (both international and Greek) expressed their willingness "to participate in a voluntary program of debt exchange." Creditors would have a choice between four options: a 30 year "par bond" with no face value reduction paying slightly lower coupons than typical for Greece's debt stock (namely, 4 per cent in the first 5 years, 4.5 in the next five years, and 5 per cent thereafter); a 30 year "discount bond" with a 20 per cent face value reduction but slightly higher coupon rates (6, 6.5 and 6.8 per cent, respectively); and a 15 year discount bond with a 20 per cent face value reduction and 5.9 per cent coupon. The fourth option was to receive the par bond not immediately but in lieu of cash repayment at the time the time of maturity of the bond held by the creditor. Importantly, following a structure popularised in the Brady deals of the early 1990s, the principal of the 30 year bonds were to be fully collateralised using zero coupon bonds purchased by Greece from the EFSF and held in an escrow account. For the 15 year bond, the collateral would cover collateralisation up to 80 per cent of any loss on principal, up to a maximum of 40 per cent of new principal.

Assuming a 90 per cent participation rate among privately held bonds maturing between August of 2011 and July of 2020 (the bonds to be targeted in the exchange, as subsequently clarified by the Greek Ministry of Finance), this amounted to private financing of about €135 billion in total, about €54 billion of which corresponded to the period between mid-2011 and mid-2014.[6] Hence, under the July 2011 proposal, the official and private sector together would have lent Greece an extra €118 billion at low interest rates between 2011 and 2014. This exceeded the €70 billion financing gap calculated by the IMF in its July report by €38 billion corresponding to the collateral that the official sector was offering to lend to Greece in order to persuade the private sector to chip in its contribution. In principle, this does not look like a good deal: an extra €38 billion of official sector lending "bought" just €54 billion of private sector financing through 2011-14. However, the proposal also implied postponing the repayment of €135 billion in principal falling due between 2014 and 2020, hence giving Greece and its official sectors some leeway in case it remained shut off from capital market after the programme period.

From a financing perspective, the July 2011 proposal hence implied a significant contribution from the private sector. But did it also imply debt relief? The IIF claimed so in its July press release, which stated that the debt exchange implied a 21 per cent Net Present Value (NPV) loss for investors, based on an assumed discount rate of 9 per cent (reflecting a guess as to what the yield of the new bonds might be following a successful exchange). However, there are several reasons to be sceptical of this claim.

[6] These numbers come from the IIF's July 21 press release, but can also be approximately derived by taking Greece's bond amortisations (€203 billion between mid-2011 and 2020 and €89 billion between mid-2011 and mid-2014), excluding holdings by the ECB and other central banks (about €53 billion for bonds maturing during 2012-2020 and €26 billion during 2012-2014) and multiplying the result with 0.9. The ECB's holdings were not publicly known in July 2011, but became public in February 2012 for all Greek bonds maturing after January of 2012. Small discrepancies between the derived amounts and those stated by the IIF could be explained by ECB holdings of bonds maturing in the second half of 2011.

First, the IIF's was referring to the fact that the value of the new instruments, applying a 9 per cent discount rate on the risky portion of their cash flows (together with a lower interest rate on the collateralised portion) amounted to 79 cents per Euro of old principal. Hence, investors opting for the new bonds would have suffered a loss of 21 cents on the Euro compared to the alternative of receiving full *and immediate* repayment of their old bonds. This approach to computing creditor losses reflects widespread market convention, and makes sense in some settings (when either the outstanding bonds are of very short maturity; or when bonds are "accelerated", i.e. become due and payable immediately), but not when creditors own bonds of longer maturity and do not have the right to immediate full repayment. In such a situation, the value of the new bonds should be compared not to 100 but rather a present value of the payment stream promised by the old bonds, *evaluated at the same discount rate as the new bonds* (see next section and Sturzenegger and Zettelmeyer, 2008, for details). Using the IIF's 9 per cent discount rate, this implies much smaller creditor losses, namely, just 11.5 per cent (see Table 1).[7]

Table 1. Creditor Losses Implicit in July 2011 IIF Financing Offer
(in per cent of outstanding principal)

	Assuming creditors had chosen ….					
	30 year Par bond, using discount rate of ... 1/			30 year Discount bond, using discount rate of 1/		
	5.0	9.0	15.0	5.0	9.0	15.0
Value of new securities received (PV_{new})	103.6	79.0	61.4	106.3	79.0	59.4
Haircut in market convention (computed as 100-PV_{new})	*-3.6*	*21.0*	*38.6*	*-6.3*	*21.0*	*40.6*
Value of old bonds (PV_{old}) 2/	101.3	89.3	75.6	101.3	89.3	75.6
Present value haircut (computed as 100*(1-PV_{new}/PV_{old})	*-2.3*	*11.5*	*18.7*	*-4.9*	*11.5*	*21.4*

1/ Refers to discount rate applied to coupons. Collateralised principal discounted at 3.787% which was calibrated to achieve an NPV of the new par bond of exactly 79% assuming a 9% discount rate for the coupons.
2/ Average value of non-ECB bond holdings

Second, it is not clear that from the perspective of computing Greece's *debt relief* (as opposed to creditor losses), 9 per cent was in fact the appropriate discount rate. For example, the IMF used 5 per cent in its debt sustainability calculations for Greece. Sturzenegger and Zettelmeyer (2007b) argue that if the country is expected to return to capital markets over the medium term, the discount rate for the purposes of

[7] This point – that creditor losses implicit in the IIF's financing offer were very small when properly computed -- was made by several academics and analysts soon after the deal was announced; see Cabral (2011) and Ghezzi, Aksu, and Garcia Pascual (2011). See also Kopf (2011) for a similar point about the June 2011 "French proposal", Ardagna and Caselli (2012) for a broader critique of the July 2011 deal, and Porzecanski (2013) for a description of the run-up and aftermath of the July deal.

computing debt relief should be in the interval between the country's future expected borrowing rate and the international risk free rate, because the country will be using rates in this interval to transfer revenues across time (namely, be saving at an international risk-free rate, or borrowing against future revenues at a market rate).[8] In July 2011, long German bonds yielded between 2.9 and 3.6 per cent, depending on maturity. It is of course difficult to say what expectations of Greece's "normal" borrowing rate following re-access to capital markets were in July 2011, however, a yield in the order of the 5 to 5.5 per cent – implying a 200 basis point spread over bunds, and close to the rate assumed by the IMF in its debt sustainability analysis – seems plausible. The table shows that if a 5 per cent discount rate had been used to compare old and proposed new debt flows, the debt relief implied by the July 2011 financing offer would have been approximately zero – indeed, slightly negative. Using the "risk free" discount rate of about 3.5 per cent (not shown in the table), would indicated an *increase* of Greece's debt burden by about 11-15 per cent the July 2011, depending on which bond investors would have opted for.

In the event, the July 2011 financing offer was never implemented. The deepening recession in Greece and the difficulties of the EU and IMF to agree on a credible package of structural reforms with the Greek government lowered expectations of the growth path that Greece might realistically achieve and exacerbated worries about its debt servicing capacity. These worries were reflected in sharply rising secondary yields, making it much less likely that the debt exchange envisaged in July would succeed – not just in the sense of restoring Greece's solvency over the medium term, but even in the more pedestrian sense of attracting high participation.[9] On October 9, 2011, German finance minister Wolfgang Schäuble, was quoted in Frankfurter Allgemeine as saying "the debt reduction we aimed at in July may have been too low". This view was corroborated by a new IMF analysis prepared for the October 26 Euro summit in Brussels, which concluded that Greece's debt was no longer sustainable except "with much stronger PSI".[10]

III. THE MARCH-APRIL 2012 BOND EXCHANGE

The Euro Summit statement of October 26th, 2011 invited "Greece, private investors and all parties concerned to develop a voluntary bond exchange with a nominal discount of 50% on notional Greek debt held by private investors" and pledged to "contribute to the PSI package up to 30 billion euro" as well as additional lending to

[8] This assumes that countries will in fact re-access capital markets in the foreseeable future (as was assumed for Greece by both its official and private creditors in mid-2011). If this is not the case, a higher discount rate may be appropriate, as argued by Dias, Richmond and Wright (2012).

[9] Greek 10 year benchmark yields started rising sharply from mid-August onwards, stabilising at around 23 per cent in mid-September – over 8 percentage points above their end-July levels. In these circumstances, the prospect of a relatively low 9 per cent "exit yield" following the debt exchange envisaged in July seemed increasingly remote. On 12 October 2011, IIF Deputy Managing Director Hung Tran was quoted by Reuters as saying that under current market conditions, and assuming a 15 per cent discount rate, private creditors would lose 39 per cent in present value terms if the July exchange offer were carried out. Although this exaggerated the losses that investors would have suffered, his basic point – that by October, higher expected exit yields would have implied significantly higher losses for participating investors even if the terms of the offer had not changed – was correct. Table 1 shows that for a 15 per cent discount rate (applied to both old and new payment streams), investor losses would have been between 19 and 21 per cent on average, rather than 11.5 per cent.

[10] Debt sustainability analysis dated October 21, 2011, available at http://www.linkiesta.it/sites/default/files/uploads/articolo/troika.pdf (accessed 19.3. 2013).

help with the recapitalisation of Greek banks. This set the stage for a new round of PSI negotiations between Greece and a group of creditors led by a steering group of 12 banks, insurers and asset managers on behalf of a larger group of 32 creditors, which together held an estimated 30-40 per cent of Greece's privately held debt (Table 2).

Table 2. Composition and Estimated Greek Bond Holdings of Creditor Committee

Steering Commitee (12 Members)		**Further Members of the Creditor Committee**			
	Holdings (€ bn)		Holdings (€ bn)		Holdings (€ bn)
Allianz (Germany)	1.3	Ageas (Belgium)	1.2	MACSF (France)	na
Alpha Eurobank (Greece)	3.7	Bank of Cyprus	1.8	Marathon (USA)	na
Axa (France)	1.9	Bayern LB (Germany)	na	Marfin (Greece)	2.3
BNP Paribas (France)	5.0	BBVA (Spain)	na	Metlife (USA)	na
CNP Assurances (France)	2.0	BPCE (France)	1.2	Piraeus Bank (Greece)	9.4
Commerzbank (Germany)	2.9	Credit Agricole (France)	0.6	RBS (Great Britain)	1.1
Deutsche Bank (Germany)	1.6	DekaBank (Germany)	na	Société Gén. (France)	2.9
Greylock Capital (USA)	na	Dexia (Belg/Lux/Fra)	3.5	Unicredit (Italy)	0.9
Intesa San Paolo (Italy)	0.8	Emporiki (Greece/France)	na		
Landesbank BW (Germany)	1.4	Generali (Italy)	3.0		
ING (France)	1.4	Groupama (France)	2.0		
National Bank of Greece	13.7	HSBC (Great Britain)	0.8		

Note: The estimates of bond holdings are from Barclays (2011) and based on company and media reports and other sources as of 2010 or 2011. Creditor committee composition as of Dec. 2011 is reported by the IIF (http://www.iif.com/press/press+219.php).

On February 21, 2012, Greece and the steering committee announced in parallel press releases that a deal had been agreed. A formal debt restructuring offer followed three days later. This turned out to look very different from the IIF's July "financing offer". Investors were only offered one take-it-or-leave it package – referred to as the "PSI consideration", not a menu of four alternatives. The promised official contribution was used not to collateralise principal repayments of the new bonds, but rather to finance large upfront cash payments. Most importantly, the new bonds offered for exchange involved both much lower face value and lower coupon rates. Specifically, the "PSI consideration" comprised:

(i) One and two year notes issued by the EFSF, amounting to 15 per cent of the old debt's face value;
(ii) 20 new government bonds maturing between 2023 and 2042, amounting to 31.5 per cent of the old debt's face value, with annual coupons between 2 and 4.3 per cent. These bonds were issued under English law and governed by a "co-financing agreement" with the EFSF which instituted a sharing provision for the private bondholders vis-à-vis the EFSF (see below);
(iii) A GDP-linked security which could provide an extra payment stream of up to one percentage point of the face value of the outstanding new bonds if GDP exceeded a specified target path (roughly in line with the IMF's medium and long term growth projections for Greece).
(iv) Compensation for any accrued interest still owed by the old bonds, in the form of 6-month EFSF notes.

