PRELIMINARY

HAIRCUTS

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Abstract

This paper estimates "haircuts"—realized investor losses—in recent debt restructurings in Russia, Ukraine, Pakistan, Ecuador, Argentina, and Uruguay. Haircuts are computed as the percentage difference between the present values of old and new instruments, discounted at the yield prevailing immediately after the exchange. We find substantial differences between average haircuts ranging from 10-15 percent (Uruguay) to more than 70% in the case of the Argentina domestic exchanges. Some (but not all) exchanges exhibit substantial variations in haircuts even within the exchange, depending on the instrument tendered. Thus, "intercreditor equity" was often violated ex post, at least in a present value sense. When domestic and foreign residents could be identified we find that exchanges have tended to be milder on domestic bondholders.

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I. INTRODUCTION

This paper estimates investor losses—or "haircuts," in market parlance—associated with the new generation of sovereign debt restructurings that started with Russia's 1998 default and has since extended to a number of emerging market countries in Eastern European, the Middle East, and Latin America. Specifically, we examine the December 1999 exchange of Pakistani Eurobonds, the 1999 "Novation" exchange of Russian domestic debt, a string of restructurings in Ukraine during 1998 and 1999, the 2000 external debt exchanges in Russia, Ukraine and Ecuador, the November 2001 "Phase 1" exchange of Argentine bonds, the 2002 "Pesification" of Argentine debt, and the May 2003 Uruguayan bond exchange.

One motivation for the empirical exercise conducted in this paper is simply to better understand emerging market debt as an asset class. A key question in this regard is how much investors typically recover in a default situation, and whether there are substantial variations from one debt restructuring to another. It is also interesting whether investors were treated equally within each debt restructuring, or whether some instrument holders came out better than others, and if so, whether there is a systematic relationship with the characteristics of the initial instrument or the residence of the bondholder.

A second motivation is related to economic policy. Some of the debt restructurings that we consider in this paper, such as Pakistan's 1999 Eurobond restructuring, were based on a deliberate decision by official creditors to force private creditors to take some losses in order to reduce the moral hazard associated with official debt forgiveness. The question is whether they succeeded, and how big those losses turned out to be ex post. However, policy makers in international institutions and creditor countries are also interested in the continued existence of a sovereign debt market, and concerned about debtor moral hazard. In particular, they would like distressed debtors to "act in good faith" in restructuring their debts, avoiding restructuring proposals that fall below commonly accepted standards of what defines a reasonable offer. But what is normal or reasonable in this context? To answer this question, it is necessary to know something about the magnitude of investor losses in past restructurings.

Though this is the first paper, to our knowledge, to systematically compute "haircuts" for a range of debt restructurings with a common methodology, there has been important related work. First, there is a literature on "private sector involvement" in the recent debt crises, including Eichengreen and Rühl (2000), Lipworth and Nystedt (2001), IMF (2001), World Bank (2002), and Cline (2004) that discusses the terms of recent debt restructurings and describes reductions in face value as well as the market performance of bonds before and after specific events. Unlike this study, however, these papers do not estimate net present value losses suffered by investors. Second, there are some papers on average returns to emerging market debt, most recently Klingen, Weder and Zettelmeyer (2004), who estimate returns to emerging market debt since 1970 and for shorter subperiods for a variety of emerging market countries. However, their sample ends in 2000 and excludes the transition economies; thus, they miss most of the debt crises studied in this paper. Moreover, their results are based on annual data, which does not allow the computation of losses associated

with specific debt restructuring events. Third, investment banks and creditor organizations, as well as the International Monetary Fund, have in some cases estimated the "haircuts" associated with some specific crises. However, these estimates are generally not published, the computations underlying them are often not transparent, and the methodologies used may vary across episodes.[2]

The methodology adopted in this paper is to compute investor losses in this paper as the difference between the net present value of the original and the new (restructured) instruments, using the immediate post-exchange ("exit") yield of the new instrument to discount both payments streams. Thus, these are the realized, ex post losses of investors in the immediate aftermath of a restructuring. In the section that follows, we justify this measure of investor losses in some detail.

Our main results are as follows. First, there are substantial differences between the average haircuts in the exchanges, ranging from haircuts in the order of 10 percent to more than 70 percent. Second, some (but not all) exchanges exhibit substantial variations in the haircut even within the same exchange, depending on the instrument tendered. Thus, in most cases, "intercreditor equity" was violated ex post, at least in a present value sense. Finally, we find that when it was possible to distinguish between local and foreign bondholders, the former were usually offered more favorable terms. We explore some regularities in within-exchange variations in investor losses, and some conjectures of what might be driving them.

II. MEASURING INVESTOR LOSSES

Economists and market participants would generally agree that the losses suffered by investors in a debt exchange should be measured by comparing the net present value of cash flows promised under the old and new debt instruments. The question is whether these cash flows should be discounted using a common interest rate or different interest rates, and what discount rates should be used.

For example, an investor holding an instrument since the time of its emission or purchase may feel that he loses to the extent that the market value of the new debt instrument is lower than the market value of the old instrument at the time of its purchase; in effect comparing the NPV of the original instrument discounted with pre-crisis yields to the NPV of the new instrument discounted with the "exit yield" prevailing after the exchange. For our purposes, however, this definition of investor losses is too broad, since it includes any loss attributable to the deterioration of economic fundamentals prior to the crisis, rather than the loss attributable to the terms of the exchange. At the other extreme, it is unhelpful to compare the market value of the old instrument just prior to the exchange with the market value of the new instrument just after the exchange, since, in a world of perfect foresight, these should be

[2] For an exception, see the IMF's published report on the Uruguay debt exchange; this includes some estimates of NPV losses for investors (IMF, 2003, Appendix II, p. 49).

equal. Any measured gain or loss will thus reflect the extent to which the result of the exchange was incorrectly anticipated, independently of the terms of the exchange.

Like most authors, we thus take the view that the cash flows promised under the new and old instruments must be compared using the same discount rate (except for adjustments reflecting differences in maturities, as explained below). From the perspective of measuring *realized* losses the appropriate discount rate is the yield implicit in the market value of the new instrument immediately after the close of the exchange: this will reflect the results of the exchange (i.e., the participation rate) but not news about economic fundamentals that becomes available after the exchange, i.e. after the results of the exchange are known. Thus, our approach is to compare the market value of the new instruments, plus any cash payment received, with the NPV of the payments remaining on the old instruments, discounted using the yield of the new instruments (r):

$$H \equiv NPV(old, r) - NPV(new, r). \tag{1}$$

One nice property of a haircut in this particular definition is as a measure of the "coercion", or pressure, that must have been exerted on investors in order to solve the free rider problem associated with a particular exchange. To see this, let $u_i(accept \mid \{a_j\}_{j \neq i})$ denote the expected payoff from accepting the exchange offer, conditioning on the actions of other investors (i.e. accept or reject), and $u_i(reject \mid \{a_j\}_{j \neq i})$ the expected payoff from holding on to the old debt instrument. To the extent that the exchange was successful, it must have been true that for the investors that accepted the exchange offer,

$$u_i(accept \mid \{a_j\}_{j \neq i}) - u_i(reject \mid \{a_j\}_{j \neq i}) \geq 0, \tag{2}$$

$u_i(accept \mid \{a_j\}_{j \neq i})$ is just the market value of the new instrument, that is, the price that can be observed in the secondary market after the exchange. By definition this is equal to the net present value of the cash flow promised by the new instrument, discounted by the secondary market yield of these new instruments. Thus, $u_i(accept \mid \{a_j\}_{j \neq i}) = NPV(new, r)$. Using (1) and (2), one obtains:

$$H \leq NPV(old, r) - u_i(reject \mid \{a_j\}_{j \neq i}), \tag{3}$$

$u_i(reject \mid \{a_j\}_{j \neq i})$ is the (unobservable) utility, or value, of holding on to the old instrument, conditioning on the outcome of the exchange, given expectations about what would happen to old instruments that were not traded in. $NPV(old, r)$ is the net present value of the cash flow associated with the old instrument discounted at the yield of the *new* instrument—that

is, assuming "equal treatment", or no discrimination. In actual fact, of course, there was discrimination, in the sense of an open or implicit threat that the old instruments would not be serviced in the same way as the new ones, so $NPV(old,r) - u_i(reject \mid \{a_j\}_{j \neq i})$ was typically greater than zero. The haircut, *H*, tells us how big the difference between the theoretical value of the old instrument, $NPV(old,r)$, and its value as it was actually perceived must have been, at a minimum, to make the exchange work (in the sense that equation (2) was satisfied), given the quality of the exchange offer $NPV(new,r)$. In this sense, *H* measures the (minimum) "coerciveness" of an exchange.

While conceptually simple, measuring *H* as defined in (1) involves a number of practical complications. The most important of these is that the maturities of the new and old instruments will typically not be the same. Suppose, as will generally be the case, that the maturity of the new instrument is longer than that of the old instrument, and that the term structure is upward sloping. Then the yield of this new instrument will be higher than that of a new instrument with the length of the old instrument. By discounting the old instrument with this higher yield, we will tend to underestimate the NPV that we would have obtained by discounting with a yield corresponding to the maturity of the old instruments, and consequently the extent of the haircut.

To deal with this problem, we attempt to estimate the "new" yield corresponding to the average length of the old instrument by interpolating the yields on new instruments (there are usually more than one) accordingly. When this is not possible—as it may be if all new instruments are longer than the old one in terms of remaining maturity— [or when the yield curve does not have any discernible pattern] we use the yield on the new instrument that is closest to the old bond in terms of average length, and make an adjustment using the yield curve on US treasury bills.

A second complication is that by applying the new instrument yield to the old instrument we are also assuming that both instruments were of the same seniority. However, in some cases—for example the Russian exchange in which new instruments were upgraded to debt of the Russian Federation as opposed to debt owed by a state-owned bank—the sovereign resorted to security enhancements to make new instruments more attractive. By discounting the old instrument's cash flow with the yield of the new instruments we would be incorrectly applying this enhancement to the old instrument. In this case, we may be overestimating the haircut with respect to the true old instruments.

A third complication relates to the treatment of unpaid interest. We treat unpaid interest on the old bonds as part of the outstanding claim, but generally ignore interest on interest. The main exception is the Russian exchange, in which cash payments associated with past due interest were spread out over a long time period; in this case, we compute the value of PDI as a net present value.

A fourth complication arises when the exchange involves a change in the currency of denomination of the two instruments. In this case old and new instruments cannot be

discounted at the same rate. Fortunately, in most cases there are both foreign and domestic currency exit yields, so it just a matter of applying the discount factor of the relevant currency in each case, adjusted by maturity when necessary.

A fifth complication arises from the lack of information. In several instances the package received by the bondholders contained a combination of new bonds, but there is little precision as to how much bond of each was exchanged for each particular instrument. In general, when facing such lack of information we compute two bounds. In one the bondholder receives the best possible instrument. In the other, she receives the worst. In general (but not always), these alternatives do not generate substantially different results.

Finally, in some instances—the Ukraine exchanges in 1998 and the November 2001 Argentine exchange—the new instrument was not immediately traded, and thus there is no "exit yield" for these bonds. In the case of Ukraine we obtain exit yields from the market returns on similar instruments issued immediately after the exchange. In the case of Argentina, old bonds continued to be traded after the exchange, and the new instruments were eventually traded, albeit after a substantial time lag. As explained in more detail below, the implicit yields of these two groups of bonds are used to compute upper and lower bound estimates for the true haircut. Fortunately, they are sufficiently close to be informative.

Given the complexities of the computation it is not surprising that this exercise has not been tackled yet. We believe that the contribution of this paper lies in resolving these complexities in a consistent fashion and obtaining comparable numbers among the different exchanges.

III. RESULTS

A. Russia[3]

Russia's devaluation on August 18, 1998 led to a default on its domestically issued debt, while the government tried to stay current on its external obligations. On August 25 the government made a first restructuring offer on its Ruble denominated "GKO" treasury bills, which was rejected by market participants. In March of 1999, the government finalized a restructuring agreement, known as "novation", with holders of GKOs and longer term Ruble denominated OFZs, which had rejected the government's August 1998 exchange offer.

Under the novation scheme, holders of GKO or OFZs would accept to have their scheduled payment discounted to August 19, 1998, at a rate of 50 percent per annum. Subsequently, they would received a package including a combination of cash and very short term instruments in addition to longer term OFZs. The short term component included a cash payment equivalent to 3.33% of the adjusted nominal value, 3.33% in 3-month GKOs (these

[3] This material has in part been reconstructed with information from NUPI, Center for Russian Studies. For a complete review of the events leading to the Russian crisis see Kharas et al (2001), and for a comprehensive description of the Russian debt restructuring is provided by Santos (2003). See also JP Morgan (1997, 2000).

bonds had an issue date of December 15 so that they would expire shortly after the exchange on the 24th of March), 3.33% in a 6-month GKOs (also with an issue date on December 15), and "cash value" OFZ for 20 percent of nominal value that could be used at par to pay tax obligations that were in arrears as of July 1st, 1998, or to purchase newly issued shares of Russian banks. The remaining 70% was returned in OFZs with maturities ranging from 4 to 5 years with coupons of 30, 25, 20, 15 and 10 each year, respectively. With the exception of cash, any receipts from selling these OFZs had to be deposited in restricted ruble accounts that could be used to purchase selected Russian corporate bonds and equity securities.[4]

Table 1 shows the results for the GKO exchange. For brevity we only show the first GKO maturing in each of the months for which there were GKO instruments restructured.[5] The upper half of the table shows the present value at the time of the exchange of GKOs with a face value of 100 rubles. The exit yield on GKOs was used to discount GKOs payments maturing after March 1999 to the time of the exchange. The average ruble deposit rate in the Russian financial sector was used to bring payments due prior to the exchange date to March 1999.[6]

The lower half of the table shows what investors received in return, both in "cash items" and in longer term OFZs with all flows discounted at 25.3%, the average yield of GKOs during March 1999. Recall that the values are computed taking into account that the original flow had been discounted at a 50% nominal interest rate back to August (line "recognized value of old instrument"). Thus, if an instrument had a face value recognition of 90% (see first column) the 3.33% of cash implies a payment of 3.33*0.9=3 per 100 of face value, and so on with the other instruments.

As there is little information as to the exact number of OFZs given to each GKO holder, we compute two bounds. One (lower) bound considers that the holder received only the shorter of the OFZs, thus providing the most convenient alternative to bond holders. The other (upper) bound considers that the bond holders only obtained the longest version. Fortunately, the difference between the two bounds is minimal so the computation is meaningful.

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[4] Nonresidents electing to convert and repatriate restricted rubles had available an alternative but it entailed additional losses.

[5] The complete table for all GKOs bonds identified by Bloomberg as defaulted can be found in www.utdt.edu/~fsturzen.

[6] Both rates were obtained from the Rusian Central Bank, at www.cbr.ru/eng/statistics/. This page provide monthly average yields of financial institutions and for GKO bonds with maturities up to 90 days.

Finally, the haircuts are computed, in percentage terms, by subtracting the total value obtained from the present value of the old claim and dividing by the latter. The numbers indicate that investors lost between 13% and 24% of the pre-existing claim.[78]

Russian institutional holders, which were required to hold GKO/OFZs by law, received slightly different terms (10 percent cash, 10 percent in 3 month GKOs, 10 percent in 6 month GKOs, 20 percent in cash value OFZs and 50 percent in OFZs with maturities ranging from 4 to 5 years).[9] While the larger share of cash payments may seem to indicate a better deal, the fact that the coupon rate offered on OFZs was larger than the market discount rate, implies that the PV of the new claims *decreased* when the cash items increased. The final two lines of Table 1 show the corresponding haircuts. The differences with the previous case, are, in any case, very small.

The banking crisis that followed the devaluation-default decision eventually had implications for Russian external debt payments. On December 2 of 1998, the state-owned Vneshekonombank missed a 362 million payment on its "PRINs", and on June 2, 1999, it missed a payment on its "IANs". "PRINs" and "IANs" were dollar denominated, floating interest, long term bonds with total face value of US$ 29 billion that had been issued in 1997 following an agreement with the London Club to restructure Soviet era debt owed to Western commercial banks. Though widely considered as part of Russia's external public debt, they were technically obligations of Vneshekonombank rather than obligations of the Russian Federation. In addition, Russia had issued several Eurobonds between 1996 and 1998, on which it did not default.

In May 1999, the Russian government also defaulted on Soviet era MinFin 3. However, in January 2000 it offered to exchange the bonds for one of two alternatives. Either a new eight-year bond similar to the original instrument, i.e. in US dollars and with a coupon of 3%, or a four year OFZ (ruble denominated bond) paying an interest rate of 15% for the first year and 10% thereafter, with interest paid semiannually and bullet principal payment. Table 2 shows the haircuts involved in the MinFin 3 restructuring. Grossing up the missed principal payment by the US treasury bill,[10] was worth 106.2 on February 2nd of 2000. The new eight-

[7] It is plausible but wrong to think that the low haircut is the result that the computation is done in rubles, unattentive to the fact that the exchange rate was devaluing very quickly. At the time of the exchange, expected depreciation of the local currency is embedded in the interest rates, if this expectation is very high so will interest rates, and therefore higher will be the PV loss from maturity extensions and low interest rates.

[8] It may be worth noticing that we are ignoring the restrictions imposed by the fact that amounts had to be placed in restricted rouble accounts. Thus these haircut computations correspond to those faced by an investor that would not exit the Russian market immediately.

[9] Some investors that refused to take the "novation" offer were paid according to the original (ruble) terms; however, non-residents were not allowed to repatriate their funds for a period of 5 years.

[10] This is equivalent to assuming that the bondholders had taken their money out of Russia and into a safe option after the MinFin3 had come due.

year bond, discounted at the exit yield of the new bond of 17.5%,[11] delivers a PV of 45.6 implying a haircut of 57%. The OFZ alternative, discounted at the only slightly higher ruble rate of 20% gives a PV of 76 and a haircut of only 28.3%. While the haircut computation delivers a smaller value for the conversion to a ruble instrument, it is reported (and this is confirmed by the amounts issued) that most investors opted for the first alternative.[12]

Shortly after the MinFin3 restructuring proposal, on February 11, 2000 Russia offered to exchange both Vnesh's PRINs and IANs for two new Eurobonds of the Russian Federation. The deal was closed in August 2000, restructuring all PRINs and IANs with a total of 21 billion of new instruments issued in exchange for an original nominal value of 31.8 billion (the original face value of $29 billion, plus past due interest amounting to US$ 2.8 billion).

In exchange for IANs, PRINs, bondholders were offered a 2030 Eurobond with a step up (2.25 to 7.5 percent) coupon, after a face value reduction of 37.5 percent for the longer maturity PRINs and 33 percent for the shorter maturity IANs. Past due interest was compensated (without face value reduction) by a 2010 Eurobond with a fixed 8.25 percent coupon, and a small cash "sweetener".

Table 3 summarizes the Russian PRIN,and IAN exchange. The upper half of the table shows the terms and present values of 100 units of PRINs and IANs, respectively, at the time of the exchange,[13] as well as the associated past due interest accumulated between December of 1998 and February of 2000. As explained in the last section, the present values are computed using the yield curve of Russian debt adjusted for the shorter maturities of the PRINs and IANs. The adjustment is easy in this case since a range of undefaulted Russian Eurobonds were trading in the secondary markets at the time, whose yields can be used to interpolate. Since the Russian Eurobond yield curve was quite flat, it makes very little difference.

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[11] Corresponding to its first day of trading, the 29th of June of 2000.

[12] A possible may be found in that while the bonds that replaced the MinFin 3 were issued February 1st 2000, the option to exchange the MinFin 3 was open ended. Thus for bond holders trading in later than this date the haircut computation may be slightly different. By year end most bondholders had traded in their original holdings.

[13] For most instruments that are examined in this paper, if an investor had bought and held 100 units of principal since the time of issue, the face value of his or her claim at the time of the debt exchange would also be 100 units. However, there are two exceptions: first, amortizing bonds, that were in part repaid before the debt exchange, and bonds with capitalized interest payments, whose face value increased before the debt exchange. In these cases, the computations in the tables (PVs of the old instruments values obtained in the form of new instruments) refer to 100 units of principal *at the time of the exchange*, rather than at the time of issue. For example, the interest paid on Russian PRINs prior to the December 1998 default was in part capitalized into IANs, so that an investor owning 100 PRINs at the time of issue would have owned a basket of 100 PRINs and about 3.6 IANs at the time of the debt exchange. However, the computations in the left column of table 1 refer to 100 units of PRINs only, not to the PRIN/IAN basket associated with 100 units of PRINs *at issue*.

The lower half of the table shows what investors received in return: a small cash payment for PDI, some amount of the 2010 Eurobond for PDI, and the 2030 Eurobond in exchange for the original instrument, after a face value reduction. The lines "value obtained (per 100 units of principal)" are computed by subtracting the corresponding face value reduction (if any) from 100 units of the old bond and then multiplying with the price of one new bond. For example, in the "PRINs" column, (100 – 37.5)*0.418 = 26.1. Finally, the haircuts are computed, in percentage terms, by subtracting the total value obtained from the present value of the old claim (including PDI) and dividing by the latter. The main result is that investors lost about 50 percent of the pre-exchange claim. Percentage losses on the shorter IANs were very slightly higher than on the longer PRINs.

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Table 1. Russian Novation Exchange
1st March, 1999

	GKO	GKO	GKO	GKO	GKO	GKO	GKO	GKO
Old Instruments								
Issue date	11/02/98	06/10/98	01/14/98	03/11/98	03/25/98	04/08/98	05/06/98	06/10/98
Amount issued (US$ mn)	379	155	149	274	349	181	351	101
Amount outstanding (US$ mn) 1/	379	155	149	274	349	181	351	101
Maturity date	11/04/98	12/02/98	01/13/99	02/10/99	03/10/99	04/07/99	05/05/99	06/09/99
Average remaining life (years)	0.25	0.33	0.44	0.52	0.60	0.67	0.75	0.84
Compound/discount rate used (yield, in percent) 2/	22.3	25.7	24.2	22.8	25.3	25.3	25.3	25.3
Present value on 3/1 (per 100 principal)	106.8	105.8	102.9	101.2	99.4	97.8	96.1	94.0
New Instruments and Cash obtained								
Recognized value of old instrument (per $100 of Principal) 3/	90.1	87.3	83.3	80.8	78.1	75.8	73.4	70.7
Discount rate used (yield, in percent): 25.3% 4/								
Cash Payment (3.33% of total recognized value)								
Per $100 of Principal	3.00	2.91	2.78	2.69	2.60	2.53	2.45	2.36
New GKO 3/24/1999 (3.33% of total recognized value)								
Per $100 of Principal	2.96	2.87	2.74	2.66	2.57	2.49	2.41	2.32
New GKO 6/16/1999 (3.33% of total recognized value)								
Per $100 of Principal	2.81	2.72	2.60	2.52	2.44	2.37	2.29	2.21
Cash Value OFZ (20% of total recognized value)								
Per $100 of Principal	9.55	9.25	8.83	8.57	8.28	8.04	7.79	7.49
Lower Bound - Shortest Maturity OFZ 6/16/1999 (70% of total recognized value)								
Per $100 of Principal	74.71	72.39	69.12	67.05	64.82	62.88	60.93	58.64
Upper Bound - Longest Maturity OFZ 6/16/1999 (70% of total recognized value)								
Per $100 of Principal	72.72	70.46	67.28	65.27	63.10	61.21	59.31	57.08
Lower Bound - Total Value received	93.03	90.14	86.07	83.49	80.72	78.30	75.87	73.02
Upper Bound - Total Value received	91.04	88.21	84.23	81.71	78.99	76.63	74.25	71.46
Haircuts based on longest OFZ (lower bound)	12.9%	14.8%	16.4%	17.5%	18.8%	19.9%	21.0%	22.4%
Haircut based on shortest OFZ (upper bound)	14.7%	16.6%	18.2%	19.3%	20.6%	21.6%	22.7%	24.0%
Haircuts based on longest OFZ (lower bound)-Insitutional Investors	16.4%	14.8%	16.4%	17.5%	18.8%	19.9%	21.0%	22.4%
Haircut based on shortest OFZ (upper bound)-Insitutional Investor	17.8%	16.6%	18.2%	19.3%	20.6%	21.6%	22.7%	24.0%

1/ Data taken from Bloomberg
2/ For those maturities prior to 3/1 average deposit rate is used for compounding. For those maturing after this date, post-restructuring GKO's yield is used.
3/ Every future flow was to be discounted at a 50% rate as to 8/1/1998. This was to be the recognized value to be exchanged for new instruments.
4/ Corresponds to the post-restructuring GKO's yield as quoted by the Central Bank of Russia.