Another important difference with respect to the July proposal was that the offer cast a much wider net. Whereas the July plan had envisaged exchanging only sovereign and sovereign-guaranteed railway bonds with less than 9 years of remaining maturity, the February 2012 offer was directed at all privately held sovereign bonds issued prior to 2012, with total face value of €195.7 billion, as well as 36 sovereign-guaranteed bonds issued by public enterprises (not just Hellenic Railways, but also of the Hellenic Defence Systems, and of Athens Public Transport). As a result, the total volume targeted in the February offer exceeded that of the July proposal by about €50 billion, in spite of the fact that Greece's bonded debt stock had shrunk by €10 billion in the meantime, as investors continued to be repaid in full and on time while negotiations dragged on.

Perhaps the only important sense which the February proposal did *not* differ from the July plan is that it excluded the bond holdings of the ECB – Greece's single largest bondholder by far, with €42.7 billion (16.3 per cent) of holdings in February 2012 – national Central Banks (€13.5 billion of Greek bonds, about 5 per cent of the total), and the EIB (€315 million). Just ahead of the publication of the offer, these were swapped into a new series with identical payment terms and maturity dates. As part of the February swap arrangement, the ECB committed to return any profits made through its Greek government bond holdings, most of which had been purchased significantly below par during 2010, to its shareholders. But this did not mean that they would necessarily be returned to Greece: while some Euro area members -- notably, France – announced that they would do so, the Euro group as a whole agreed on such a return only in late November 2012.

With some relatively minor exceptions,[11] all bondholders that were offered the "PSI consideration" also received a "consent solicitation", in which they were asked to vote for an amendment of the bonds that permitted Greece to exchange the bonds for the new package of securities. Bondholders accepting the offer were considered to simultaneously have cast a vote in favour of the amendment. However, bondholders that ignored or rejected the exchange offer were deemed to have voted against the amendment only if they submitted a specific instruction to that effect.

The rules for accepting the amendment differed according to their governing law. About €20 billon of sovereign and sovereign-guaranteed bonds – just under 10 per cent of eligible face value – had been issued under English-law. For these bonds, the amendment rules were laid out in "collective action clauses" (CACs) contained in the original bond contracts, and voted on bond-by-bond.[12] In contrast, the large majority of Greece's sovereign bonds that had been issued under Greek law – €177.3 billion, over 86 per cent of eligible debt – contained no such collective action clauses, meaning that these bonds could only be restructured with the unanimous consent of

[11] For technical and legal reasons, holders of Japanese-law bonds, an Italian-law bond, and Greek-law guaranteed bonds, with total face value of €7.9 billion (3.8 per cent of eligible debt) received only exchange offers. In addition, one Swiss-law bond received a consent solicitation but no exchange offer. See a longer previous version of this paper (Zettelmeyer et al. 2012) for details.

[12] Typically, these envisaged a quorum requirement (i.e. minimum threshold of voter participation) between 66.67and 75 per cent in a first attempt, followed by a quorum of between one-third and 50 per cent in a second meeting if the initial quorum requirement was not met. The threshold for passing the amendment was usually between 66.67and 75 per cent of face value in the first meeting, and as low as 33.33 per cent in the second meeting.

all bond holders. However, because they were issued under local law, the bond contracts themselves could be changed by passing a domestic law to that effect. In theory, Greece could have used this instrument to simply legislate different payment terms, or give itself the power to exchange the bonds for the new securities, but this might have been viewed as an expropriation of bondholders by legislative fiat, and could have been challenged under the Greek constitution, the European Convention of Human Rights and principles of customary international law.

Instead, the Greek legislature passed a law (Greek Bondholder Act, 4050/12, 23. February 2012) that allowed the restructuring of the Greek-law bonds with the consent of a qualified majority, based on a quorum of votes representing 50 per cent of face value and a consent threshold of two-thirds of the face-value taking part in the vote.[13] Importantly, this quorum and threshold applied across the totality of all Greek-law sovereign bonds outstanding, rather than bond-by-bond. While this "retrofit CAC" gave bondholders collectively a say over the restructuring which was roughly analogous to that afforded to English-law bondholders, the sheer size of what it would have taken for bondholders to purchase a blocking position made it near impossible for individual bondholders (or coalitions of bondholders) to block the restructuring.

The offer was contingent on Greece obtaining the EFSF notes that were to be delivered to creditors in the exchange (which in turn depended on the completion of some prior actions under Greece's IMF- and EU supported programme); and a "minimum participation condition", according to which the proposed exchange and amendments would *not* go forward if this were to result in a restructuring of less than 75 per cent of face value. Conditions of the type had been used in most debt exchange offers since the mid-1990s to reassure tendering bondholders that they would not be left out in the cold (i.e. holding a smaller, and potentially illiquid claim) in the event that most other bondholders chose not to accept the offer (see Bi et al., 2011).

At the same time, Greece and the Troika decided to set a 90 per cent minimum participation threshold as a precondition for unequivocally going forward with the exchange and amendments. This implied, in particular, that if Greece succeeded with its attempt to amend its domestic law sovereign bonds within the framework set out by the February 23 law, the exchange would likely go forward, since the Greek-law sovereign bonds alone amounted to about 86 per cent of the total eligible debt. Between the two thresholds Greece would allow itself discretion, "in consultation with its official sector creditors" on whether or not to proceed with the exchange and amendments.

Greece gave its creditors just two weeks, until 8 March, to accept or reject the offer. This tight deadline was needed to complete at least the domestic-law component of the exchange before 20 March, when a large Greek-law bond issue was coming due for repayment.

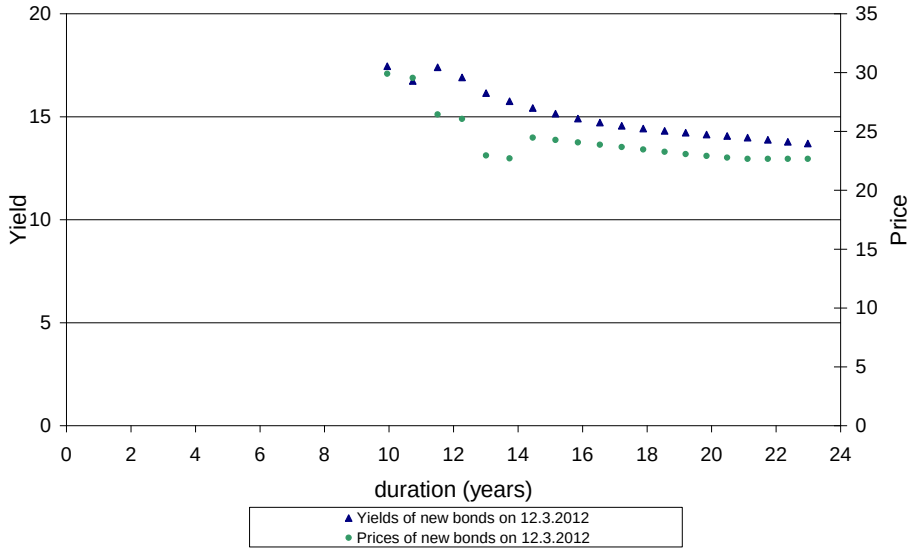
[13] While the quorum requirement was lower than typical for the initial bondholder meeting under English-law bonds, this was arguably justified by the fact that the Greek sovereign allowed itself only "one shot" to solicit the consent of bondholders.

Restructuring outcome

On March 9, Greece announced that 82.5 per cent of the €177.3 billion in sovereign bonds issued under domestic law had accepted the exchange offer and consent solicitation, Participation among the foreign-law bondholders was initially lower, at around 61 per cent. But together, these participation levels implied that both thresholds that were critical for the success of the exchange – first the two-thirds threshold for amending all Greek-law bonds using the February 23 law, and subsequently the overall participation threshold of 90 per cent – could be met by a wide margin. Since EFSF financing had also been made available in the meantime, the government announced that it would proceed with the exchange of the Greek-law bonds. At the same time, the participation deadline for foreign-law bondholders was extended twice, to early April.

Greece's new bonds started trading immediately, on March 12, at yields in the range of just under 14 (longer bonds) to about 17.5 per cent (shorter bonds, see Figure 1). Weighted by principal, the average "exit yield" was 15.3 per cent – higher than the sovereign yield of any other Euro area country at the time, and suggesting that even after the success of a very significant debt reduction operation seemed all but assure, private creditors remained sceptical about the future of Greece's programme and its longer term ability to repay. At the same time, Greece's high exit yields were not unusually high compared to emerging market debt restructurings of the past.[14]

Figure 1. Exit yield curve, by duration of new bonds



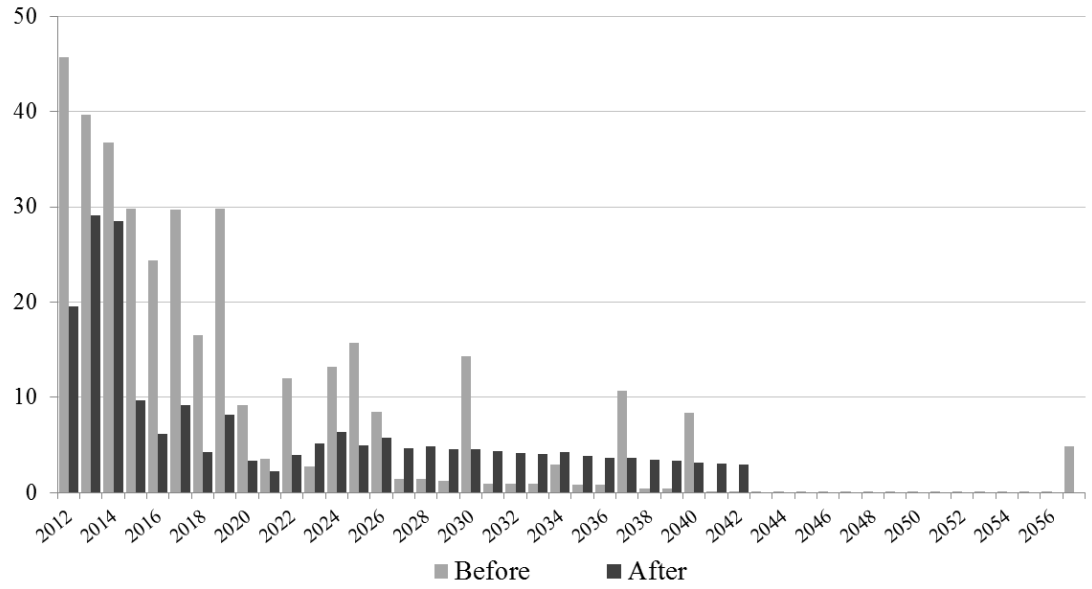
By the time the last of Greece's exchanged or amended foreign-law bonds had settled on April 25, Greece had achieved total participation of €199.2 billion, or 96.9 per cent. Holders of €6.4 billion in face value held out. The holdouts were scattered

[14] See Zettelmeyer et al, Appendix A3, which shows exit yields for all distressed debt exchanges since 1990 for which secondary market prices were available soon after the exchange. Sturzenegger and Zettelmeyer (2007b) and Cruces and Trebesch (forthcoming) provide some evidence suggesting that exit yields tend to be abnormally high (even after restructurings that ultimately prove to be successful). Possible reasons include the high degree of uncertainty in the period immediately after a debt restructuring, and in some cases lack of liquidity in bond markets after defaults.

across 25 sovereign or sovereign guaranteed bonds, of which 24 were foreign-law titles (see Zettelmeyer et al, 2013 for details). The final participation rate among foreign law bondholders was 71 per cent, only slightly higher than the 67 per cent achieved by Argentina in 2005. However, because of the large share of domestic law debt and the application of the Greek Bondholder Act to bail in the domestic law bondholders, the share of holdouts in total eligible debt was ten times smaller – just 3.1 per cent, as against 33 per cent. Perhaps because of this, Greece has so far – again, unlike Argentina – repaid the holdouts in full (as of this writing in March 2013, three bonds involving holdouts have matured).