Table 2. Russian MinFin Exchange
1st February, 2000

	MinFin III
Old Instrument	
Issue date	05/14/93
Amount issued (US$ mn)	1,307
Amount outstanding (US$ mn)	1,307
Maturity date	05/29/99
Coupon (percent)	3
Average remaining life (years)	Matured
Compound rate used (yield, in percent) 1/	4.8
Present value on 3/1 (per 100 principal)	106.2
New Instruments	
Option 1: **New 7 years, 3% coupon MinFin**	
Maturity	11/14/07
Present value (1) on Nov. 7 (UB)	45.6
Discount rate used (yield, in percent)	17.5%
Option 2: **New 3 years, 15%-10% coupon rouble denominated OFZ**	
Maturity	11/19/03
Exchange Coefficient (RUBs per dollar)	26.2
Present value (1) on Nov. 7 (UB)	76.1
Discount rate used (yield, in percent)	20.0%
Haircut based on Option 1	57.1%
Haircut based on Option 2	28.3%

1/ 3 months' USA T-Bill yield used to compound the corresponding dollar cash flow

One caveat applies, namely that the new instruments had two features that were designed to upgrade their seniority relative to the old instruments. First, there was an *upgrade in the obligor*, which became the Russian federation rather than Vneshekonombank. Second, it included *expanded cross acceleration clauses* linking default on the 2010 and 2030 bonds to any other issues of Russian Federation Eurobonds (including new issues), and vice versa. MinFins as domestic debt remained subordinated, in the sense that—though dollar denominated—they were not legally linked to existing Russian Federation Eurobonds. Since we are ignoring this upgrade in our haircut calculations, the extent of the haircut could be slightly overestimated.

Table 3. Russian PRINs and IANs Exchange
(February 11-August 23, 2000)

	PRINs	IANs
Characteristics of Old Instruments		
Amount outstanding (US$ mn)	22,231	6,841
Maturity date	12/15/2020	12/15/2015
Average life (years) 1/	10.92	9.05
Coupon (percent)	libor + 13/16	libor + 13/16
Present value of cash flow on August 23 (PV1, per 100 of principal)	56.5	60.8
Discount rate used (in percent) 2/	16.6%	16.6%
Present value of cash flow on August 23 (PV2, per 100 of principal)	57.2	62.0
Discount rate used (in percent) 3/	16.4%	16.2%
Past due interest on August 23 (PDI, per 100 of principal, face value)	10.3	8.3
Present value of PDI as of August 23 (per 100 of principal)	9.1	8.6
Present value (1) of cash flow including PDI	65.6	69.4
Present value (2) of cash flow including PDI	66.2	70.6
New Instruments and Cash obtained		
Cash payment		
Per $100 of PDI	9.5	9.5
Value obtained (per 100 of principal)	1.0	0.8
2010 percent Eurobond with 8.25 percent coupon (for PDI)		
Amount issued (US$ mn)	2066.2	515.0
Price on issue date	71.1	71.1
Value obtained (per 100 of principal)	6.6	5.3
Total Compensation for PDI (per 100 of principal)	7.6	6.1
2030 Eurobond with 2.25 - 7.5 percent step-up coupon (for principal)		
Amount issued (US$ mn)	13,894	4,584
Price on issue date	41.8	41.8
Face value reduction (per 100 of principal)	37.5	33.0
Value obtained (per 100 of principal)	26.1	28.0
Total value obtained	33.7	34.1
Haircut based on PV1	48.7%	50.8%
Haircut based on PV2	49.2%	51.7%

1/ Weighted average of time of amortization, using percent amortization in each time period as weights.
2/ Yield to maturity on new 2030 Eurobond yield on August 25, 2000
3/ Yield corresponding to mean repayment period, using linear interpolation of outstanding Eurobond yields.
4/ For PRINs, PV of PDI is smaller than nominal PDI because some of the PDI took the form of capitalized interest, i.e. a claim on a future payment stream rather than a past cash payment.

B. Ukraine[14]

Ukraine started having problems in keeping to date with its debt shortly after the Russian crisis had dried up the market for Ukranian issues. By August 1998 the Ukranian government had already negotiated "quasi voluntary" debt exchanges with three groups of creditors: domestic commercial banks who were holders of treasury bills (OVDPs), non-resident holders of treasury bills, and holders of a loan placed through Chase Manhattan in October of 1997.

A conversion scheme for treasury bills owned by domestic banks was announced on August 26. It offered to exchange T-bills into longer term hryvnia denominated bonds of 3 to 6 years maturity. The interest rate on the new bonds was set at 40 percent for the first year, and a floating coupon equal to the future 6-month T-bill yield plus 1 percentage point for the remainder of the period. According to the IMF [15] commercial banks eventually agreed to exchange about hryvnia 800 million, or about one third of their portfolio.

Table 4 shows the haircuts involved for a typical outstanding treasury bills held by a domestic holder at the time of the exchange. This entails no loss of generality as the mechanics of the exchange implied that all OVDP holders suffered a similar haircut. Thus the haircut presented is identical to that suffered by holders of other OVDPs. The payments due under the old instrument were discounted at the running Treasury bill rate. This curve remained surprisingly constant throughout the exchange so it makes virtually no difference whether we use the curve corresponding to a few days earlier or a few days after the exchange.[16] This yield curve delivers a downward curve starting at 72% for short-term instruments, going down to 55% at slightly more than one year maturity. The discounted value determines the number of new, coupon-bearing bonds obtained by bondholders.[17] As it is unclear how many of each type of new bonds was obtained by each bondholder, we compute two extreme alternatives. In one, bondholders had their holdings transformed fully into the shortest bond (3 year maturity), in the other everything was transformed into the

[14] For a description of this case see also Eichengreen and Rühl (2000) and Lipworth and Nystedt (2001). This material has in part been reconstructed with information from the Ukrainian-European Policy and Legal Advice Centre (UEPLAC).

[15] (Country Report 99/42, p. 43)

[16] We use new issues because the instruments issued in the exchange did not trade for quite some time after the exchange.

[17] An independent source confirms the exchange ratio assumed in the table. According to Ukraine Today, 31st August 1998, "Only OVDPs with the term of maturity on August 27, 1998 will be exchange for conversion bonds in full. The exchange of September bonds will be done on a 98.89/96.72% basis, of October bonds at 95.04-93.34% basis, November bonds at 91.6-96.72% basis. The value of July 24-August 27, 1999 maturity OVDP papers is to be estimated at 65.57% of their nominal value". Notice that the value of the 1999 corresponds roughly with the one assumed by us, as resulting from discounting the flows at the exit yield.

longest maturity (6 years). The cash flows corresponding to these new bonds are also discounted by the yield curve computed from new issues in the immediate aftermath of the exchange.[18] The comparison of both values delivers very similar results, which, in addition, confirm that the haircut was relatively small (between 7.35% and 7.75%) and equal for all instruments. This is consistent with the presumption that the Ukraine government, at the time, was not attempting to haircut investors but just to extend maturities.

Foreign bondholders faced a similar conversion but with different terms. All holders were given the chance to exchange their holdings for an hryvnia denominated bond with a 22 percent hedged annual yield, but the market largely ignored this option. Some holders that had purchased currency hedges were given a special deal, but the lack of information as to the terms of these hedges does not allow computing the corresponding losses. T-bill holders without currency hedges received a 2 year zero-coupon dollar-denominated Eurobond with a yield of 20%. It is only this option, from the three available, that we estimate.

Investors eventually agreed to exchange about 83 percent of the eligible amount of 1.41 billion hyrvnias. Table 4 shows the results, which turned out quite different than for domestic holders. The value of the OVDPs was transformed into dollars at the prevailing exchange rate of 2.25. Then the bondholder was given a 2 year zero-coupon bond with an implicit yield of 20%. Discounting at the yield of the DM Eurobond (adjusted to US dollar rates using the implicit discount embedded in currency futures at the time), delivers a haircut of 52% relative to the PV of the OVDP.

Finally, on October 20, the government rescheduled the $109 million fiduciary loan that had been issued through Chase Manhattan, paying 25 percent ($27.25 million) in cash and the remainder in the form of a new fiduciary loan with a dollar interest rate of 16.75 percent. Payment of interest and principal was to happen in quarterly installments starting in 1999. Principal payment would be limited to $2 million per quarter during the first year, and the balance would be paid in four equal installments in 2000.[19] Table 4 shows the haircut on this restructuring. As the new loan did not trade, we discount the flows by the yield on the DM Eurobonds of the Ukraine republic adjusted to a dollar rate using the DM-US interest rate differential arising from future exchange contracts for the same maturity. When the new PV is compared with the value of the payment due, it delivers a haircut of 30%.

In 1999, in the face of a bunching of debt service in the second quarter—in particular, repayment of the 10-month bond placed through ING Barings in August of 1998 ($163 million including interest) maturing on June 9—the government was again forced to seek a

[18] The future floating rates were inferred from the yield curve at the time of the exchange.

[19] IMF European II department, "Ukraine—Extended Arrangement—Financing Assurances Review, and Request for Waivers and Modification of Performance Criteria," EBS/98/176, Supplement 1 (unpublished report to the Executive Board available under the IMF archives policy, Washington: International Monetary Fund), October 27, 1998, p.2.

restructuring. On May 18, the Ministry of Finance submitted to ING a debt conversion offer, according to which 20 percent would be repaid on time, with the remainder swapped for a new international bond with a three year maturity. The ING bond was mostly held by one investor—Regent Pacific Group— initially insisted on full repayment.

Ukraine's first offer being rejected the original repayment date passed, but on July 15, the Ministry of Finance and ING Barings reached an agreement by which 20 percent of the bond would be repaid in cash, with the remainder exchanged for DM bonds, at a rate of 94.3 cents of new debt for each dollar of old debt. The DM bonds would be an additional issue of the *existing* DM 1 billion international bond issued in 1998 and due on February 2001, with a coupon of 16 percent. On August 2, 1999, Ukraine made the 20 percent cash payment to ING Barings. And on August 20, it tagged the original 2001 DM Eurobond for the remainder. Table 4 shows that this exchange entailed a haircut of about 35%.

While these piecemeal restructurings provided some immediate cash flow relief, they also created large payments obligations for 2000 and 2001. For 2000, Ukraine's debt service obligations were about $3 billion, including about $1.1 on bonds (principal and interest) $900 million to the IMF, and $250 to Russia. However, gross international reserves stood at only around $1 billion at the end of 1999. There was no hope for any significant amount of new borrowing. Consequently, in early 2000, Ukraine had no alternative but to seek a new restructuring.

On February 4, 2000, with ING Barings as lead manager, Ukraine launched a comprehensive exchange offer involving all outstanding commercial bonds. This included a Euro 500 million, 14.75 percent Eurobond due in March 2000, the restructured $74 million 16.75 percent Chase Manhattan bond maturing in October 2000, the remainder of a restructured Merrill Lynch Eurobond (US$258.4 million) falling due in October of 2000, and the DM 1.5 billion, 16 percent Eurobond due in February 2001. In addition, there were about $1 billion of 8.5 percent bonds owed to the Russian energy exporter Gazprom falling due between March of 2000 and March of 2007.

Creditors could choose between two 7-year coupon amortization bonds denominated either in Euros or U.S. dollars, to be issued under English law. For the Euro denominated bond, the coupon was set at 10 percent, while for the U.S. dollar denominated bond it was set at 11 percent. The was no face value reduction except for the zero coupon Merrill Lynch Eurobond, where it was about 5 percent and for the "Gazprom bonds", where it ranged between 0 and 33 percent depending on the maturity date of the bonds. Coupon payments for the new bonds were set on a quarterly basis, with no grace period for interest payments. Amortization was to occur twice a year, with 3 percent at each amortization date in 2001, 5 percent in 2002, and 9.33 percent at each date between 2003 and 2007. Past due interest and accrued interest (i.e. interest accrued since the last scheduled coupon payment which was not yet payable) was paid in full and in cash. The exchange offer established a minimum participation threshold of 85 percent among the holders of bonds maturing in 2000-2001. In the event, there was almost full participation.

In Table 5 all claims (present values of old instruments, past due interest and principal, cash payments, and the number of units of new instruments received) are computed for 100 units of principal outstanding at the time of the exchange.[20] In addition to one case of past due interest (on the DM Eurobond, whose annual 16 percent coupon payment was missed in February 2000), there is a case of past due principal from a missed amortization payment due in January 2000; according to the IMF (2001), these payments were missed for "intercreditor equity" reasons, i.e. to avoid paying some investors in full during or immediately before a debt restructuring offer. Note that while past due interest and principal need to added to the forward looking present value of the old instrument in order to establish the total claim, accrued interest is automatically reflected in the present value, since it is embodied in the first coupon payment coming due.

One difficulty compared to the case of Russia is that only the two newly issued Eurobonds were trading in the market after the exchange; thus, it is not possible to interpolate yields based on a full Eurobond yield curve for the purpose of discounting, as was the case for Russia. Instead, the yields used for discounting are those of the actual new instruments used to exchange each of the old bonds, with a small maturity adjustment based on the U.S. yield curve.

[20] Thus, for the amortizing Chase Manhattan loan shown in the second column, present values, PDP, etc. are expressed as percentages of the principal that had not been repaid by February of 2000 (89 percent of the original principal).

Table 4. Ukraine Domestic Exchanges
August 1998 - August 1999

	OVDP Domestic Holders	OVDP International Holders	Chase Manhattan	ING Loan
Old Instruments				
Issue date	08/19/98	08/18/98	10/20/97	08/09/98
Amount issued (US$ mn)	9	35	109	163
Amount outstanding (US$ mn)	1	35	109	163
Maturity date	05/12/99	08/18/99	10/20/98	07/09/99
Coupon (percent)	0.0	0.0	10.0	17.5
Discount rate used (yield, in percent)	64.9%	60.5%		
Present value on 8/98 (per 100 principal)	68.73	62.30		
Present value on 10/98 (per 100 principal)			100.00	
Present value on 8/99 (per 100 principal)				100.00
New Instruments and Cash obtained				
Recognized value of old instrument (per $100 of Principal)	68.73	62.30	100.00	100.00
Discount rate used (yield, in percent):	54.8%	74.1%	76.3%	81.6%
Cash Payment				
Per $100 of Principal	0.00	0.00	25.00	20.00
Lower Bound - Shortest Maturity 8/26/2001 (68.7% of total recognized value)				
Per $100 of Principal	63.40			
Upper Bound - Longest Maturity 8/26/2004 (68.7% of total recognized value)				
Per $100 of Principal	63.67			
Eurobond Merrill Lynch 8/26/2000 (62.3% of total recognized value)				
Per $100 of Principal		29.59		
Chase Manhattan 10/20/2000 (75% of total recognized value)				
Per $100 of Principal			44.34	
ING Loan 2/26/2001 (80% of total recognized value)				
Per $100 of Principal				44.51
Lower Bound - Total Value received	63.40			
Upper Bound - Total Value received	63.67			
Eurobond Merrill Lynch - Total Value received		29.59		
Chase Manhattan - Total Value received			69.34	
ING Loan - Total Value received				64.51
Haircuts based on shotest 3 years bond (lower bound)	7.8%			
Haircut based on longest 6 years bond (upper bound)	7.4%			
Haircut - Eurobond Merrill Lynch		52.5%		
Haircut - Chase Manhattan			30.7%	
Haircut - ING Loan				35.5%

Table 5. Ukraine External Debt Exchange
(February 4-April 7, 2000)

	2000 US$ Eurobond	Chase Manhattan	Merrill - Lynch	2001 DM Eurobond	Gazprom bonds 1/
Old Instruments					
Issue date	3/1/1998	10/20/1998	10/1/1998	26/02/1998	21/03/1995
Amount issued (in US$ mn) 2/ 3/	493	82	500	756	1,015
Amount outstanding (in US$ mn) 3/	493	74	258	756	1,015
Currency of denomination	Euro	US$	US$	DM	US$
Maturity date	3/1/2000	10/20/2000	10/1/2000	2/26/2001	3/21/2007
Average remaining life (years) 4/	0.07	0.42	0.66	1.06	3.58
Coupon (percent)	14.75	16.75	0	16	8.5
Present value of cash flow on 2/4/2000 (per 100 principal) 5/	112.4	73.6	122.1	90.4	63.8
Discount rate used (in percent) 6/	27.6%	27.9%	28.1%	28.3%	29.5%
Past due principal (per 100 outstanding) by February 4, 2000	0.0	25.0	0.0	0.0	0.0
Past due interest (per 100) up to 3/15/2000	0.0	0.0	0.0	16.0	
Present value including PDP and PDI	112.4	98.6	122.1	106.4	63.8
New Instruments and Cash obtained					
Cash payments (for PDI and accrued interest)	14.7	6.7	0.0	16.8	1.7
Option 1: **2007 10 percent Euro-denominated Eurobond**					
Price on issue date	59.1	59.1	59.1	59.1	59.1
Units obtained (per 100 of principal)	100.0	100.0	94.6	100.0	81.9
Value obtained (per 100 of principal)	59.1	59.1	55.9	59.1	48.4
Option 2: **2007 11 percent US$-denominated Eurobond**					
Price on issue date	58.9	58.9	58.9	58.9	58.9
Units obtained (per 100 of principal)	100.0	100.0	94.6	100.0	81.9
Value obtained (per 100 of principal)	58.9	58.9	55.7	58.9	48.2
Total value obtained if chose Euro bond (per 100 of principal)	73.8	65.9	55.9	76.0	50.2
Total value obtained if chose US$ bond (per 100 of principal)	73.5	65.6	55.7	75.7	50.0
Haircut based on choice of Euro bond (in percent)	34.4%	33.2%	54.2%	28.6%	21.4%
Haircut based on choice of Dollar bond (in percent)	34.6%	33.4%	54.4%	28.9%	21.7%

1/ Simple average, i.e. synthetic instrument consiting of all 29 outstanding Gazprom bonds in equal parts.
2/ For Chase Manhattan loan, the difference between amounts issued and outstanding is due to amortization during 1999. For Merrill Lynch bond, it is due to the retiring of principal after July 1999 exchange offer.
3/ Evaluated using February 4, 2000 market exchange rates
4/ Weighted average of time of amortization, using percent amortization in each time period as weights.
5/ Includes accrued interest.
6/ Yield to maturity of new bond of corresponding currency, with minor maturity adjustment based on US yield curve.

The main result is that while in this case there were no significant nominal haircuts except on some of the "Gazprom bonds", the present value losses were significant, ranging from about 22 to 54 percent. Not surprisingly, the haircut did not depend much on which of the two new bonds was chosen by investors. However, it varied quite significantly across the old bonds. Two main facts stand out: first, the haircut suffered by the Merrill Lynch bond (54 percent) stands out. In an accounting sense, this is due to the fact that the PV of the cash flow of this bond was higher than the rest, with a large nominal return of 44 percent expected in October, while the terms of restructuring were slightly worse (perhaps because it was felt that since a zero coupon bond was being exchanged for an 11 percent coupon bond, a small face value reduction was appropriate). Second, except for the Merrill Lynch bond, bonds with shorter life suffered larger haircuts than bonds with longer life. This can be observed both for the bonds shown and within the class of Gazprom bonds. Thus, the larger nominal haircuts applied to longer dated Gazprom bonds did not completely offset the smaller present values of the longer bonds at the discount rates applied in our calculations. We return to this point in the last section of the paper.

C. Pakistan[21]

Pakistan's 1999 Eurobond restructuring originated from a history of high public debt (about 90 percent of GDP since the early 1990s) and a major balance of payments crisis in May of 1998 triggered by international sanctions imposed after a series of nuclear tests. After the lifting of most sanctions in late 1998, Pakistan negotiated a Paris Club restructuring in January of 1999 which required the country to seek comparable debt relief from private creditors, and in particular, to restructure its international bonds. By July, the government had signed a rescheduling with commercial banks covering about $900 million in commercial loans, but it held off on restructuring its Eurobonds, as no principal repayments were coming due until the end of the year. Finally, on November 15, Pakistan launched a bond exchange, ahead of a Paris club deadline that required it to show "progress" in negotiations with bondholders by the end of 1999. No interest or principal payments were missed prior to the exchange.

The exchange involved swapping three bonds: a $150 million, 11.5 percent Eurobond due in December 1999; a $160 million, 6 percent exchangeable note due in February 2002 with a put option in February 2000; and a $300 million Libor-plus-3.95 percent floating rate note due in May of 2000. All three would be exchanged for a new amortizing bond with an overall maturity of six years and a three-year grace period, paying a 10 percent coupon. There was no nominal haircut; in fact, holders of the two bonds with the shorter average life received slightly more in nominal terms than under the original instruments (Table 6).

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[21] This chapter relies on Helbling (2001), Burki (2000), IMF Country Reports No. 97/120, 01/11, 01/24, 01/222 and 03/338, the IMF Staff Report for the 1998 Article IV consultation (unpublished but publicly available under the IMF's policy of releasing most Executive Board documents that are more than five years old) financial sector newsletters and news reports.

Table 6. Pakistan Eurobond Exchange
(November 15-December 13, 1999)

	December 1999	2002 Eurobond	May 2000 Eurobond
Old Instruments			
Issue date	12/22/1994	2/26/1997	5/30/1997
Amount issued (US$ mn)	150	160	300
Amount outstanding (US$ mn)	150	160	300
Maturity date 1/	12/22/1999	2/26/2002	5/30/2000
Average remaining life (years)	0.025	0.205	0.463
Coupon (percent)	11.5	6	libor + 3.95
Present value of cash flow on 12/13/1999 (per 100 of principal) 2/	105.3	99.7	96.8
Discount rate used (in percent) 3/	21.4%	21.4%	21.4%
New Instrument			
2005 percent amortizing Eurobond with 10 percent coupon			
Amount issued (US$ mn)	-4.8	-9.1	0.0
Price on issue date	68.1	68.1	68.1
Units obtained (per 100 of principal)	103.2	105.7	100.0
Value obtained (per 100 of principal)	70.3	72.0	68.1
Haircut	33.3%	27.8%	29.7%

1/ 2002 Bond had put option in February 2000.
2/ Includes accrued interest. For puttable 2002 bond, we assume that the option to put would have been used for entire outstanding amount in February of 2000
3/ Yield to maturity on new 2005 Eurobond, with a minor maturity correction based on the US yield curve.