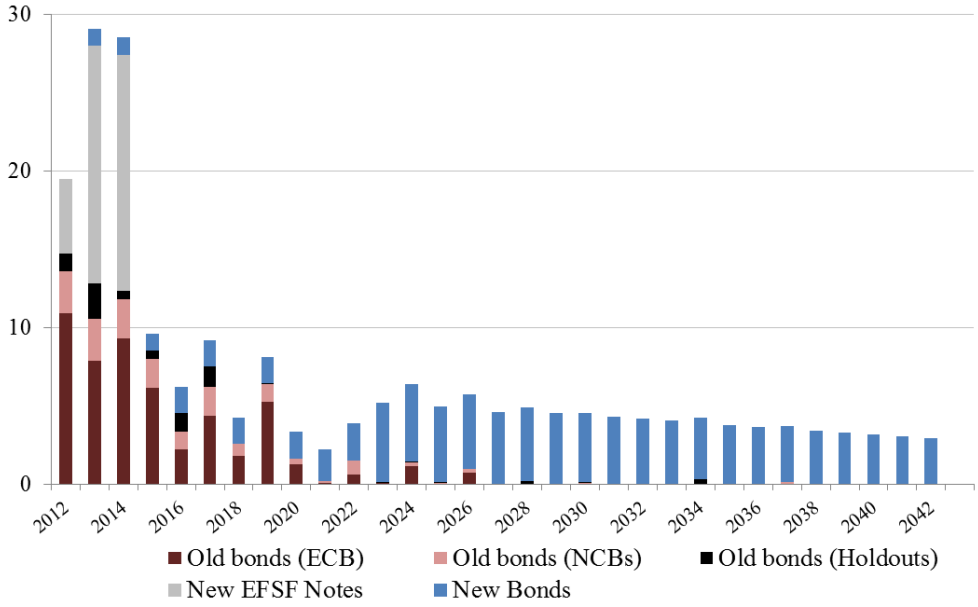
Figure 2 shows how the debt exchange changed the payments expected by creditors. The series denoted "before" the exchange refers to the payment flows promised by Greece's old bonds, both interest and amortisation. The series "after", which is decomposed in Figure 3, comprises both payment flows due to old bonds that were not exchanged (bonds in the hands of holdouts, national central banks and the ECB), payment flows promised by the new bonds, and payments flows associated with the short term EFSF notes (both the 6-month notes that compensated investors for accrued interest, and the 1 and 2 year notes in the amount of 15 per cent of the old face value).[15] The main message from Figure 2 is that although the exchange significantly lowered the flows to investors as a whole, they did not significantly shift the payment profile into the future, as the longer maturities of Greece's new bonds (compared to most of the old ones) was offset by a bunching of payments due to the EFSF notes at the short end of the maturity profile. In addition, Greece's debts to non-participating investors – holdouts (€6.4 billion) and the ECB and national central banks (€56.7 billion) -- were bunched at the short end (see Figure 3), and continued to exceed Greece's new long term bonds (€55.8 billion) in face value.

Figure 2. Impact of the Debt Exchange on Greece's Debt Service to Private Creditors



[15] Payments associated with the GDP linked-security are ignored in the figures because of their small expected amount and the uncertainty surrounding them.

Figure 3. Post-exchange debt service (by type of creditor)



Distributional implications

We now compute the distributional implications of the restructuring, from three angles: First, aggregate investor losses; second, distributional implications across investors, and third, total debt relief received by Greece.[16]

Investor losses in the aggregate

As already mentioned in the discussion of the July 2011 financing offer, there are several ways to compute the loss, or "haircut", suffered by a representative investor holding sovereign bonds. Market practitioners define haircuts as 100 minus the present value of the new bonds offered. For the reasons explained above, this measure tends to exaggerates creditor losses, as it implies that so long as the value of the new bonds is below par, creditors suffer a haircut – even in an entirely voluntary debt management operation in which the new bonds have higher market value than the old bonds. Following our previous work, but also private sector economists such as Ghezzi, Aksu and Garcia Pascual (2011) and Kopf (2011), we hence take an alternative approach, namely, to compute present value haircuts as the percentage difference between the present value of the new and old bonds, both evaluated at the exit yield observable immediately after the exchange. This definition has two useful interpretations:

[16] Important distributional angles that are not covered in the analysis that follows include redistribution from the official sector to Greece as a result of change in bailout terms in March 2012, and the distributional implications of the restructuring *within* Greece. For example, Greek pension funds were hard hit (like other private sector creditors of the government), whereas banks and bank creditors were not hit at all, as banks were effectively compensated for the losses due to the restructuring. Establishing the overall distributional implications of the Greek crisis, bailout and restructuring is an area for future research.

- First, it measures the loss suffered by a participating creditor compared to a situation in which he or she had been allowed to keep the old bonds and have them serviced with the same probability as the new bonds that were issued in the exchange. In other words, it compares the value of the old and new bonds in a hypothetical situation in which there would have been no discrimination against the holders of the old bonds.
- In actual fact, participating creditors of course chose the new bonds, suggesting that – if the haircut was positive – there must have been discrimination against holdouts in some form. Hence, the present value haircut can equivalently be interpreted as measuring the strength of the incentives that the debtor must have offered to prevent free riding – by threatening to default, or perhaps through other means. This leads to the question of what those incentives were in the case of Greece, and how they compare to previous exchanges. We take this up in the next section.

Although the present value haircut is conceptually simple, computing it in practice is not always straightforward. One problem is that the risk characteristics of the new bonds, and hence the exit yields, can be specific to the maturity of the new bonds (or more generally, the timing of the promised payment stream), which may differ from those of the old bonds. This was the case in Greece, where exit yields are available for bonds of 10 year maturity and up (Figure 1), but it is not clear what rate to use to discount old bonds of shorter maturity. Another problem is that the market on the first day of trading after a debt exchange may not be very liquid (for example, because some institutional investors are not yet in the market pending some rating action). Hence, the exit yield may not be entirely representative for the yield that establishes itself in the market shortly after the exchange, even if there is no new information about fundamentals in the intervening period.

We seek to address these problems by computing alternative aggregate haircut estimates based on three approaches (Table 2).

- The first column of Table 2 calculates the value of the old bonds using the average discount rate corresponding to the prices of the new bonds (15.3 per cent). For the purposes of discounting shorter old bonds, this is likely too low.
- The second and third columns show the sensitivity of these results to using yields on two alternative dates: 19 March – one week after the first date of trading; which incidentally coincides with the date on which the result of the CDS settlement was announced (16.3 per cent);[17] and 25 April, the date on which the final exchange results were announced (18.7 per cent).
- Finally, the last column of Table 2 shows the average haircut using a different discount rate for each bond depending on its maturity. For this purpose, we construct a yield curve which is based on observed data at the longer end (for maturities ten years and up, based on the exit yields of the newly issued bonds) as well as imputed yield curve values for the shorter end where no exit yields are observed, which are derived using a simple valuation model.[18]

[17] For a discussion of the CDS settlement, see Zettelmeyer et al. (2013).

[18] The model assumes that the high observed long-term yields are driven by some combination of a continued fear of default in the short run and the expectation of lower (but still higher than pre-crisis) sovereign yields in the long run if a new default is avoided. It is then possible to calibrate combinations of these parameters – the short- and medium-run cumulative default probability, and the long-run yield

Table 2. Haircuts Implicit in Greek Debt Restructuring
(in per cent of outstanding principal)

	Assumed discount rate (per cent) 1/			
	15.3	16.3	18.7	Curve 3/
Value of new securities received (PV_{new})	23.1	22.5	21.2	22.8
Haircut in market convention (computed as 100-PV_{new})	*76.9*	*77.5*	*78.8*	*77.2*
Value of old bonds (PV_{old}) 2/	65.3	63.3	59.0	56.5
Present value haircut (computed as 100*(1-PV_{new}/PV_{old})	*64.6*	*64.4*	*64.0*	*59.6*

1/ Used for discounting payment streams of both new and old Greek government bonds. For EFSF bills, present value of 15 is assumed. GDP warrants valued at 0.23 per cent of outstanding principal (corresponding to the issue price of 0.738 per cent of the principal of new bonds issued).

2/ Assumes that old bonds are exchanged proportionally to their outstanding face values held in the private sector.

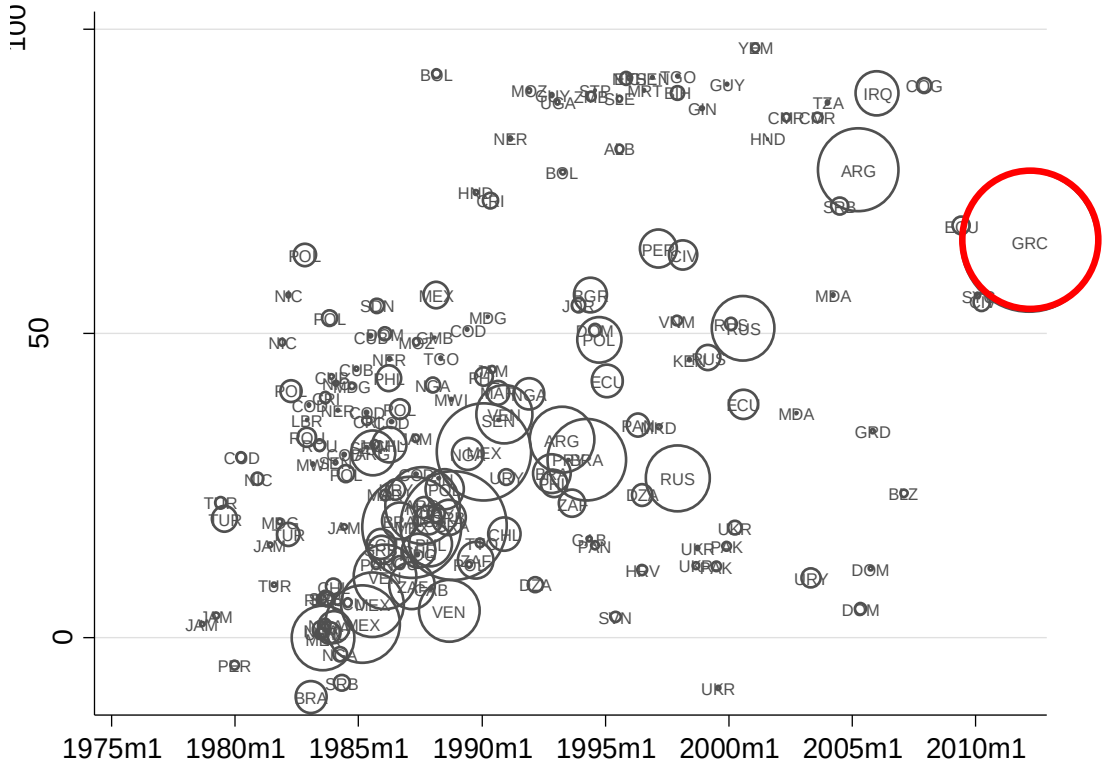
3/ Based on an imputed yield curve, see footnote 15 and Zettelmeyer et al. (2013) for details. The case shown is the one with assumed peak default probability after 2 years; 12 month standard deviation.

The main result is that the present value haircut was in the range of 59 – 65 per cent. Using a fixed discount rate for all of the old bonds leads to estimates close to 65 per cent regardless of whether we use the exit yield of 15.3 per cent or the somewhat higher rates at which yields stabilised in subsequent weeks (16.3). However, the yield curve approach produces an average haircut that is notably lower; at around 59 per cent (sensitivity analysis suggests a range from about 55 to 61 per cent). The reason for this is that the valuation model used to construct discount rates for maturities of less than 10 years assumes that as of March 2012, much of the sovereign risk in Greece was concentrated in the period between the May 2012 election and mid-2015, as a result of election uncertainty, the continuing recession, and large debt repayment obligations to the ECB and (in 2014 and 2015) the IMF. As a result, the constructed discount rates in the maturity spectrum between 1 and 8 years, in which the bulk of Greece's old bonds were set mature, are significantly higher than the average exit yield of 15.3 per cent, resulting in a lower value of these bonds, and hence lower haircut estimates.

How did the losses suffered by Greek bondholders compare to previous debt restructurings? The answer is in Figure 4, which compares the current offer with virtually all debt restructuring cases involving private creditors since 1975, based on estimates by Cruces and Trebesch (forthcoming). For the purposes of historical comparison, we stick to the 64.8 per cent haircut that is obtained by using the average exit yield for discounting, since the same approach was also used by Cruces and Trebesch.

– to reproduce the observed high but falling exit yields at the longer end. Yields at shorter end of the curve are calculated using these calibrated parameters and the actual cash flows of the shorter bonds. See Zettelmeyer et al. (2013), Appendix, for details.

Figure 4: Haircut and Size of the Greek Exchange Offer in Historical Perspective



Note: the figure plots the size of the present value haircut, using the methodology described in the text, for Greece (2012) and 180 restructuring cases from 1975 until 2010. The circle sizes represent the volume of debt restructured in real US$, deflated to 1980 (excluding holdouts). For Greece, we use the haircut estimate of 64.6% (column 1 in Table 2) and the exchange volume of US$ 199.2 billion (excluding holdouts). The source of the historical estimates is Cruces and Trebesch (forthcoming).

There are a number of cases of highly indebted poor countries, such as Yemen, Bolivia, and Guyana, that imposed higher losses on their private creditors. However, the haircut exceeds those imposed in the Brady deals of the 1990s (the highest was Peru 1997, with 64 per cent), and it is also higher than Russia's coercive 2000 exchange (51 per cent). Within the class of high- and middle-income countries, only three restructuring cases were harsher on private creditors: Iraq in 2006 (91 per cent), Argentina in 2005 (76 per cent) and Serbia and Montenegro in 2004 (71 per cent). The figure also shows that the 2012 Greek exchange was exceptional in size. Unlike on the haircut front, it breaks records here, exceeding the next largest sovereign credit event in modern history, which to our knowledge was Russia's default on 1.7bn British pounds in 1918, equivalent to just under 100 billion in 2011 Euros. The Greek exchange also easily surpasses the German default of 1932-33, the largest depression-era default, comprising 2.2bn US$ at the time, or approximately 26 billion in 2011 Euros.

Bond-by-bond "haircuts"

An important characteristic of the Greek exchange was that every investor was exactly the same (and only one) package of new securities. At the same time, residual maturities across Greece's eligible bonds ranged from almost zero (March 20th, 2012

bond) to 45 years (Greece had issued a CPI-indexed 50 year bond in 2007). Because coupon rates were typically in the order of 4-6 per cent – much lower than the exit yields – the value of these long bonds was much less than those of short bonds with the same face value. As a consequence, there are large differences in haircuts across bonds. Short dated bonds – were investors were asked to give up a face value that was almost within reach – suffered much higher haircuts (up to 80 per cent) than longer dated bonds, whose face value would have been heavily discounted in the high yield environment prevailing in Greece after the debt exchange (Figure 5). This fact is robust to the discounting approaches compared in Table 2.[19]

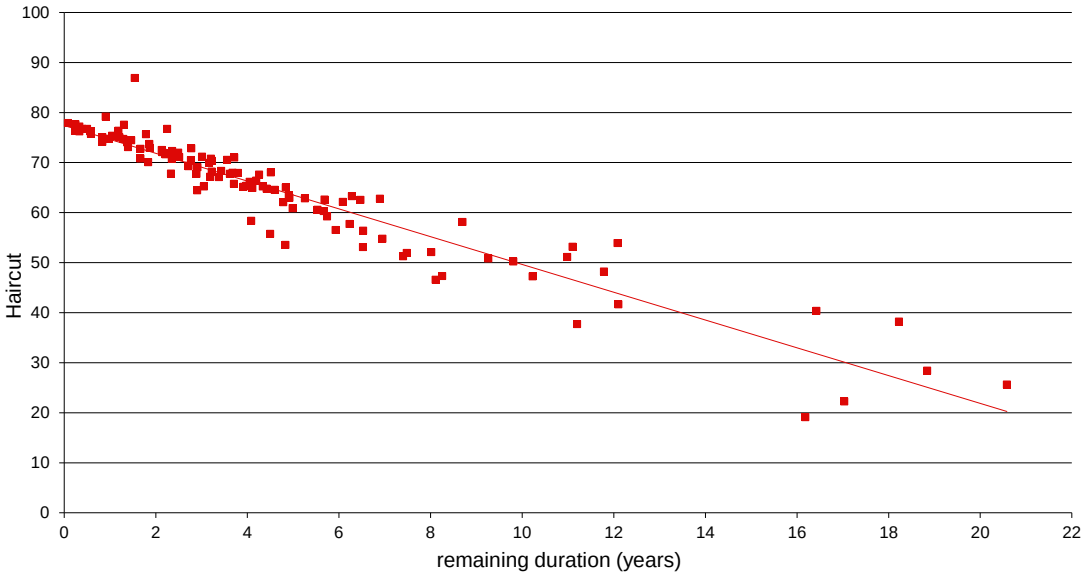
We are not aware of a previous restructuring case with such a large variation in present value haircuts across instruments. There are a few examples of selective defaults, in which countries discriminate between domestic and foreign creditors as a group, or across types of debt instruments.[20] But within these groups, there was often an attempt to reduce variations in haircuts by adapting the terms of the exchange to the terms of the old instruments or by offering investors a menu.[21] While there have been a number of previous exchanges with "one-size-fits-all" offers – such as in Pakistan 1999, Moldova 2002 or Cote D'Ivoire 2010 – these tended to be simple operations directed at just a few outstanding instruments.

[19] If imputed yields are used for discounting, the drop at the beginning is much faster initially, followed by a plateau at around 50 per cent, and then a further gentle drop. This reflects higher discount rates in the 2-6 year range, which imply that the values of the old bonds in this maturity range are lower in this approach than if a uniform discount rate is used.

[20] Recent examples include Russia's 1998-2000 defaults and restructuring, and Jamaica's 2010 sovereign debt swap, which both involved domestically issued debt but left Eurobonds untouched. See Sturzenegger and Zettelmeyer (2007a) and Erce and Diaz-Cassou (2012).

[21] In Ecuador's 2000 debt exchange, for example, shorter dated instruments were exchanged at par while holders of longer dated bonds suffered a face value haircut; in addition, shorter-term bondholders were given preferential access to a shorter maturity new bond. In Argentina's 2001 "Phase 1" exchange and Uruguay's 2003 exchange, the maturities of the new bonds depended on the residual maturities of the original bonds, i.e. bondholders with shorter instruments were offered shorter new bonds.

Figure 5. Bond-by-bond haircuts, by remaining duration
(Using a uniform 15.3 per cent discount rate)



According to individuals close to the exchange, the motivation for the one-size-fits all approach was mainly to keep it simple in order to get the deal done before the looming deadline of March 20 when the next very large bond became due (€14.4 billion). It is also possible that some of the banks leading the negotiation with Greece held longer-dated instruments, and as such did not have an interest in an alternative exchange structure that might have led to lower haircuts at the short hand but higher haircuts at the long end. In addition, there may have been little sympathy for an approach that would have improved the lot of short-term creditors, many of whom had deliberately bought short-dated instruments at large discounts in the hope of still being repaid in full.

Debt relief

As already discussed, the present values and haircuts presented in Table 2 may not be a good estimate of the debt relief received by the Greek sovereign, as from the perspective of a debtor country it is appropriate to apply a discount rate that reflects expected future borrowing rates over the lifetime of the new bonds, rather than the yields prevailing immediately after a debt exchange.

In the case of Greece, it is of course difficult to say when, and at what rate, the government will be able to return to capital markets on a regular basis. While there are estimates for OECD countries linking debt, deficits and growth to borrowing rates (for example, Ardagna, Caselli and Lane, 2007), these variables are themselves extremely difficult to forecast for Greece. We therefore compute debt relief based on three alternative assumptions about borrowing conditions in the long term.

1. The average nominal interest rate on public debt assumed by the IMF at the outer end (for 2030) of its March 2012 debt sustainability analysis, namely 5 per cent.

2. The expected long run yield on the new Greek bonds implicit in the prices at which these bonds traded after issue, which is about 8 per cent.[22]
3. Greece's borrowing rate from the EFSF, which equals the EFSF's funding cost plus a small spread. This could be rationalised by a scenario in which Greece remains dependent on EFSF support in the medium term. We assume a borrowing rate of 3.5 per cent in this scenario.

For reference purposes, we also show the debt relief that would be implied by the exit yield of 15.3 per cent (Table 3).

Table 3. Debt Relief Attributable to March-April 2012 Debt Restructuring

	Assumed discount rate (per cent) 1/			
	3.5	5.0	8.0	15.3
Value of new securities received (PV_{new}) 3/	46.5	40.4	32.2	23.1
Value of old bonds (PV_{old}) 3/	109.0	100.2	86.3	65.3
Present value haircut/debt relief (%) 4/	57.4	59.7	62.7	64.6
Present value debt relief (€ billion) 5/	124.7	119.1	107.8	84.0
net of bank recapitalisation costs 6/	102.7	97.1	85.8	62.0
Present value debt relief (per cent of GDP) 7/	*64.3*	*61.5*	*55.7*	*43.3*
net of bank recapitalisation costs 6/	*53.0*	*50.1*	*44.3*	*32.0*

1/ Used for discounting payment streams of both new and old Greek government bonds. For EFSF bill present value of 15 is assumed. GDP warrants valued at 0.23 per cent of old principal.
2/ See note to Table 2.
3/ Per 100 units of principal outstanding
4/ Percentage difference between value of new and old bonds: 100*(1-PVnew/PVold)
5/ Value of old bonds minus value of new securities, scaled by total volume of debt restructure (€ 199.21 billion)
6/ Assumes debt restructuring-related bank recapitalisation costs of €22 billion.
7/ Using preliminary 2012 GDP of Greece from Eurostat, €193.75 billion

The first three lines of Table 3 follow the same structure as Table 2, showing the average present value of the old and new instruments per outstanding unit of the old debt and the percentage difference between the two – the "haircut". For the three lower discount rates used in the table, this haircut can be interpreted as alternative estimates of the debt relief achieved by the debt restructuring, expressed in per cent of the value of the old debt stock. Debt relief in per cent of the value of the old debt stock increases over the range of discount rates shown, but not by very much. This reflects the fact that, as shown in Figure 2, the PSI operation did not significantly change the maturity profile of debt payments to investors. However, debt relief in Euro terms – the *absolute* difference in the present values of the old and new debt – is

[22] To rationalise the exit yield curve mapped out by Greece's new bonds, one needs to assume not only high default probability in the short run, but also a long term yield (in the event that default in short-medium term can be avoided). These turn out to be about 8-8.2 per cent (see Zettelmeyer et al, 2013, Appendix 2 for details). Assuming that Greece remains in the Eurozone, this would imply long-term *real* interest rates of about 6 per cent, which is not implausible for a high-debt OECD country (for example, Italy borrowed at long term real interest rates of 6½ - 7 per cent in the late 1980s and the first half of the 1990s).

higher for lower discount rates, because percentage debt relief is applied to a much higher base.

The main result from Table 3 is that debt relief – net of the fiscal costs of compensating Greek banks for losses sustained as a result of the debt exchange, estimated at €22 billion[23] -- was in the order of 44 to 53 per cent of GDP, depending on which discount rate that is applied.[24] This is very large in historical comparison. The next largest operation to restructure privately held debt, Argentina's 2005 debt exchange, achieved only about half that amount as a share of GDP, namely, about 22.5 per cent of GDP, based on a discount rate of 7.7 per cent.[25]

How the free rider problem was overcome

Each holder of Greek bonds, even members of the steering committee that negotiated the terms of the exchange offer with Greece, was in principle free to accept or reject Greece's exchange offer. This leads to the question of what ultimately induced the high creditor participation of almost 97 per cent, notwithstanding a present value haircut of more than 50 per cent for all but the most long-term creditors.

For the large creditors – and in particular, the large European banks – the likely answer is that without their participation, the restructuring would have fallen apart, leading almost inevitably to a disorderly default. Furthermore, any attempt to free ride would have been squashed by their home country authorities, who were also Greece's official creditors, and as such interested in maximising private sector participation.[26] Hence, it is not surprising that on March 6th, just prior to the exchange deadline, the major members of the creditor committee that had negotiated with Greece released press statements that they were committed to participate in the offer.[27]

However, the members of the creditor committee held at most 40 per cent of the debt eligible for the exchange. Additional debt may have been in the hands of other institutions amenable to official pressure, but according to market estimates in early 2012, these institutions together held at most €120 billion out of the almost €200 billion that were eventually exchanged. The problem was how to deal with the remaining €80 billion (at least) of potential free riders that might be tempted to "hold out" in the hope of being repaid in full or receiving a better deal.