Table 6 is similar in structure but simpler than most of the previous tables, as there was only one exchange option and no need to reimburse past due interest or principal. Haircuts were of about the same order as the average haircut in the case of Ukraine, i.e. about 30 percent.

Unlike Ukraine, however, there was not much variation in the magnitude of haircuts across the old instruments. In this respect, the Pakistan exchange resembles the Russian PRINs and IANs exchange. Also as in the case of Russia, the remaining life of the original instruments was almost the same across instruments (in this case, very short).

D. Ecuador[22]

Ecuador's debt crisis occurred less than five years after a Brady deal with commercial banks had reduced the country's external debt to sustainable, though still high, debt levels. It originated in a banking crisis that erupted in April of 1998 and became progressively worse due to a lack of crisis resolution instruments and political obstacles. Central Bank liquidity support to failing banks put pressure led to a currency crisis in early 1999, and by mid-1999, net international reserves had fallen to levels that made it very difficult to meet upcoming debt service payments—about $550 million on Brady and Eurobonds during the remainder of 1999 and 2000, and maturing domestic debt in the order of US$500 million—without agreement on an IMF program. But the IMF in turn required some degree of "private sector bail-in" to help close the financing gap and return to sustainable debt levels.

Against this background, on August 25, 1999, Ecuador announced that it would suspend coupon payments on Discount and PDI Brady bonds. After a failed attempt to persuade the Brady bondholders to accept a debt exchange limited to Brady bonds, Ecuador also defaulted on its remaining Brady bonds and, by the end of October, on its Eurobonds. It was the first default on international sovereign bonds since the 1930s (previous postwar defaults—including during the 1980s debt crisis, and the Russian and Ukrainian defaults of 1998— had affected only commercial bank loans and domestic debt). In addition, about US$ 500 million of short-term domestic dollar-denominated debt was restructured to longer maturities at a reduced rate of interest.[23]

With IMF support, on July 27, 2000, Ecuador launched an offer to exchange its defaulted Brady Bonds and Eurobonds for new uncollateralized bonds maturing in 2030 with a step-up coupon starting at 4 percent and rising to 10 percent, in 1 percent steps, by 2006 (Table 7). For each type of defaulted bond, an exchange ratio was set in line with "stripped" secondary market prices; thus, the idea was to treat each bond equally based on their pre-default prices. The shortest instruments, namely Eurobonds and Brady Interest Equalization bonds were exchanged at par, while the longer dated Brady bonds were exchanged at 1:0.78 (PDI bonds), 1:0.58 (Discount bonds) and 1:0.40 (Pars). Holders of Par and Discount bonds also received a cash payment equal to the present value of their U.S. collateral. Past due interest and principal were repaid in cash, while accrued interest (interest owed since the last scheduled coupon payment) was exchanged, at par, for a new Republic bond with a fixed coupon of 12 percent, maturing in 2012. Bondholders could also elect to exchange their principal for this shorter bond rather than the 2030 bonds at the price of a further 35 percent discount relative to the face value of the 2030 bonds. The aggregate amount of 2012 bonds was limited to 1.25 billion, and holders of Eurobonds and shorter dated Brady bonds were given priority in the

[22] This chapter is based on Jacome (2004), Fischer (2001), Beckerman (2002), Bucheit (2000), IMF Staff Country Reports, and news reports.

[23] IMF (2002) suggests that the PV loss in the domestic exchange was 9% but we have not been able to confirm this.

allocation of the 2012 bonds. By the time the exchange was finalized on August 23, over 97 percent of the eligible bonds had agreed to tender.

Two technical issues in Table 7 are worth mentioning. First, although our general principle is to compute the present value of the old instruments using the yield on the new instruments as the discount rate, the 2025 principal repayments scheduled for the Par and Discount bonds are discounted using the US long treasury bill rate, since these repayments were collateralized and not subject to country risk. *Ceteris paribus*, collateralization thus increases the present value of the old instruments and the value received in the exchange in equal measure (since the latter involved the release of the collateral), which means that it has no effect on the haircut, which is the percentage difference between the two.

Table 7. Ecuador Exchange
(July 27-August 23, 2000)

	Pars	Discounts	PDIs	IEs	2002 Euro	2004 Euro
Old Instruments						
Issue date	02/28/1995	02/28/1995	02/28/1995	12/21/1994	04/25/1997	04/25/1997
Amount issued (US$ mn)	1,655	1,435	2,308	191	350	150
Amount outstanding (US$ mn) 1/	1,655	1,435	2,775	143	350	150
Maturity date	02/28/2025	02/28/2025	02/27/2015	12/21/2004	04/25/2002	04/25/2004
Average remaining life (years) 2/	24.5	24.5	10.59	2.56	1.67	3.67
Coupon (percent)	3-5 step up	libor+13/16	libor+13/16	libor+13/16	11.25	libor +4.75
Present value of cash flow on August 23 (PV1) 3/	49.0	66.3	46.4	76.6	90.1	79.8
Discount rate used (in percent) 4/	21.1	21.1	21.8	22.6	22.6	22.6
Present value of cash flow on August 23 (PV2) 3/	48.5	64.8	45.0	75.5	89.2	78.5
Discount rate used (in percent) 5/	21.6%	22.0%	22.4%	23.4%	23.5%	23.3%
Past due principal (PDP, per 100 of principal)	0.00	0.00	0.00	10.00	0.00	0.00
Past due interest (PDI, per 100 principal) 6/	4.10	4.68	1.96	7.29	12.05	11.25
PV1 + PDI + PDP	53.1	70.9	48.3	93.9	102.2	91.0
PV2 + PDI + PDP	52.6	69.4	46.9	92.8	101.2	89.7
New Instruments and Cash obtained						
Cash payments						
Release of principal collateral (per 100 of principal)	23.5	23.5	0.0	0.0	0.0	0.0
Payment for PDI and PDP (per 100 of principal)	4.1	4.7	2.0	17.3	12.0	11.3
2030 Eurobond with 4/5/6/7/8/9/10 percent step-up coupon						
Amounts issued (US$ mn) 7/	662.0	832.3	1169.4	0.0	0.0	0.0
Price on issue date	36.2	36.2	36.2	36.2	36.2	36.2
Units obtained for principal (per 100 of principal)	40.0	58.0	78.0	100.0	100.0	100.0
Value obtained for principal (per 100 of principal)	14.5	21.0	28.2	36.2	36.2	36.2
2012 Eurobond with 12 percent coupon						
Amounts issued (US$ mn) 7/	15.6	50.7	745.0	95.1	240.4	103.2
Price on issue date	60.2	60.2	60.2	60.2	60.2	60.2
Units obtained for accrued interest (per 100 princ.)	0.9	3.5	3.5	1.4	3.7	3.8
Value obtained for accrued interest (per 100 princ.)	0.6	2.1	2.1	0.8	2.2	2.3
if elected instead of 2030 bonds:						
Units obtained for principal (per 100 of principal)	26.0	37.7	50.7	65.0	65.0	65.0
Value obtained for principal (per 100 of principal)	15.7	22.7	30.5	39.1	39.1	39.1
Total value obtained	42.6	51.3	33.4	57.3	53.4	52.7
Haircut based on PV1 (in percent)	19.7%	27.7%	30.9%	39.0%	47.7%	42.2%
Haircut based on PV2 (in percent)	19.0%	26.1%	28.9%	38.3%	47.2%	41.3%

1/ For PDIs, difference between amount issued and outstanding is due to capitalization of interest payments prior to the exchange; for IEs, difference is due to amortization payments made between June 1995 and June 1999.
2/ Weighted average of time of amortization, using percent of remaining amortization in each time period as weights.
3/ Including accrued interest
4/ Yield of new bond actually used to exchange principal of respective old bond (2030 for Pars and Discounts, 2012 for IEs and Eurobonds, and a mix for the PDI bond). For Pars and Discounts, 2025 principal was discounted using US long rate.
5/ Yield corresponding to average life, using linear interpolation of outstanding Eurobond yields. For Pars and Discounts, 2025 principal was discounted using US long rate.
6/ Including interest on principal and interest arrears.
7/ Based on the assumption that all bondholders opted for the 2012 bond and were rationed as announced in the exchange offer (i.e. shorter instruments had priority; the 2012 would be prorated within the marginal class, i.e. PDI bonds).

Second, unlike in the Ukrainian exchange, past due principal—which existed for IE bonds, which were amortizing bonds—was repaid in cash. As a result, the present values of old instruments, number of units of new instruments, etc. shown for the IE bonds refer to 100 units of principal outstanding *after* repayment of PDP, which was 65 percent of the original principal. Similarly, for PDI bonds, which were capitalizing bonds (part of the coupon payments were rolled into a rising principal amount) the values refer to the principal outstanding at the time of the exchange, which as about 118 percent of the original principal.

The main results are as follows. As expected, the 2012 option delivered a slightly higher value (compare lines "value obtained for principal" for the 2030 and 2012 bonds), and thus was rationed. As in the case of Ukraine, there were substantial differences in the haircuts across instruments, ranging between 19 and 48 percent. Again, the bonds with the longest remaining average life tend to suffer the smallest NPV haircuts (in the 20-30 percent range), while the largest haircuts are associated with the shortest instruments, notwithstanding the fact that the longer instruments were subjected to larger reductions in face value. *Ex post*, it turns out that these reductions were insufficient to equalize the NPV haircuts; consequently, there is a negative correlation between NPV haircuts and nominal haircuts.

Aside from being the first debt exchange to involve Brady bonds, Ecuador's exchange was innovative in several respects. The new bonds contained two novel features meant to minimize the chances of a new debt restructuring in the foreseeable future and protect the interests of bondholders. A "mandatory debt management" provision committed Ecuador to retiring a minimum proportion of the face value of each of the new bonds every year. A "principal reinstatement" provision meant that a payment default occurring in the first 10 years would automatically result in the issuance of additional 2030 bonds to the holders. The effect of this was to offer a (limited) protection of bondholders against the dilution of their claims by new debt holders in the event of default. Finally, for the first time in sovereign debt, the Ecuador exchange used "exit amendments" to put pressure on potential holdouts. As part of the exchange, Ecuador solicited the consent of existing bondholders to change various *non*-payment terms of the old instruments, which (unlike the payment terms) could be changed with simple majority, with the effect of reducing the liquidity of non-tendered bonds and stripping them from various creditor protections.

E. Argentina

In November 2001, after several attempts at balancing the budget and avoiding a restructuring of debt obligations, a substantial reduction in tax collection together with the lack of additional access either to market or multilateral funds forced the government to seek debt relief through a "voluntary" exchange in two stages. The first stage (Phase 1) would be targeted at domestic residents and the second (Phase 2) to nonresidents. The idea was to segment local and foreign bondholders to protect the local financial institutions and domestic pension funds by guaranteeing the resources to honor the obligations with them. In the end, Phase 1 did happen, but shortly after the government was ousted in a civilian coup that decided on a broader default; thus Phase 2 never materialized.

The strategy of the "Phase 1" exchange was to offer local holders of Argentina's bonds to swap their bonds for a "guaranteed" loan governed by Argentine law. The guarantee of the loan would be the revenues collected through the financial transaction tax. Moreover, bondholders were given the option of recovering the original bonds if any terms or conditions of the guaranteed loans were changed in the future. In exchange for the granting of the guarantee, interest payments would be reduced and maturities extended. The holders of the bond were given one to three options depending on the instrument. One option was a fixed rate bond in which interest rates would be reduced by 30 percent relative to the original rate, with a cap at 7 percent per annum. Maturities were also extended on shorter term instruments and interest payments made monthly, in order to match interest payments with the collection of the financial transaction tax. For floating rate bonds a similar conditions were imposed the cap being set at Libor plus 300bps. Finally, a third option was to convert into a capitalizing bond with maturity in 2011. Only a few bonds were offered this alternative.

Several incentives for participation were offered, including the fact that the new instrument would carry an accounting benefit in that for banks and pension funds the new instrument could be valued at par rather than marked to market. However, the main incentive was the threat of an involuntary restructuring at worst terms if the exchange was not accepted.[24] The obligation was considered a technical default by rating agencies and S&P moved Argentina to the selective default (SD) category.

The bond exchange was successful in the sense that almost all debt in the hands of banks, local pension funds and local residents was tendered. In all, 41 billion of debt instruments were tendered implying a reduction of 2.35 billion in interest and 2.5 in amortizations in 2002 alone. Financing needs were reduced by US$26.2 billion in the first five years.

From the perspective of computing haircuts, Argentina's Phase 1 exchange poses unique challenges. To begin with, the number of old and new instruments involved was much larger than in any previous exchange. Most importantly, there was no secondary market for the new domestic instruments immediately after the exchange. As a result, the methodology used in our previous computations—to discount both new and old payment streams with the maturity-adjusted "exit yield"—cannot be applied. Instead, our approach is to compare the old and new payments streams using two alternative discount rates that arguably constitute upper and lower bounds, respectively, for the true, unobservable, exit yield, as follows.

First, while the new instruments were not initially traded, the old instruments—which continued to be held by nonresident and some resident bondholders—were, and post-exchange yields for these instruments are available. However, because the government had announced that the new instruments would in effect be treated as senior—the declared intention was to restructure the old instruments in a second phase while attempting to service

[24] The "guarantee" that was supposed to back the new loans was given comparatively little importance as all government debt is guaranteed by tax collection.

the new ones— the yield on the old instrument can be regarded as an upper bound for the unobservable yield of the new instruments. This is also clear from the fact that most of the local bondholders that were given a choice did in fact agree to exchange. The PV is estimated by discounting the new guaranteed loans by the yields on the bond with the closest average life (adjusted by the US T-bill yield curve when the two did not match perfectly).
Second, the new instruments were eventually traded, in mid 2003, but at that time the instruments had suffered a new restructuring involving a currency conversion (*pesification*, more on this below), so that the prices and yields on these instruments at the time were useless for the purposes of evaluating the Phase 1 instruments that were denominated in US dollars. However, by then the government had issued post-default debt both in dollars and in indexed pesos.

Thus we construct our lower bound as follows. Comparing the yields on the Boden 07 (a post default fairly liquid paper denominated in indexed pesos) and a guaranteed loan of similar average life (that corresponding to the restructuring of the Bonte 03) we computed the liquidity premium associated to the guaranteed loans to be equal to 2.7% (we keep this number fix thereafter). We then apply this liquidity premium to post default dollar instruments, in particular the Boden 2012 which started trading in September 2002 plus an adjustment by the US T bill yield curve when appropriate. Notice however, that by September 2002, much legal and political uncertainty had been resolved, a new arrangement with the IMF was in place, and the economy was rapidly recovering. Thus, the observed yields at that time will almost certainly understate what the yields would have been in November of 2001.

Table 8 contains haircut calculations for most of the exchanged instruments, using maturity adjusted yields derived from either the November 2001 yields on the old, mostly externally issued instruments ("upper bound", or UB, estimates) or yields on the post default debt adjusted by a liquidity premium. Argentina had remained current on its payments until the exchange, so there was no PDI or past due principal, and there were no cash payments associated with the exchange. Most of the old bonds had two or three alternative conversion choices, generally including a longer fixed rate bond and a floating rate bond.

The good news from Table 8 is that in spite of our inability to estimate the exit yield with any precision, the upper and lower bound haircut estimates corresponding to each old bond are not so far apart as to be meaningless. Based on option 1, which was given to all old instruments and which was generally the most favorable, almost all "lower bound" estimates exceed 25 percent while most "upper bound" estimates are below 50 percent. With a few exceptions, these results place the Argentine "Phase 1" exchange at about the same level of coerciveness as the Ecuador and Ukraine exchanges.

Table 8. Argentina "Phase 1" Exchange

7 November, 2001

	Bonte 02	Bonte 03F	Bonte 03	Bonte 04	Bonte 05	Bonte 06	Bonte 27	FRAN	FRB	FRN 04
Old Instruments										
Issue date	5/9/1997	7/21/1998	2/21/2000	5/24/1999	2/21/2000	2/21/2001	9/19/1998	4/13/1998	3/31/1993	4/6/1999
Amount issued (US$ mn)	2,201	260	1,695	1,358	1,727	856	98	456	4,126	231
Amount outstanding (US$ mn) 1/	2,201	260	1,695	1,358	1,727	856	98	456	2,310	231
Remaining capital (per 100 units issued)	100	100	100	100	100	100	100	100	56	100
Maturity date	5/9/2002	7/21/2003	5/21/2003	5/24/2004	5/21/2005	5/15/2006	9/19/2027	4/10/2005	3/29/2005	4/6/2004
Coupon (percent)	8.75	floating	11.75	11.25	12.13	11.75	9.94	6 mo n/a	L + 13/16	L + 5.75
Average remaining life (years) 2/	0.49	1.69	1.52	2.53	3.52	4.51	25.87	3.41	1.83	2.40
Present value (1) on 11/7 (UB) (per 100 principal)	75.6	57.0	55.0	55.0	57.7	46.0	44.8	142.4	92.8	58.5
Present value (2) on 11/7 (LB) (per 100 principal)	97.7	102.1	97.2	93.3	92.5	88.4	82.8	273.8	79.5	85.7
Accrued interest (per 100 principal)	4.33	0.67	5.35	5.09	5.52	5.61	1.3	1.9	3.37	0.71
Present value (1) on 11/7 (UB) (per 100 principal) 3/	79.9	57.7	60.4	60.1	63.2	51.6	46.1	144.3	96.1	59.2
Implicit discount rate (yield, in percent)	96.1	72.4	73.9	47.4	37.1	41.5	23.7	48.1	5.4	37.6
Present value (2) on 11/7 (LB) (per 100 principal) 4/	102.0	102.7	102.5	98.4	98.0	94.0	84.1	275.7	82.9	86.4
Discount rate used (in percent) 5/	14.2	14.9	14.8	15.3	15.7	16.1	12.5	13.0	15.0	15.3
New Instruments (Guaranteed Loans) 6/										
Total amount exchanged for all the options 7/	479.7	115.0	1,052.7	930.3	936.3	721.4	44.2	149.7	1,380.9	5.0
***Option 1:* Shorter Maturity, Fixed Rate**										
Maturity	5/9/2005	7/21/2006	5/21/2006	5/24/2007	5/21/2008	5/15/2009	9/19/2027	4/10/2008	3/31/2008	4/6/2007
Present value (1) on Nov. 7 (UB)	46.3	34.3	35.3	32.6	33.8	31.4	31.1	33.9	21.3	18.2
Discount rate used (yield, in percent) 8/	37.1	41.5	41.5	38.9	33.9	33.2	23.7	33.8	36.5	52.2
Present value (2) on Nov. 7 (LB)	78.2	72.6	73.4	68.8	71.5	68.3	48.9	71.6	56.0	59.2
Discount rate used (yield, in percent) 9/	15.7	16.2	16.1	16.4	14.4	14.5	15.3	14.3	14.3	16.4
***Option 2:* Shorter Maturity, Floating Rate**										
Maturity	5/9/2005	7/21/2006	5/21/2006	5/24/2007	5/21/2008	5/15/2009	9/19/2027	4/10/2008	...	...
Present value (1) on Nov. 7 (UB)	40.4	23.9	24.9	18.0	24.1	20.8	10.1	24.3	...	...
Discount rate used (yield, in percent) 8/	38.1	48.6	48.5	52.3	36.5	36.7	44.8	36.5	...	...
Present value (2) on Nov. 7 (LB)	71.3	63.8	64.8	58.9	59.8	55.6	30.0	60.1	...	...
Discount rate used (yield, in percent) 9/	15.7	16.2	16.1	16.4	14.4	14.5	15.3	14.3	...	...
***Option 3:* Longer Maturity, Capitalizing**										
Maturity	...	...	11/6/2011	11/6/2011	11/6/2011	11/6/2011	...	11/6/2011	...	...
Present value (1) on Nov. 7 (UB)	...	...	13.5	13.5	13.5	13.5	...	13.5	...	...
Discount rate used (yield, in percent) 8/	...	...	31.8	31.8	31.8	31.8	...	31.8	...	...
Present value (2) on Nov. 7 (LB)	...	...	51.5	51.5	51.5	51.5	...	51.5	...	...
Discount rate used (yield, in percent) 9/	...	...	14.7	14.7	14.7	14.7	...	14.7	...	...
Haircuts based on PV1 (upper bound)										
if chose option 1	42.1	40.5	41.4	45.7	46.6	39.1	32.5	76.5	77.8	69.3
if chose option 2	49.4	58.6	58.7	70.0	61.9	59.8	78.1	83.2	...	...
if chose option 3	...	...	77.7	77.6	78.7	73.9	...	90.7	...	...
Haircut based on PV2 (lower bound)										
if chose option 1	23.4	29.3	28.4	30.1	27.0	27.3	41.8	74.0	32.4	31.5
if chose option 2	30.1	37.9	36.7	40.2	39.0	40.9	64.3	78.2	...	...
if chose option 3	...	...	49.8	47.7	47.5	45.2	...	81.3	...	...

2/ Weighted average time of amortization, using percent amortization in each time period as weights. 3/ Actual secondary market price of old bonds trading on [November 7, 2001]. 4/ Includes accrued interest.

5/ Yield on new instruments, with maturity correction, when these first traded in secondary markets in June 2003. 6/ There were no face value reduction under any option, i.e. principal units were exchanged 1:1.

7/ As no information on exact amount converted in each guaranteed loan is available the total number for all the options is offered 8/ Yield to maturity of old instruments after exchange [on November 7, 2001], adjusted for maturity difference

9/ Yield to maturity of new instruments when first traded in June of 2003, adjusted for maturity difference.

Table 8. Argentina "Phase 1" Exchange (cont.)