In solving this problem, Greece and its legal and financial advisors could look to the experience of previous distressed debt exchanges. Following the return to bonds as

[23] See IMF report of March 16, 2012: http://www.imf.org/external/pubs/cat/longres.aspx?sk=25781.0
[24] This should be interpreted as debt relief attributable to redistribution from the private sector. An additional, albeit small, element of debt relief came from the fact that cash payments to investors were financed by low-interest lending from the EFSF. At discount rates above the costs of servicing these PSI-related debts to the EFSF, this would generate a (small) additional transfer to Greece, namely, the difference between the present value of the short-term EFSF notes received by investors and the present value of Greece's payments to the EFSF to repay these notes, which were stretched over a 30 year period.
[25] See Sturzenegger and Zettelmeyer (2007b).
[26] As famously remarked by Commerzbank's Chief Executive Martin Blessing, for these institutions the participation in the restructuring was "as voluntary as a confession during the Spanish Inquisition" (WSJ.com, 24 February 2012).
[27] Financial Times, March 6, "Greece inches closer to €206bn debt deal."

the predominant form of emerging market finance in the early 1990s, there was a widespread fear that the dispersion of these bonds in the hands of many creditors would make it virtually impossible to achieve orderly debt restructuring. Yet, history by and large proved these fears wrong: almost all debt exchange offers since the Brady deals of the 1990s have been successes in the sense that creditor participation has been high, and restructurings much quicker than in the era of bank finance (see Bi et al, 2011 and Das et al, 2012 for details). To deter free riding, countries used a combination of three mechanisms:

- Most frequently, by threatening potential holdouts with non-payment – an approach that is particularly credible when an exchange offer follows a default, as happened in Russia (2000), Argentina (2005) and a number of other cases – or undertaking actions to weaken their legal position in the event of litigation. In some exchanges, such as Ecuador (2000) and Uruguay (2003), countries used consent solicitations ("exit consents") to weaken the legal protections in the bonds of holdout creditors, taking advantage of the fact that the non-payment clauses of bond contracts can generally be changed with simple majority (Buchheit and Gulati, 2000).

- Less frequently, by using "collective action clauses" that allow a qualified majority of creditors to change the payment terms of the bonds against the opposition of a group of holdouts, if such clauses were present.[28]

- Finally, through legal devices or financial enhancements that put tendering bondholders at advantage in *future* sovereign debt crises.[29] This could be achieved through the already mentioned "exit consents", which weaken the position of holdouts in absolute and relative terms, or by offering creditors cash, collateralised securities, securities issued by a more creditworthy borrower, or securities that are harder to restructure and hence *de facto* senior. Examples include the collateralised "Brady bonds" offered to bank creditors that had suffered default in the 1980s and the Russian 2000 debt exchange, which replaced debt owed by a state-owned bank with Eurobonds owed directly by the Russian sovereign and issued under foreign law.

The July 2011 proposal was an attempt to deal with free riding only through the last mechanism, by offering an upgrade from Greek law to English law combined with collateralised principal. Even after the official creditors had decided on "stronger PSI" in October 2011, the idea of undertaking a "purely voluntary" debt exchange relying only on positive participation incentives lingered on. By January 2012, however, it

[28] Prior to Greece (2012), collective action clauses had been used in Ukraine (2000), Moldova (2002), to restructure Uruguay's Yen-denominated bond (2003), in Belize (2007), and in Seychelles (2009). However, in the first three cases they were used for only one bond, and in the last two the number of bonds involved was small. Reasons why their use has not been more widespread include the fact that bonds issued in New York tended to lack such clauses prior to 2003, and that CACs are of limited utility in restructurings involving multiple bond issues, because they have to be voted on bond-by-bond, and holdouts can acquire blocking positions in individual bond issues.

[29] This effect can lead an individual creditor to accept even when suffering a large haircut, and even conditional on all other creditors accepting, because it implies that the original instrument is riskier, and hence needs to be discounted at a higher rate, following a successful exchange. This is true even in a "voluntary" setting in which the debtor genuinely would continue servicing a holdout's instrument so long as it has the funds to do so. See Gulati and Zettelmeyer (2012a) for details.

became clear that there was a problem with this approach: offering a safer instrument will not, by itself, address the free rider incentive for creditors holding sufficiently short-term bonds. Conditional on a successful voluntary exchange, short term bondholders are very likely to be repaid in full even if the claim is junior to the new debt, as the chance of a new debt crisis in the (short) period between the exchange and the maturity date is very low. Based on this argument, it seemed unlikely that the holders of a €14.5 March bond, whose participation was considered essential, would agree to tender.

The end result was that Greece relied on all three of the above mechanisms, but with different emphasis, and in new ways (see Zettelmeyer et al. 2013 for details):

First, and most importantly, it introduced a powerful collective action mechanism into domestic law bonds. In February 2012, the Greek parliament enacted the Greek Bondholder Act, which allowed it to impose the new payment terms on holdouts with the agreement of two-thirds of face value weighted votes. Unlike the English-law bonds, this threshold applied across bonds rather than just bond-by bond, subject only to a participation quorum of at least 50 per cent of face value. In the end, this aggregation feature turned out to be pivotal for the results of the debt exchange, as it allowed the restructuring of 100 per cent of the Greek-law sovereign bonds, which themselves made up over 86 per cent of the bonds covered by the restructuring.

Second, the "PSI consideration" was designed to be as attractive as possible, for a given haircut, to bondholders who feared (correctly) that Greek sovereign risk would remain high even after a successful debt exchange. Three features of the "PSI consideration" made it particularly valuable to investors in these circumstances:

- A large portion of the new securities bundle – 15 per cent of original principal – took the form of highly rated EFSF bills which were almost as good as cash. These represented an outsized share of the value of the new bundle of securities, namely, almost two-thirds (15/23; see Table 2). Regardless of what happened to Greece in the future, participating investors would have this "bird in hand".
- The new bonds were issued under English law, and included standard creditor protections such as pari passu, negative pledge, and cross-default clauses. Greek-law sovereign bonds contained almost none of these protections. However, the contract provisions were arguably less important than the governing law itself. Greek-law bondholders who had just experienced the power of the local legislature to change contract provisions retroactively would find some comfort in the fact that English law bonds would preclude a change of their contractual rights through legislative fiat.
- The new bonds were issued under a "co-financing agreement" that created an exact symmetry between Greece's debt service to the new bondholders and its debt service to the EFSF related to the EFSF notes and bills that it had received for the purposes of the debt exchange. In the event of a shortfall in payments by Greece, a common paying agent committed to distributing this shortfall pro rata between the EFSF and the bondholders. Hence, the co-financing agreement made it difficult for Greece to default on its bondholders without also defaulting on the EFSF. The co-financing agreement also

stipulates that the payment terms of the new bonds cannot be amended without the consent of the EFSF.

Apart from making the "PSI consideration" more attractive to risk-averse investors, the implication of the last two features was to commit Greece to an aggressive stance vis-a-vis holdouts in the event of a future default. Faced with the choice of defaulting on "old" Greek-law bonds whose terms could be changed through an act of parliament or on new bonds that exposed the Greek sovereign to litigation in foreign courts and forced it to also default on the EFSF, Greece would surely opt for the latter.

Finally, although the Greek government went out of its way to appear non-coercive before and in the language of the exchange offer – for example, the February 24 invitation memorandum refers to the exchange as a "voluntary liability management transaction by way of a voluntary bond exchange" – it did, at the last minute, adopt a harsher tone towards potential holdouts. On March 5, three days before the expiry of the exchange deadline, Greece issued a press release stating that "Greece's economic programme does not contemplate the availability of funds to make payments to private sector creditors that decline to participate in PSI." On the same day, Greek finance minister Evangelos Venizelos was quoted as saying that "Whoever thinks that they will hold out and be paid in full, is mistaken" (Reuters, March 5, 2012).[30]

Although it is impossible to say exactly how much either the upgrade in "safety" or fear of discrimination contributed to the success of the exchange offer, it is clear that the safety upgrade was viewed as essential ex ante and that one or both played a significant role ex post. Even a solid commitment by members of the creditor committee would not have been enough to ensure that the two-thirds majority threshold specified by the Greek Bondholder Act would be met. With hindsight, we know that over 82 per cent of Greek law bondholders exchanged their bonds and an additional 3.3 per cent voted in favour of the amendment, far exceeding the holdings of the institutions that were either members of the creditor committee or otherwise susceptible to regulatory pressure. Thus, there must have been a significant contingent of potential free riders that ultimately opted in favour of the offer or amendment.

IV. From Debt Exchange to Buy-Back

Despite the success of the debt exchange and the associated approval of a second official bailout programme for Greece on March 14 2012, high yields on the new bonds signalled the market's view that a second default in Greece continued to be a clear and imminent danger. Part of this had to do with domestic political and social opposition to the adjustment programme, which materialized in the general elections in May with the unexpected rise of the anti-bailout party Syriza. The ensuing political deadlock receded only after a second election in June enabled a pro-bailout coalition government under a new Prime Minister, Antonis Samaras (Figure 6).

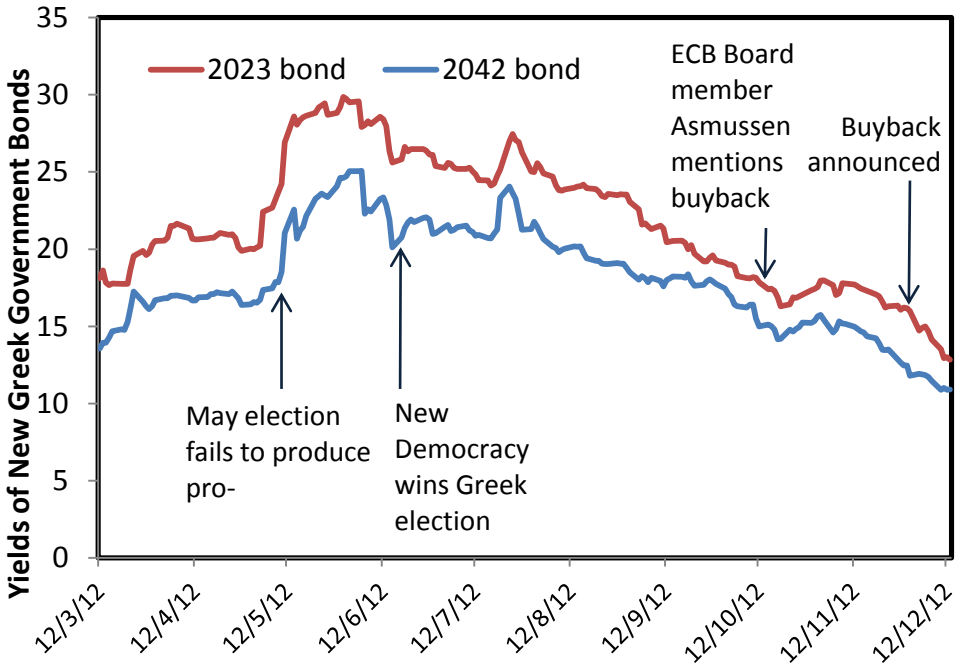
[30] Even so, an analysis of Greece's behaviour using an index of government coerciveness developed by Enderlein et al. (2012) indicates that the Greek government's actions were among the least coercive in a sample that includes all distressed debt exchanges since 1990. Only Uruguay 2003 was less coercive as far as debtor behaviour is concerned. See Zettelmeyer et al. (2013).

However, continued high default risk also had to do with the design of the March debt exchange and the associated second bailout programme itself. Greece had received a high degree of debt relief, but only at the price of promising more austerity and structural reform which – given its economic and social troubles – did not seem plausible to many outside observers. At the same time, debt service after the exchange continued to be surprisingly high in the short term. This reflected the compromise that had made the debt exchange possible in the first place: getting official Europe and the ECB to agree to a restructuring required exempting the ECB and national central banks from a haircut, and also taking a soft approach vis-a-vis free riders. At the same time disproportionately high haircuts discouraged particularly short term bondholders from taking part in the exchange. As a result of all these factors, the debts to ECB, national central banks and holdouts implied payments of more than €10 billion in each year between 2012 and 2015 (see Figure 3). This meant that there was no room for slippage: if official disbursements under the programme stopped or were delayed, a default on the ECB, in particular, was very much in the cards, and with it, potential exit from the Euro.

In the event, programme payments *were* delayed, as the programme ran off track almost immediately as result of the May and June elections and protracted negotiations with the new government. An initial set of disbursements under the March programme -- €75.6 billion in total, three quarters of which was financing for the debt restructuring and the associated bank recapitalisation – took place between March and June, but over €36 billion in additional EFSF and IMF payments promised for the second and third quarter were withheld. Greece coped by continuing to cut spending, accumulating arrears on other government liabilities and selling T-bills to its banks. A critical moment came on August 20th when Greece repaid over €3 billion to the ECB, using ad-hoc financing from the ECB through the Emergency Liquidity Assistance (ELA) mechanism.[31]

[31] According to press reports, on August 2, 2012 the ECB governing council approved a request from the Bank of Greece to raise the ceiling of short-term paper that it could accept as collateral for emergency liquidity assistance to Greek banks from €3 to €7 billion. This allowed the Greek government to raise the money to repay the ECB by selling €4 billion in T-Bills to Greek banks on August 14. See "ECB saves Greece from bankruptcy by securing emergency loans paper", Reuters, 3. August 2012; "Greece avoids default ... for now", CNN Money, 17. August 2012.