7 November, 2001

	Global 03	Global 05	Global 06	Global 08	Global 09	Global 10	Global 12	Global 15	Global 17	Global 18
Old Instruments										
Issue date	12/20/1993	12/4/1998	10/9/1996	6/19/2001	4/7/1999	3/15/2000	2/21/2001	6/15/2000	1/30/1997	6/19/2001
Amount issued (US$ mn)	1,843	862	1,213	11,096	1,413	860	923	903	2,503	6,745
Amount outstanding (US$ mn) 1/	1,843	862	1,213	11,096	1,413	860	923	903	2,503	7,060
Remaining capital (per 100 units issued)	100	100	100	100	100	100	100	100	100	100
Maturity date	12/20/2003	12/4/2005	10/9/2006	12/19/2008	4/7/2009	3/15/2010	2/21/2012	6/15/2015	1/30/2017	6/19/2018
Coupon (percent)	8.38	11.00	11.00	7 -15.5	11.75	11.38	12.38	11.75	11.38	12.25
Average remaining life (years) 2/	2.10	4.06	4.91	7.11	7.41	8.34	10.28	13.60	15.23	16.61
Present value (1) on 11/7 (UB) (per 100 principal)	52.5	53.1	45.0	45.2	45.7	44.6	43.6	43.0	44.3	40.4
Present value (2) on 11/7 (LB) (per 100 principal)	89.4	87.0	84.5	89.1	89.8	87.2	88.6	84.5	81.6	83.4
Accrued interest (per 100 principal)	3.19	4.68	0.86	2.68	0.98	1.64	4.7	4.6	3.06	0.00
Present value (1) on 11/7 (UB) (per 100 principal) 3/	55.7	57.8	45.9	47.9	46.7	46.3	48.3	47.6	47.4	40.4
Implicit discount rate (yield, in percent)	52.6	35.3	38.7	33.7	33.1	32.0	31.9	30.7	28.8	23.7
Present value (2) on 11/7 (LB) (per 100 principal) 4/	92.6	91.7	85.4	91.8	90.7	88.8	93.3	89.1	84.6	83.4
Discount rate used (in percent) 5/	15.1	15.9	16.3	14.2	14.5	14.6	14.7	14.9	15.1	15.1
New Instruments (Guaranteed Loans) 6/										
Total amount exchanged for all the options 7/	58.7	83.8	70.4	8,997.0	277.1	130.7	492.5	318.7	884.8	5,876.6
***Option 1:* Shorter Maturity, Fixed Rate**										
Maturity	12/20/2006	12/4/2008	10/9/2009	12/19/2011	5/7/2012	3/15/2013	2/21/2012	6/15/2015	1/30/2017	7/19/2018
Present value (1) on Nov. 7 (UB)	25.9	31.5	31.5	29.9	27.3	26.4	27.8	25.6	27.5	13.8
Discount rate used (yield, in percent) 8/	48.7	34.0	32.0	32.1	31.9	32.0	31.9	30.7	28.8	28.8
Present value (2) on Nov. 7 (LB)	69.4	69.3	67.1	65.1	61.4	59.9	62.0	55.5	54.9	43.6
Discount rate used (yield, in percent) 9/	16.3	14.5	14.5	14.6	14.7	14.8	14.7	14.9	15.1	15.1
***Option 2:* Shorter Maturity, Floating Rate**										
Maturity	12/20/2006	12/4/2008	10/9/2009	12/19/2011	5/7/2012	3/15/2013	2/21/2012	6/15/2015	42765.0	43300.0
Present value (1) on Nov. 7 (UB)	21.0	21.9	21.9	14.1	12.1	11.6	9.4	10.6	10.7	2.8
Discount rate used (yield, in percent) 8/	48.7	36.6	36.7	44.2	44.3	44.3	44.3	44.5	44.6	44.6
Present value (2) on Nov. 7 (LB)	60.4	57.0	56.9	51.2	46.3	44.2	40.2	38.4	37.5	28.3
Discount rate used (yield, in percent) 9/	16.3	14.5	14.5	14.6	14.7	14.8	14.7	14.9	15.1	15.1
***Option 3:* Longer Maturity, Capitalizing**										
Maturity	...	40853.0	11/6/2011	11/6/2011	11/6/2011	11/6/2011	...	...	...	...
Present value (1) on Nov. 7 (UB)	...	13.5	13.5	13.5	13.5	13.5	...	...	...	...
Discount rate used (yield, in percent) 8/	...	31.8	31.8	31.8	31.8	31.8	...	...	...	...
Present value (2) on Nov. 7 (LB)	...	51.5	51.5	51.5	51.5	51.5	...	...	...	...
Discount rate used (yield, in percent) 9/	...	14.7	14.7	14.7	14.7	14.7	...	...	...	...
Haircuts based on PV1 (upper bound)										
if chose option 1	53.4	45.5	31.2	37.6	41.5	42.9	42.4	46.3	41.9	66.0
if chose option 2	62.2	62.2	52.3	70.6	74.0	74.9	80.5	77.7	77.4	93.0
if chose option 3	...	76.7	70.6	71.8	71.1	70.9	...	...	...	...
Haircut based on PV2 (lower bound)										
if chose option 1	25.0	24.5	21.4	29.1	32.3	32.6	33.5	37.7	35.2	47.7
if chose option 2	34.8	37.8	33.3	44.2	48.9	50.2	56.9	57.0	55.7	66.0
if chose option 3	...	43.9	39.7	43.9	43.3	42.0	...	...	...	...

Table 8. Argentina "Phase 1" Exchange (cont.)

7 November, 2001

	Global 19	Global 20	Global 27	Global 29	Global 30	Global 31	Global 31 meg	PRE 3	PRE 4	PRE 5
Old Instruments										
Issue date	2/25/1999	2/3/2000	9/19/1997	3/1/1999	7/21/2000	1/31/2001	6/19/2001	9/1/1992	9/1/1992	1/1/2000
Amount issued (US$ mn)	176	158	995	125	241	15	8,817	276	2,304	0
Amount outstanding (US$ mn) 1/	176	158	995	125	241	15	9,219	73	648	0
Remaining capital (per 100 units issued)	100	100	100	100	100	100	100	21	21	100
Maturity date	2/25/2019	2/1/2020	9/19/2027	3/1/2029	7/21/2030	1/31/2031	6/19/2031	9/1/2002	9/1/2002	1/1/2010
Coupon (percent)	12.13	12.00	9.75	8.88	10.25	12.00	12.00	1 mo CD	1 mo L	1 mo n/a
Average remaining life (years) 2/	17.30	18.23	25.87	27.32	28.71	29.24	29.62	0.46	0.46	8.14
Present value (1) on 11/7 (UB) (per 100 principal)	42.0	44.5	44.1	55.9	41.5	44.0	39.5	97.1	90.6	9.4
Present value (2) on 11/7 (LB) (per 100 principal)	84.8	82.7	67.4	130.9	71.1	82.9	74.4	118.8	124.6	53.7
Accrued interest (per 100 principal)	2.43	3.20	1.30	1.63	3.02	3.23	0.0	2.6	2.71	0.00
Present value (1) on 11/7 (UB) (per 100 principal) 3/	44.4	47.7	45.4	57.6	44.5	47.2	39.5	99.7	93.4	9.4
Implicit discount rate (yield, in percent)	31.9	29.1	23.7	28.7	26.7	29.8	22.5	81.9	143.8	52.4
Present value (2) on 11/7 (LB) (per 100 principal) 4/	87.2	85.9	68.7	132.5	74.1	86.2	74.4	121.3	127.3	53.7
Discount rate used (in percent) 5/	15.2	15.3	15.3	12.3	15.2	15.2	15.2	13.4	14.2	13.0
New Instruments (Guaranteed Loans) 6/										
Total amount exchanged for all the options 7/	74.0	48.1	467.9		113.2	47.1	8,148.1	27.2	320.7	
***Option 1:* Shorter Maturity, Fixed Rate**										
Maturity	2/25/2019	2/1/2020	9/19/2027	3/1/2032	7/21/2030	1/31/2031	6/19/2031	9/1/2005	9/1/2005	1/1/2013
Present value (1) on Nov. 7 (UB)	24.0	26.5	30.5	22.8	27.8	25.1	18.8	43.0	29.6	15.5
Discount rate used (yield, in percent) 8/	31.9	29.1	23.7	31.9	26.7	29.8	22.5	39.8	52.2	33.3
Present value (2) on Nov. 7 (LB)	52.7	52.6	47.9	49.0	49.0	49.1	36.5	78.6	72.2	41.0
Discount rate used (yield, in percent) 9/	15.2	15.3	15.3	15.2	15.2	15.2	15.2	14.9	14.9	16.1
***Option 2:* Shorter Maturity, Floating Rate**										
Maturity	2/25/2019	2/1/2020	9/19/2027	3/1/2032	7/21/2030	1/31/2031	6/19/2031	...	...	...
Present value (1) on Nov. 7 (UB)	10.5	10.5	9.9	10.0	10.2	10.3	2.4	...	...	...
Discount rate used (yield, in percent) 8/	44.7	44.8	44.8	44.8	44.7	44.7	44.7	...	...	...
Present value (2) on Nov. 7 (LB)	35.1	34.8	29.4	33.0	29.8	29.8	19.8	...	...	...
Discount rate used (yield, in percent) 9/	15.2	15.3	15.3	15.2	15.2	15.2	15.2	...	...	...
***Option 3:* Longer Maturity, Capitalizing**										
Maturity	...	...	...	...	...		...	...	...	...
Present value (1) on Nov. 7 (UB)	...	...	...	...	...		...	...	...	...
Discount rate used (yield, in percent) 8/	...	...	...	...	...		...	...	...	...
Present value (2) on Nov. 7 (LB)	...	...	...	...	...		...	...	...	...
Discount rate used (yield, in percent) 9/	...	...	...	...	...		...	...	...	...
Haircuts based on PV1 (upper bound)										
if chose option 1	46.0	44.3	32.8	60.4	37.6	46.9	52.5	56.9	68.3	-64.3
if chose option 2	76.4	78.1	78.3	82.6	77.0	78.1	93.8	...	...	...
if chose option 3	...	...	...	...	...	...	...	...	...	...
Haircut based on PV2 (lower bound)										
if chose option 1	39.6	38.8	30.3	63.0	33.9	43.0	50.9	35.2	43.3	23.6
if chose option 2	59.8	59.5	57.3	75.1	59.8	65.4	73.4	...	...	...
if chose option 3	...	...	...	...	...	...	...	...	...	...

Table 8. Argentina "Phase 1" Exchange (cont.)

7 November, 2001

	Pre 6	PRO1	PRO2	PRO3	PRO4	PRO5	PRO6	PRO8	PRO9	Hidro
Old Instruments										
Issue date	1/1/2000	4/1/1991	4/1/1991	12/28/1994	12/28/1994	1/15/1999	1/15/1999	1/1/2000	4/15/2001	12/2/1992
Amount issued (US$ mn)	105	883	727	5	888	329	1,174	9	101	20
Amount outstanding (US$ mn) 1/	76	658	520	6	1,144	289	1,033	10	101	20
Remaining capital (per 100 units issued)	100	54	54	91	91	88	88	100	100	71
Maturity date	1/1/2010	4/1/2007	4/1/2007	12/28/2010	12/28/2010	4/15/2007	4/15/2007	1/1/2016	4/15/2007	12/2/2008
Coupon (percent)	1 mo L	0.00	1 mo L	0.00	1 mo L	ARCRR	3 mo L	1 mo L	3 mo L	1 mo L
Average remaining life (years) 2/	8.14	2.71	2.71	4.54	4.54	5.42	2.71	14.15	5.42	3.54
Present value (1) on 11/7 (UB) (per 100 principal)	18.5	48.8	58.1	34.2	46.4	42.9	41.0	10.4	31.6	60.9
Present value (2) on 11/7 (LB) (per 100 principal)	60.9	83.1	96.4	67.4	89.7	80.9	73.3	46.5	76.1	95.9
Accrued interest (per 100 principal)	0.00	0.40	0.46	0.33	0.42	1.17	1.2	0.0	0.22	0.32
Present value (1) on 11/7 (UB) (per 100 principal) 3/	18.5	49.2	58.6	34.5	46.8	44.0	42.3	10.4	31.8	61.2
Implicit discount rate (yield, in percent)	36.4	51.9	47.8	51.9	43.4	51.9	51.3	36.8	52.2	36.6
Present value (2) on 11/7 (LB) (per 100 principal) 4/	60.9	83.6	96.9	67.8	90.1	82.0	74.5	46.5	76.4	96.2
Discount rate used (in percent) 5/	11.6	14.6	15.4	15.3	13.8	11.8	15.4	11.9	12.1	14.5
New Instruments (Guaranteed Loans) 6/										
Total amount exchanged for all the options 7/	3.1	317.3	189.5	0.2	278.6	128.5	343.7	0.1	9.8	19.7
***Option 1:* Shorter Maturity, Fixed Rate**										
Maturity	1/1/2013	4/1/2010	4/1/2010	12/28/2013	12/28/2013	4/15/2010	4/15/2010	1/1/2019	4/15/2010	12/2/2011
Present value (1) on Nov. 7 (UB)	4.5	24.3	14.3	17.7	9.6	24.3	14.0	3.0	19.5	11.6
Discount rate used (yield, in percent) 8/	52.7	40.5	52.3	40.9	52.6	40.5	52.3	52.9	40.7	52.5
Present value (2) on Nov. 7 (LB)	33.3	60.2	53.2	50.0	42.9	60.3	52.6	23.9	55.1	47.8
Discount rate used (yield, in percent) 9/	16.1	15.6	15.6	15.9	15.9	15.6	15.6	16.3	15.8	15.8
***Option 2:* Shorter Maturity, Floating Rate**										
Maturity	...	...	...	...	...	...	...	...	...	...
Present value (1) on Nov. 7 (UB)	...	...	...	...	...	...	...	...	...	...
Discount rate used (yield, in percent) 8/	...	...	...	...	...	...	...	...	...	...
Present value (2) on Nov. 7 (LB)	...	...	...	...	...	...	...	...	...	...
Discount rate used (yield, in percent) 9/	...	...	...	...	...	...	...	...	...	...
***Option 3:* Longer Maturity, Capitalizing**										
Maturity	...	...	...	...	...	...	...	...	...	...
Present value (1) on Nov. 7 (UB)	...	...	...	...	...	...	...	...	...	...
Discount rate used (yield, in percent) 8/	...	...	...	...	...	...	...	...	...	...
Present value (2) on Nov. 7 (LB)	...	...	...	...	...	...	...	...	...	...
Discount rate used (yield, in percent) 9/	...	...	...	...	...	...	...	...	...	...
Haircuts based on PV1 (upper bound)										
if chose option 1	75.8	50.5	75.5	48.7	79.4	44.7	66.8	71.4	38.6	81.0
if chose option 2	...	...	...	...	...	...	...	...	...	...
if chose option 3	...	...	...	...	...	...	...	...	...	...
Haircut based on PV2 (lower bound)										
if chose option 1	45.4	27.9	45.1	26.2	52.4	26.5	29.4	48.6	27.9	50.3
if chose option 2	...	...	...	...	...	...	...	...	...	...
if chose option 3	...	...	...	...	...	...	...	...	...	...