Figure 6. Yields of New Greek Sovereign Bonds from Issue Date (12.03.2012) until Buyback (12.12.2012)



At the same time, the economic news was not encouraging, especially with respect to growth. As summarized by the IMF (2013, p. 11) "the deepening recession created further headwinds for fiscal adjustment, increased the burden of Greece's debt, and raised substantially the probability that Greece would get stuck in a weak-confidence, high-debt, low-growth trap". The privatization program came to a near-complete halt, yields on Greek bonds remained high even after the political crisis had been resolved, and by September 2012, it became clear that the budget shortfall was even larger than expected, up to €30 billion, thus substantially increasing the Greek Debt/GDP ratio for 2012.

Against this backdrop, the IMF began to demand further debt relief for Greece as a condition for further IMF disbursements. Given that by far the largest creditor of Greece at this point was the EU – both through the EFSF, and through the "Greek Loan Facility" (GLF) that had financed the first bailout programme – meaningful debt relief could only come from the official sector. At the same time, unsurprisingly, Eurozone leaders balked at the idea of large scale debt relief so soon after large scale official lending had been made available to Greece at terms that were already significantly more favourable than the first package. There was particular resistance against politically highly visible cuts in the face value of debt owed by Greece.

The result was a compromise within the Troika, involving four elements. First, longer maturities and lower interest rates on GLF and EFSF lending (but no face value reduction). Second, a commitment to return profits made in connection with ECB purchases of Greek bonds to Greece. Third, EFSF funding for a partial buyback of Greece's newly issued bonds, which were still trading at a large discount (prior to the announcement, about 28 cents for each Euro of face value). Finally, a commitment by the Eurogroup to "consider further measures and assistance, including inter alia lower co-financing in structural funds and/or further interest rate reduction of the Greek

Loan Facility, if necessary, for achieving a further credible and sustainable reduction of Greek debt-to-GDP ratio, when Greece reaches an annual primary surplus, as envisaged in the current MoU, conditional on full implementation of all conditions contained in the programme."[32] The latter was likely important to the IMF, which was concerned that the debt relief granted by the EU was not going far enough.[33]

The December buyback: a boondoggle?

The most controversial element of the November package, and the only one involving private creditors, was the proposed buyback of Greek sovereign bonds issued only 9 months earlier. From the perspective Eurozone leaders, the appeal of this proposal was that it allowed a face value reduction of Greek debt without requiring an unpopular nominal write down on the official debt. Indeed, when the buyback was carried out on 12 December 2012, it used €11.3 billion in EFSF financing to retire €31.9 billion of Greek bonds, hence reducing the face value of Greece's debt by €20.6 billion.[34] On this basis, it was declared an important success in the quest to put Greece's debt on a sustainable path,[35] and cleared the way for the next instalments of EFSF and IMF disbursements.

At the same time, the average price at which Greece had bought back its debt, 34 cents per Euro of face value, was 23 per cent higher than the price of Greece's debt prior to the buyback announcement. This seemed to confirm a problem with voluntary buybacks that economists had been pointing out for some time, triggered by the experience of the Bolivian buyback of 1988:[36] namely, that their benefits tend to be appropriated by the creditors, in the form of a higher market value of debt, rather than by the debtor country. The question is to what extent this is true for the case of Greece, and whether and to what extent Greece improved its debt sustainability as a result of the buy back.

To answer these questions, it is necessary to briefly recall the essence of the "buyback boondoggle" argument – that is, the claim that voluntary debt buybacks are generally a waste of public funds that could be better spent elsewhere, particularly in a crisis when there may be a dire need for public investments or social spending. The argument consists of two parts.[37]

The first is that the reduction in debt service obligations expected from the buyback – and hence the increase in the probability that a distressed sovereign will actually be

[32] See Eurogroup statement on Greece, 27. November 2012.
[33] In its January 2013 report on Greece, the IMF states that, if macro risks played out, "additional debt relief and financing would be needed from Greece's European partners". Specifically, this "would require an upfront haircut of about 25 per cent on EFSF loans, GLF loans, and ECB SMP bond holdings." (IMF 2013, p. 39).
[34] Initially, a ceiling of €10 EFSF financing had been set for the buyback, but following the buyback auction, the EU agreed to finance a slightly higher amount.
[35] See Eurogroup statement on Greece, 13. December 2012.
[36] Key contributions include Bulow and Rogoff (1988) who coined the term "buyback boondoggle", Krugman (1988), Dooley (1989), and Krugman et al. (1991). For summaries and commentaries in the context of the Eurozone crisis see Claessens and Dell'Ariccia (2011), Manasse (2011) , Adam (2012), Sterne (2012) and various FT Alphaville blogs; for example "The return of the Greek buyback (boondoggle)", 19 October 2012.
[37] For a slightly different and more detailed rendering of the same two points, and an overview of the pros and cons of buybacks (mainly cons), see Claessens and Dell'Ariccia (2011).

able to service the remaining debt – will also result in a secondary market increase of the debt, after the buyback is announced. The average buyback price will therefore be generally higher than the "marginal" price of the debt – i.e. the price of buying back just one unit. This result is an inescapable consequence of the voluntary nature of the buyback. If debtors expect the debt to decline as a result of the buyback, they will no longer be willing to sell at the marginal price, because this no longer reflects the true value of the debt. As a result, "negotiated buybacks", which cap the extent of the price rise (or try to lock in the pre-announcement price), are always preferable to voluntary buybacks, at least from the perspective of debt reduction.

Note, however, that the extent to which the price actually rises in a voluntary buyback will depend on the circumstances.[38] For example, compare a situation where the cash used in the buyback is a gift from donors (as in the famous 1988 Bolivian case) and where it is borrowed from a senior lender such as the IMF. In both cases, the expected net reduction in the face value of debt service obligations will tend to push the price up. But in the case of the IMF-financed buyback, there is a countervailing effect: private borrowers realise that if there is a debt problem, they will be last in line. This means that the buyback price will rise less compared to the pre-buyback price (and it is even possible to construct examples where it would fall).

The second part of the argument, which is more controversial,[39] assumes that the benefits of the buyback to the country can be judged by the change in its net asset position before and after the buyback, with its debt measured at market prices. For example, take a situation where the market value of the debt is unchanged as a result of the buyback: that is, the reduction in face value is exactly offset by an increase in the price of the debt (this more or less happened in Bolivia). From the perspective of the critics, this means that the buyback is a waste of public money – a boondoggle – since the country will have spent its cash, but the value of its debt remains the same. However, while the value of the debt is all that matters for a creditor, this is not obvious from the country perspective. For example, if there are large costs of default, and the buyback helps the country avoid default, the operation may well be welfare improving (depending on what else the country could have done with the cash used to buy back the debt) even in a situation in which the market value of the debt is unchanged.

Consider now the December 2012 Greek buyback, starting with a comparison of the market value of Greece's debt before and after, as sketched in the last paragraph. To do this, it is necessary to determine a "pre-buyback price". The most obvious candidate for this was the price on 23 November 2012, also because the Eurogroup itself seems to have viewed this price as a benchmark.[40] Note that this could be wrong in either direction: in particular, the change in price between 23 November and 12 December is quite likely to overstate the impact of the buyback announcement because it was a reaction not just to the buyback but also to the other elements of the November package (including the resumption of EU-IMF disbursements, and official

[38] This is explored in detail by Krugman et al. (1991).
[39] See, for example, Cline (1995), pp. 187-93, in the context of the Bolivian buyback debate.
[40] "The Eurogroup was informed that Greece is considering certain debt reduction measures in the near future, which may involve public debt tender purchases of the various categories of sovereign obligations. If this is the route chosen, any tender or exchange prices are expected to be no higher than those at the close on Friday, 23 November 2012." Eurogroup statement on Greece, 27.11.2012.

sector debt relief). It is also possible however that the change in price since November 23 understates the impact of the buyback, because the latter may have been priced in to some extent, following remarks by an ECB Board member in mid-October.[41]

Based on the November 23 reference price (27.8 cents/Euro), the market value of Greek bonds dropped by €7 billion as a result of the buyback: from €17.1 billion to €10.1 after the operation was completed on 12 December. To finance this debt reduction, Greece's debt to the EFSF went up by €11.29 billion in face value. There are, of course, no observable market prices for this debt; but it is a fair assumption that the default risk faced by the EFSF following the buyback is no longer very different from that of the private sector: given what little privately held debt Greece has left at this point (see below), it is hard to imagine a scenario where Greece would again restructure its debts to private creditors and not also to the EU. Using the average bond yield prevailing immediately after the buy-back (11.75 per cent) to discount debt service flows to the EFSF leads to a present value of just €2.7 billion – reflecting the low interest rates and very long maturity of this EFSF loan (it amortises linearly between 2023 and 2042). Discounting with a market discount rate thus implies a €2.6 reduction in the value of market debt for each €1 value of EFSF money invested, or €24.3bn in total present value reduction, which looks like a good deal. For a lower discount rate of 8 per cent, the present value of the EFSF loan would be higher (€4.9 billion), but the buyback still pays off, leading to a present value debt reduction of €2 billion – a 41 per cent return for each €1 value of EFSF money spent.

To conclude, the Greek buyback was no "boondoggle" in the Bulow and Rogoff (1988) sense, perhaps because it was a case where the debtor country the country received "substantial concessions or compensation for undertaking the repurchase" (to use their language, p. 697), in the form or highly concessional buyback funding from the official sector. This does not mean however that conducting this buyback was necessarily a good idea. Even from the narrow vantage of improving Greece's debt sustainability, there could have been more effective ways of using the EFSF financing, as briefly discussed below.

We next compute the extent to which the buyback led to debt relief. This is different from the question of how it impacted the market value of debt, because the motivation is to find out to what extent the buyback made it made it easier for Greece to repay its remaining debt *in full*. If this is the purpose, using changes in market value of debt make no sense, because they reflect changes in default risk.[42] In a static setting (i.e. if all debt were due tomorrow), it would be enough to just focus on change in face value. Given that the setting is not static but instead involves changes in payment flows, we have to discount, but rather than using market yields we use the same discount rates as in the previous section – 3.5, 5 and 8 per cent – to discount both the old flow (Greek bonds bought back) and the new one (new debt service to the EFSF). As explained before, the justification for using these rates is that they represent different guesses for the rates at which Greece might be able to transfer revenues over time, based on borrowing from either the market after it reopens or from the EFSF.

[41] See Reuters, "ECB's Asmussen says Greece could buy back own debt", October 12, 2012.

[42] For example, higher growth will drive up the market value of debt, but this does not mean that the debt burden has increased, on the contrary: the higher market value expresses the fact that it has become easier, and hence more likely, to repay a given nominal debt.

The main result, given in the bottom two rows of Table 4, is that in addition to a face value reduction of €20.6 billion, the buy-back operation did in fact achieve a reasonable volume of present value debt relief, ranging from €12 billion for the highest of the three discount rates to just under €21 billion for the lowest discount rate, or 6.2 to 10.8 per cent of 2012 GDP. These are not very large amounts, but respectable, given Greece's dire situation and the limited scale of the operation.[43]

Table 4. Debt Relief Attributable to December Debt Buyback
(in € billion unless otherwise stated)

	Discount rate (per cent)		
	3.5	5.0	8.0
Reduction in Greek government bonds			
Face value	31.9	31.9	31.9
Present value	31.7	25.4	17.0
Increase in debt to the EFSF			
Face value	11.3	11.3	11.3
Present value	10.8	8.2	4.9
Debt relief			
Face value	20.6	20.6	20.6
Present value	*20.9*	*17.1*	*12.1*
Present value (per cent of GDP) 1/	*10.8*	*8.8*	*6.2*

1/ Using preliminary 2012 GDP of Greece from Eurostat, €193.75 billion

At the same time, however, Greece could have done better by conducting the buy-back differently. Table 5 presents two main counterfactuals.

First, rather than conducting the buyback as a Dutch auction at a market price, it could have been conducted at a pre-set price, possibly backed by collective action clauses or exit consents or some combination thereof. Indeed, the November 27 Eurogroup statement stated that "any tender or exchange prices are expected to be no higher than those at the close on Friday, 23 November 2012." Had the exchange indeed been conducted at that price (namely, 28 cents/€ on average), and assuming the same amount of cash had been spent in the buyback, Greece would have obtained an extra 3-4 per cent of GDP in debt relief. Had the issue price of March 12 been used – another defensible choice, as it would have meant no further losses for investors

[43] One may ask at this point whether these amounts need to be reduced further, as was the case for the debt relief calculations in Table 3, by any money that the Greek government may have needed spend in order to recapitalise Greek banks who according to IMF information, contributed €14.1 billion of the €31.9 bought back in the operation. The answer is no: although the EFSF subsequently released a €16 billion loan tranche to Greece that was earmarked for recapitalisation, this was motivated by the generally poor asset quality of banks, not by any hole blown into bank balance sheets as a result of the buyback. This is not surprising, since there is no reason why the buyback, even if it was not fully voluntary, would have inflicted a loss on banks. In economic sense, banks made a capital gain, since they received the bonds for an average price of 25 cents/€ or less, and were selling it for 34 cents/€. In accounting terms, banks were either marking their holdings to market, in which case the buyback made no difference or were holding them to maturity, in which case the would have been valued at the initial 25 cents/€ price, in which case banks realised a profit.

beyond those already sustained in the debt exchange – debt relief would have gone up by another 2 per cent of GDP. Of course, achieving the same participation rate at these lower prices would likely have required some degree of coercion. The official sector faced a choice between sticking to the principle of a fully voluntary exchange and sticking to the aim of conducting the buyback at a price of 23 November 2012 or less, and it chose the former.

Table 5. Debt Relief in Buybacks - Alternative Scenarios
(for a discount rate of 5 per cent; in € billion unless otherwise stated)

	Actual buyback	Negotiated buyback 2/		Full buyback at time of PSI 3/
		Prices of 23.11.	Prices of 12.03.	
Reduction in Greek bonds				
Face value	31.9	39.1	43.1	61.4
Present value	25.4	31.2	34.3	49.8
Increase in debt to the EFSF				
Face value	11.3	11.3	11.3	15.0
Present value	8.2	8.2	8.2	12.9
Debt relief				
Face value	20.6	27.8	31.8	46.4
Present value	*17.1*	*22.9*	*26.1*	*36.9*
Present value (GDP) 1/	*8.8*	*11.8*	*13.5*	*19.0*

1/ Using preliminary 2012 GDP of Greece from Eurostat, €193.75 billion

2/ Assuming same available volume of official financing as in actual buyback, i.e. € 11.29 billion

3/ Uses the secondary market prices of new Greek government bonds at three issue dates: 12.3.2012 (25 cent on € on average), 11.4.2012 (18 cents) and 25.4.2012 (19 cents). Assumes this would have been financed with additional EFSF PSI notes issued in March-April. Assuming terms of EFSF notes issued to finance December buyback would increase the debt relief by about 0.9 per cent of GDP for 5 per cent discount and 0.7 of GDP for 3.5 per cent discount.

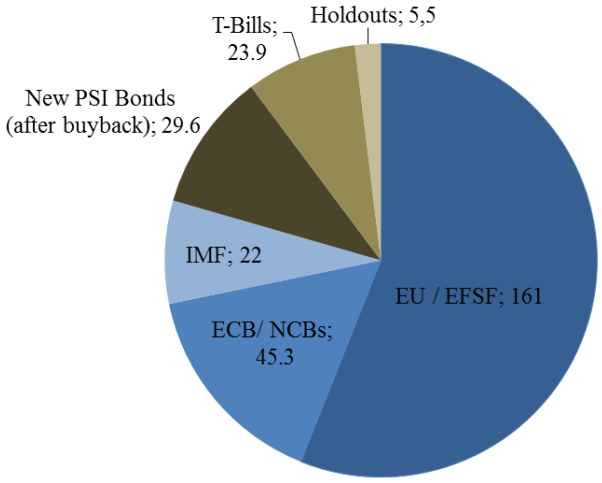
The second counterfactual is a situation in which Greece would not have first issued new bonds (in March/April) and then bought these back again (in December), but instead would have opted for a full buyback from the outset. This would of course have required more official financing in March – approximately €15 billion more, on top of the €34.5 billion provided to finance the cash portion and accrued interest in the March PSI. But €15 billion would have been only insignificantly more than the €11.3 that the EFSF ended up providing for the December buyback, and it would have led to large additional debt relief. As shown in Table 4 – based on the assumption that investors would have accepted the same value as in March in the form on cash rather than bonds – the full cash buy-back in March would have implied a further face value reduction of €46 billion, and additional present value debt relief of almost 20 per cent of GDP (assuming a 5 per cent discount rate), 10 percentage points more than what Greece obtained in the December buyback.

From the perspective of March, there was a very good argument *not* to go this route: namely, to keep €61.5 worth of Greek sovereign risk in the private sector so as to

share the burden with European taxpayers in case their needed to be another write-down. Seen in that light, the cash component of the March exchange was if anything too low, resulting in a rather modest risk cushion of remaining outstanding Greek government bonds. But if it had been clear at that point that the official sector intended to fritter away more than half of this cushion in a voluntary buyback only 9 months later, it may have been better to go for an involuntary buyback right away, with the same degree of coercion that was applied in March, and use this to maximise debt relief.

Figure 7 shows the end result of the Greek restructuring drama for Greece's creditor structure. In less than a year, the structure of Greek government debt was turned upside down, with privately held debt (bonds and T-Bills) now accounting for only about 20 per cent of total. Most strikingly, there was a near elimination of privately held sovereign bonds. In mid-February 2012, banks and other investors still held almost €206 billion of Greek bonds. But after the March/April exchange and the subsequent buyback this figure had shrunk to a mere €35 billion (€29.5 billion in the form of new bonds and €5.5 billion of old GGBs held by holdouts). At the same time, official loans by other Eurozone governments increased from €58 billion in early 2012 to more than €160 in late 2012, with a further €35 billion committed for 2013. We are not aware of any other similarly drastic case of "credit migration" from private into official hands in the history of sovereign debt.

Figure 7: Composition of Greek Sovereign Debt as of December 2012



Note: The Figure shows the amount of Greek government debt owed to private creditors (brown) and official creditors (blue) in € billion as of end-December 2012. ECB/NCB debt refers to ECB SMP holdings as well as holdings by national central banks in the Eurozone. EU/EFSF loans include the bilateral GLF loans as well as the EFSF loans. T-bills are privately held short-term debt instruments.

V. IMPLICATIONS FOR FUTURE SOVEREIGN DEBT RESTRUCTURING IN EUROPE

In this final section, we draw some normative implications from our case study. The first concerns the Greek case itself: was the decision to restructure the right one? Could it have been handled better? Second, what, if anything, does the Greek experience teach us about the wisdom of sovereign debt restructuring elsewhere in Europe? How can we tell when a country is a clear restructuring case and when it is not? Third, what does Greece tell us about how debt restructurings should be conducted, if a country decided to go ahead with it? To what extent does Greece provide a template for restructurings elsewhere?

Was the Greek restructuring a good idea? Could it have been handled better?

Economic theory answers the question of when it is optimal for countries to default roughly the same as common sense would. In the presence of default costs – financial disruptions and output costs – defaults should be rare events, but can be desirable when countries face high debt and large solvency shocks.[44] The presence of collateral damage on other countries – contagion – changes the interpretation of default costs, but does not change the answer; except for one key complication. The presence of official bailouts effectively creates a second instrument – transfers across countries – as an alternative to default. But, the expectation that this instrument may be exercised generates a moral hazard problem, since countries have control over their debt levels, the contracts they enter into and ultimately, their resilience to shocks.

Deciding whether the Greek restructuring was the right decision hence involves two questions. First, had Greece reached the threshold level of distress and high debt which would justify a debt restructuring purely from a domestic standpoint, i.e. abstracting from contagion? Second in light of the collateral damage that the Greek restructuring was likely to inflict on other countries – and arguably did inflict – was there a better alternative?

With respect to the first question, a first pass are the IMF's debt sustainability analyses (DSAs), conducted every 3-6 months since the beginning of the May 2010 programme. While for the first year or so IMF staff reluctantly concluded that Greek debt was sustainable (although it consistently refused to say that this was true "with high probability") the Fund gave up by October 2011, when its DSA noted a more severe drop in output than expected (projected at -5.5 per cent in -2011 and 3 per cent in 2012), a slower expected recovery, continued exclusion from capital markets, and lower privatization proceeds. Under the baseline scenario, the debt to GDP ratio would rise to 184 per cent by 2014 and remain above 130 per cent even in 2030, despite a continued primary surplus of at least 2.5 per cent.

Was the IMF take on Greece too pessimistic? In an analysis conducted a month earlier, William Cline argued that the July 2011 PSI agreement greatly helped debt sustainability and would suffice if Greece only stuck to its fiscal adjustment targets. In his baseline scenario the Greek debt ratio would peak at 175 per cent in 2012 and then fall to 113 per cent by 2020. Several reasons explain Cline's more favourable view.

[44] See Adam and Grill (2012) and references therein.

He assumed a more optimistic growth path (of +0.6 per cent in 2012, and +2.1 per cent in 2013), as well as higher privatization receipts than the IMF. He also predicted a primary surplus of 6 to 7 per cent from 2014 onwards. With hindsight, these assumptions do not seem plausible, particularly for a country with a weak fiscal track record. Between 1990 and 2007, the average Greek primary surplus was 0.6 per cent or GDP despite the economic prosperity of these two decades.

This leads to the second question: accepting that the debt was unsustainable; might a better approach have been to deal with the Greek debt problem through a mixture of conditionality and large transfers – genuine transfers, not just loans? Proponents of this approach can plausibly argue that the PSI decision in Greece contributed to the widening of the Eurozone in the summer of 2011, when the crisis spread to Italy and Spain;[45] and is threatening Europe again today, as the crisis in Cyprus in part a consequence of the Greek default. Given the enormous costs of a Eurozone break-up and disorderly defaults in larger countries, would it have been better to resolve the Greek crisis through official transfers rather than PSI?

We do not think so, for two reasons. Even after a €100 billion transfer from the private sector and a maturity extension and interest reduction in its official loans, Moody's (2012) continues to consider the Greek debt unsustainable, and the IMF continues to suggest that further "official sector involvement" in Greece might be needed. Hence, to both substitute for the private restructuring and address the Greek debt sustainability issue, the official transfer (not just loan) to Greece would have had to be enormous – surely in excess of €150 billion. Transfers of this magnitude are not conceivable between countries outside of a fiscal union which exercises centralised control. Second, even though the decision to restructure was risky and quite plausibly did contribute to the spread of the crisis in July 2011, the Eurozone had instruments to contain these risks – primarily, vested in the European Central Bank – and eventually exercised them, albeit reluctantly and after an initial learning period.

We hence conclude that even if the alternative of a large-scale official transfer had been politically feasible – which it was not – the debt restructuring was the right thing to do: a necessary, if not sufficient, step towards ending the debt crisis. But this does not mean that it was perfectly executed. While a full analysis is beyond the scope of this paper (see Zettelmeyer et al. 2013 for some additional material), we believe that Greece and its official creditors could have done better in five respects.

- First, the restructuring came too late by at least half a year. Once the PSI decision had been made in principle in June of 2011, nothing was gained – and about €10 billion in amortising debt was lost – by not going immediately for a deep restructuring option.
- Second, the unequal distribution of haircuts across the maturity spectrum was a mistake, in two respects: it left money on the table, and it exacerbated incentives to hold out at the short end – precisely the maturity range in which continued debt service to holdouts causes the greatest pain.
- Third the decision to exclude the ECB and national central banks from the restructuring altogether created large continued debt service obligations for Greece in the short term. This perpetuated the mutual dependency between

[45] See Ardagna and Caselli (2012).

Greece and its official creditors, with accusations of bullying on one side, and moral hazard on the other. Interrupting the programme over an extended period meant risking Eurozone breakup. This could have been managed better – for example, by selling the debt held by the ECB to the EFSF at the price at which the ECB had bought it, and then negotiating a restructuring of this debt with Greece.

- Fourth, adjustment and restructuring costs were entirely borne by Greek taxpayers and both Greek and European sovereign creditors. In contrast, Greece's bank creditors and non-guaranteed deposit holders were allowed to go scot-free. This decision is perhaps understandable in light of the fact that Greek banks were by and large relatively innocent victims of a largely sovereign debacle. However, it significantly undercut the success of the programme and restructuring. Bank recapitalisation costs in the order of €42 billion so far (22 per cent of GDP) contributed to the failure of the restructuring to restore debt sustainability, both directly and by requiring additional austerity.
- Fifth, the Greek crises resulted in large-scale cash transfers from official to private creditors, first via the cash-like EFSF notes issued in April of 2012 and later via the buy-back in December (€46 billion, all financed through EFSF loans). While these cash transfers helped to get potential free-riders on board and hence contributed to debt relief, they required large scale financing from Eurozone governments, and hence accelerated the concentration of Greek debt in the official sector. A lower cash portion would have led to a smaller transfer of Greek default risk from private into public hands and so would likely to have been a better choice on the long-run, especially for taxpayers.

Should other Eurozone sovereigns also restructure?

A serious analysis of this question is outside the scope of this paper, since it would require looking at other country case in detail. However, one can draw some general implications from the discussion so far.

A sovereign debt restructuring is the right thing do when (i) there are significant doubts about the sustainability of public debt; (ii) contagion can be contained and (iii) there is no easy alternative – including a transfer, but also a restructuring of other liabilities, particularly if the underlying solvency problem originates in a different sector (such as the banking system). The latter fits the basic intuition that the punishment should fit the crime, and contribute to the restoration of good incentives.

Table 6 shows basic fiscal indicators and the required debt-stabilizing primary balance computed from a simple static IMF DSA (see Das et al. 2012 for a summary of the model). We use Greek data of December 2011 and 2012 estimates for all other countries, as well as historical data for 1990-2007, all taken from the IMF's WEO report of October 2012.

Table 6: Static Solvency Analysis: Primary Surplus (in per cent of GDP) required to keep the Debt/GDP ratio stable

Country	Debt/GDP in 2012	Assumed Interest Rate	Required Primary Surplus				Primary Surplus in 2012	Avg Pr. Surplus 1990-2007
			Assumed GDP Growth					
			1.00%	2.00%	3.00%	4.00%		
Cyprus	87.3%	5.0%	3.5%	2.6%	1.7%	0.8%	-1.7%	0.4% /1
Spain	90.7%	5.0%	3.6%	2.7%	1.8%	0.9%	-4.5%	0.8%
Ireland	117.7%	5.0%	4.7%	3.5%	2.3%	1.1%	-4.4%	3.7%
Portugal	119.1%	5.0%	4.7%	3.5%	2.3%	1.1%	-0.7%	-1.3%
Italy	126.3%	5.0%	5.0%	3.7%	2.5%	1.2%	2.6%	2.4%
Greece	165.4% (in 2011)	5.0%	6.6%	4.9%	3.2%	1.6%	-2.2% (in 2011)	0.6%

The table shows results of a simple, static DSA analysis for 5 countries, using data on Debt/GDP and primary surplus from the IMF WEO database of October 2012 (for Greece we show figures for end-2011). The formula applied is $s = d_t\,[(i-g)/(1+g)]$, where *s* is the debt stabilizing primary balance in steady state, d_t is the Debt/GDP ratio in year *t*, *i* is the steady state interest rate and g is the steady state growth rate (see Das et al. 2012 for a detailed explanation of this simple DSA framework. The model can be easily expanded to account for inflation). Note that changes in the assumed interest rate have large effects on the resulting values of *s*.
/1 The historical primary surplus data for Cyprus is from the Economist Intelligence Unit dataset and covers only the years 1998-2007. The estimate for 2012 is from the European Commission.

The simple DSA snapshot suggests that the situation in Greece 2011 was significantly worse than that of any other of the five other countries in the table today. Under the steady state assumption of 5 per cent interest rates and 2 per cent growth, the required sustainable primary surplus for Greece amounted to 4.9 per cent, resulting in a fiscal gap of more than 7 per cent. The required adjustment is much smaller for Portugal and Italy, while the fiscal track record looks much more favourable in Ireland (see averages for 1990-2007). Given their budget histories, it is plausible that both Italy and Ireland will be able to run future surpluses of 3-4% in order to stabilize their high Debt/GDP ratios. Cyprus, Spain and Portugal have less favourable records, and their debt sustainability may be an issue in case interest rates remain high and growth low.[46] Much will also depend on how national banking crisis will pay out, especially in Cyprus and Spain. Recent developments in Cyprus suggest that the combination of official crisis lending, a sharp recession, and bank resolution costs (notwithstanding the intention to bail in creditors and large depositors), may result in a Debt/GDP ratio of 140 per cent or higher, which would raise questions about sustainability.

From a systemic perspective, a restructuring in Italy or Spain would no doubt have severe spillovers domestically and abroad, while this is less clear for Cyprus, Portugal or Ireland. As to alternative restructuring mechanisms it is clear that the debt sustainability problems of Cyprus, Ireland and Spain are largely a product of risk transfers from the corporate and banking sectors to the public balance sheet, and which should have been dealt with – and in some cases, can still be dealt with – by bailing in bank creditors rather than sovereign creditors.

[46] This said, historical evidence suggests that advanced economies have in the past often been able to reduce their debt levels from above 100% of GDP (IMF 2012, chapter 3).

To conclude, there seems to be no country in Europe today that is as clear-cut a case for sovereign restructuring as Greece in 2011 or even 2010. This said, there are several cases that might yet evolve in this direction, depending on the length and depth or the on-going recessions, and on how both old and new banking sector problems are handled.

Does Europe need a sovereign debt restructuring mechanism?

To what extent does the Greek 2012 restructuring provide a template for future Eurozone restructurings? At first glance, it would appear that the techniques used with Greece would be readily applicable elsewhere in the monetary union. After all, most Eurozone nations share with Greece the key characteristic that enabled its restructuring – over 90 per cent of their debt stock is governed by local law. This means that countries like Italy, Spain and Ireland, could use retrofit CACs to restructure sovereign debt and achieve high creditor participation. It also allows them to offer upgraded instruments issued under foreign law to dissuade free riders in a debt exchange, just like Greece did. And in a situation of debt distress, they could exploit the fear of local law instruments by swapping them against foreign law bonds at a discount – a purely voluntary operation, but one that might achieve a haircut (Gulati and Zettelmeyer, 2012b).

On these grounds, it is tempting to conclude that the techniques successfully used in Greece will make future debt restructuring in Europe a relatively straightforward matter. Unfortunately, reality is more complicated, for four main reasons.

First, in many countries, bond contracts and/or the legal environment are not as restructuring-friendly as in Greece. In Cyprus, for example, the constitution envisages that government debt payments take priority over most other obligations of the state. Removing a constitutional protection is possible, but harder than a simple legislative action. Cyprus also has a much higher share of English-law bonds (close to half), for which collective action clauses have to be voted on bond by bond, making them harder to restructure, as we saw in the case of Greece.

Second, we expect that more creditors will be encouraged to hold out and litigate instead of accepting future exchange offers. The twelve-month period between the Greek exchange in March 2012 and the date of this writing has arguably been one of the most significant in terms of sovereign debt litigation. In particular, two cases, *Assenagnon Asset Management SA v. Irish Bank Resolution Corporation Ltd.* and *NML Capital Ltd. v. Republic of Argentina*, the former under English law and the latter under New York law, have arguably enhanced the ability of holdout creditors to block restructurings.[47] In addition, the fact that more than €5 billion of "old" English-law bonds continue to be paid out in full by the Greek government may encourage future holdouts in Europe. Holdouts and legal disputes are therefore likely to become a more serious stumbling block than they were in Greece.[48]

Third, as we have seen, the Greek approach to restructuring requires a lot of official financing. Greece's €200 billion debt exchange was made possible by almost €60

[47] The cases are at [2012] EWHC 2090 and 699 F.3d 246 (2d. Cir. 2012) respectively.
[48] Schumacher et al. (2013) document the rise of creditor litigation in sovereign debt markets since the 1970s. In recent years, about 50% of debt restructurings involved legal disputes.

billion in financing from the EFSF (€5 billion to finance accrued interest payments, almost €30 billion to give cash-like short term bonds to investors and the rest to help Greece recapitalise its banks). Some of this could have been avoided by bailing in bank creditors, but the rest was the price, under the current debt restructuring regime in Europe, of taking a soft approach to dissuading free riding. This is public financing that could be spent otherwise – for example, on crisis lending that helps sustain public investment or social spending while a country is adjusting. Moreover, rescue money is becoming scarce in the Eurozone, both because of public and political opposition to further bailouts and because the pool of available resources is shrinking, as demand continues to increase and the potential roles of the EFSF/ESM are being expanded (most recently to direct recapitalisation of banks).

Finally and perhaps most importantly, a large fraction of the bonds issued by the weaker Eurozone sovereigns have been moving out of the hands of foreign investors and into the hands of local banks and other domestic institutions (Brutti and Sauré, 2013) That means that any significant restructuring of the government's debt will present the danger of causing an internal banking crisis. Of course, this is the very reason why the migration of sovereign debt to domestic holders, and banks in particular, could be happening. Domestic banks are relatively immune from restructurings because they expect to be recapitalised, for financial stability reasons, if their losses from domestic sovereign bond holdings are sufficiently high. And if the holdings of the banking system as a whole are high enough, the restructuring will likely not happen at all (see Broner et al. 2010).

Hence, while the Greek debt restructuring approach can be useful in specific cases, it falls far short of providing a template that could be a permanent fixture of the European financial architecture.

Is help already on the way? As agreed by the Eurogroup in November 2010, all Eurozone countries will be required to include CACs in all of their new sovereign debt from January 2013 on, regardless of governing law. The new CACs will be universal in Europe and will not require any retroactive change of contractual clauses, as imposed by Greece, and will not run afoul of any national constitution. Beyond these points, however, the Euro-CACs fail to address the problems identified above. First, the aggregate voting threshold is actually higher than the Greek "retrofit" CACs (75 rather than 66.67 per cent). Second, Euro CACs require at least a 66.67 per cent vote in *each* individual bond issuance, while in Greece it was sufficient to reach this threshold in aggregate.[49] Finally, it will take another 5 to 10 years until the Euro-CACs will be contained in the majority of Eurozone sovereign bonds. Until then, there will be a mixed regime of pre-2013 bonds (mostly without CACs), and post-2013 bonds (with Euro-CACs). All of this does not inspire confidence that European sovereigns will have an easier time in future restructurings, especially if there is less public money to finance cash incentives or collateral that minimise holdouts.

Against this backdrop, it may be time for setting up a more systematic mechanism to deal with restructurings in Europe. This could be achieved in a fairly straightforward fashion within the structure that has already been put in place to deal with future debt

[49] Details regarding the E-CACs are provided by the following note. Clifford Chance – Briefing Note, 2012. Euro Area Member States Take Collective Action to Facilitate Sovereign Debt Restructuring, December (http://www.cliffordchance.com/publicationviews/publications/2012/12/euro_area_me).

crises. Specifically, the treaty of the European Stability Mechanism could be modified to say that the assets and revenues of any Eurozone member nation that is undertaking an ESM-endorsed debt restructuring will be immune from attachment by holdout creditors (see Buchheit, Gulati and Tirado, 2013). One template for doing so exists already, and has worked in the context of Iraq's post-war restructuring of 2006.[50] In the context of the ESM framework, it would be possible to combine this legal mechanism with a set of policies, spelled out *ex ante*, that makes it clear under what circumstances a debt restructuring would be endorsed, and provides financial support both to the restructuring country and (if needed) to countries that are exposed to contagion.[51]

The benefit of such a mechanism would be two-fold. First and most obviously, it would make the resolution of sovereign debt crises less costly *ex post* by creating an instrument that addresses the holdout problem without requiring either large-scale use of official financing or default threats. Second, it would also improve efficiency *ex ante*, because it would make it more likely that orderly debt restructurings will actually happen in circumstances when they are deep sustainability problems. This would be true because the mechanism and the associated financial support would help contain the economic costs of a restructuring (both domestically and internationally), but also because ESM-endorsed restructurings based on a pre-agreed principles would have more political and legal legitimacy than restructurings that occur ad hoc and resort either to threats or changes in domestic law. In turn, the expectation that debt restructuring can and should occur in some circumstances would both enhance market discipline ex ante, and make it less likely that country authorities and the official sector will postpone the day of reckoning at great social and economic cost, as happened in Greece and as may be happening again in Cyprus.

[50] United Nations Resolution 1483 (May 22, 2003) put into place instructions to enable the restructuring of Iraq's debts after Saddam Hussein's removal. In response to the resolution, legislation was passed in both the EU and US and, as a result, Iraq was able to obtain close to a 90 NPV reduction of its external long-term debts.

[51] This is akin to the idea of a "sovereign debt restructuring mechanism with prequalification" or ex ante conditionality. See Panizza et al (2009), Section 5, and Sturzenegger and Zettelmeyer (2007a), Chapter 12.

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