Table 8. Argentina "Phase 1" Exchange (cont.)

7 November, 2001

	Bonex 92	Span 02	RA $02	RA $07	RA $08	Radar 1	Radar 2	Radar 3	Radar 4	Celtic 2
Old Instruments										
Issue date	9/15/1992	12/16/1997	7/10/1997	2/12/1997	6/19/2001	4/24/2001	5/28/2001	7/24/2001	8/8/2001	9/4/2001
Amount issued (US$ mn)	1,413	135	113	80	931	380	380	400	250	300
Amount outstanding (US$ mn) 1/	177	135	113	80	931	380	380	400	250	300
Remaining capital (per 100 units issued)	13	100	100	100	100	100	100	100	100	100
Maturity date	9/15/2002	11/30/2002	7/10/2002	2/12/2007	9/19/2008	4/24/2003	5/28/2003	7/24/2006	8/8/2006	9/4/2007
Coupon (percent)	6 mo L	0.00	8.75	11.75	10.00	Day. Bdl +405	Day. Bdl +405	Day. Bdl +405	Day. Bdl +405	Day. Bdl +405
Average remaining life (years) 2/	0.84	1.05	0.66	5.25	6.86	1.45	1.54	4.70	4.74	5.81
Present value (1) on 11/7 (UB) (per 100 principal)	95.6	77.2	80.2	45.0	44.3	53.3	52.5	33.2	22.6	33.7
Present value (2) on 11/7 (LB) (per 100 principal)	92.1	103.5	98.4	94.7	92.4	95.5	94.9	82.4	65.9	77.8
Accrued interest (per 100 principal)	0.51	6.21	2.84	2.77	1.33	0.98	3.0	1.0	1.30	0.00
Present value (1) on 11/7 (UB) (per 100 principal) 3/	96.1	83.4	83.1	47.8	45.6	54.3	55.4	34.2	23.9	33.7
Implicit discount rate (yield, in percent)	15.0	52.0	51.9	38.8	33.1	72.2	72.3	43.5	43.5	36.3
Present value (2) on 11/7 (LB) (per 100 principal) 4/	92.7	109.7	101.2	97.5	93.7	96.5	97.8	83.3	67.2	77.8
Discount rate used (in percent) 5/	14.4	11.8	11.7	13.6	13.1	12.1	12.1	11.2	11.2	11.5
New Instruments (Guaranteed Loans) 6/										
Total amount exchanged for all the options 7/	131.5	25.4	32.2	65.6	329.7	375.7	380.3	467.9	250.0	300.0
***Option 1:* Shorter Maturity, Fixed Rate**										
Maturity	9/15/2005	11/30/2005	7/10/2005	2/12/2010	9/19/2011	4/24/2006	5/28/2006	7/24/2009	8/8/2009	9/4/2010
Present value (1) on Nov. 7 (UB)	35.7	44.9	41.9	26.1	27.0	25.5	25.0	20.4	20.0	13.7
Discount rate used (yield, in percent) 8/	38.2	35.3	39.9	33.3	33.4	48.5	48.6	36.7	36.7	44.2
Present value (2) on Nov. 7 (LB)	66.8	76.2	78.9	57.3	58.2	65.4	64.9	55.1	54.6	50.9
Discount rate used (yield, in percent) 9/	15.9	15.9	14.9	16.0	16.1	16.1	16.1	14.5	14.5	14.6
***Option 2:* Shorter Maturity, Floating Rate**										
Maturity	...	11/30/2005	...	...	...	...	...	...	...	...
Present value (1) on Nov. 7 (UB)	...	28.5	...	...	...	...	...	...	...	...
Discount rate used (yield, in percent) 8/	...	48.4	...	...	...	...	...	...	...	...
Present value (2) on Nov. 7 (LB)	...	68.3	...	...	...	...	...	...	...	...
Discount rate used (yield, in percent) 9/	...	15.9	...	...	...	...	...	...	...	...
***Option 3:* Longer Maturity, Capitalizing**										
Maturity	...	40853.0	...	...	11/6/2011	11/6/2011	11/6/2011	11/6/2011	40853.0	40853.0
Present value (1) on Nov. 7 (UB)	...	13.5	...	...	13.5	13.5	1/13/1900	13.5	13.5	13.5
Discount rate used (yield, in percent) 8/	...	31.8	...	...	31.8	31.8	1/31/1900	31.8	31.8	31.8
Present value (2) on Nov. 7 (LB)	...	51.5	...	...	51.5	51.5	2/20/1900	51.5	51.5	51.5
Discount rate used (yield, in percent) 9/	...	14.7	...	...	14.7	14.7	1/14/1900	14.7	14.7	14.7
Haircuts based on PV1 (upper bound)										
if chose option 1	62.8	46.1	49.5	45.4	40.7	53.0	54.9	40.2	16.3	59.2
if chose option 2	...	65.8	...	...	...	...	...	...	...	...
if chose option 3	...	83.8	...	...	70.4	75.2	75.7	60.5	43.6	59.9
Haircut based on PV2 (lower bound)										
if chose option 1	27.9	30.5	22.1	41.2	37.8	32.2	33.6	33.9	18.8	34.7
if chose option 2	...	37.7	...	...	...	...	...	...	...	...
if chose option 3	...	53.0	...	...	45.0	46.6	47.4	38.2	23.4	33.8

Shortly after the Phase 1 exchange that we have just described, the government faced a bank run to which it reacted by imposing a deposit freeze. This, in turn, led to a civilian coup that eventually led to the fall of the government. The new administration defaulted on all the public debt, and shortly after (albeit, yet another government) devalued the currency. The devaluation led to a sharp increase in the nominal exchange rate, and therefore to the implicit debt burden given that most debt was denominated in US dollars. As a result, in March 2002 the government decided to pesify the guaranteed loans. The government offered to convert dollar instruments at a rate of 1.40 pesos per dollar with a promise to index capital and interest payments by inflation. At the time the peso dollar exchange rate was closer to 1.9 so this entailed a substantial loss. In addition interest rates were further reduced for most of the instruments, with all, except for those with the longest maturity, being set at 2%. Table 9 shows the results of the exchange. For brevity we show only the options available to the bonds that had exchanged at least 500 million US$ in the Phase 1 exchange.[25] Unfortunately there is no information as to how much those original bonds were traded into each category, thus we have no information as to the amount exchanged for each type.

We discount the original dollar denominated instruments by the yield of dollar denominated instruments at the time, while the cash flow of the new instruments are discounted by the yield on the indexed peso bonds. We apply the adjustment for liquidity, corresponding to the guaranteed loans whenever applicable. The unweighted average delivers a haircut of 35.7%.[26]

[25] Given that there were up to three options per bond exchanged in the Phase 1 the amount of information becomes unwieldy. The complete table for all instruments can be found in www.utdt.edu/~fsturzen.

[26] We have information of how much was traded in the Phase 1 exchange but there is no information as to how it was traded (i.e. into what instrument, of the several alternatives it was traded into). Thus there is no data as to how many of each guaranteed loans were outstanding at the time of the pesification.

Table 9. Argentina "Phase 2" Exchange (Pesification)

03 - February , 2002

	Bonte 02	Bonte 03	Bonte 04	Bonte 05	Bonte 06	PRE 4	PRO2	PRO4	PRO6	PG 2011 GL 08	PG 2009 7%	PG TF GL 03	PG TV GL 03	PG TF GL 05
Old Instruments														
Issue date	5/9/1997	2/21/2000	5/24/1999	2/21/2000	2/21/2001	9/1/1992	4/1/1991	12/28/1994	1/15/1999	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001
Maturity date	5/9/2002	5/21/2003	5/24/2004	5/21/2005	5/15/2006	9/1/2002	4/1/2007	12/28/2010	4/15/2007	11/6/2011	6/19/2009	12/20/2006	12/20/2006	12/4/2008
Coupon (percent)	8.75	11.75	11.25	12.125	11.75	1 mo L	1 mo L	1 mo L	3 mo L	7	7	5.863-7	L+300	7
Average remaining life (years) 1/	0.26	1.29	2.30	3.30	4.28	0.34	2.59	4.42	2.67	9.38	7.38	4.88	4.88	6.84
Present value on Feb. 3 (U$S per 100 principal)	101.7	103.2	101.1	101.8	99.1	22.0	54.3	81.3	67.1	53.3	70.5	72.2	62.8	71.7
Discount rate used (in percent) 2/	11.1	11.8	12.5	13.0	13.4	11.1	12.7	13.4	12.7	14.7	14.5	16.3	16.3	14.5
New Instruments														
Maturity	5/9/2002	5/21/2003	5/24/2004	5/21/2005	5/15/2006	9/1/2002	4/1/2007	12/28/2010	4/15/2007	11/6/2011	6/19/2009	12/20/2006	12/20/2006	12/4/2008
Present value on Feb. 3 (ARS$ per 100 principal)	100.1	90.7	82.5	74.8	67.7	19.2	55.0	86.4	67.1	42.4	52.2	93.9	93.6	78.9
Discount rate used (yield, in percent)	10.2	10.9	11.6	12.1	12.5	10.2	11.8	12.5	11.8	16.0	15.9	15.4	15.4	15.8
Present value on Feb. 3 (U$S per 100 principal)	52.7	47.7	43.4	39.4	35.6	10.1	28.9	45.5	35.3	22.3	27.5	49.4	49.2	41.5
Haircut (in %)	48.2%	53.8%	57.1%	61.3%	64.0%	54.0%	46.7%	44.1%	47.4%	58.2%	61.0%	31.5%	21.6%	42.1%

1/ Weighted average of time of amortization, using percent amortization in each time period as weights.

2/ Dollar Boden's yields with maturity adjustment and Guaranteed Loan Premium when applicable.

3/ Indexed local currency yields with maturity adjustment and Guaranteed Loan Premium when

	PG TV GL 05	PG TF GL 06	PG TV GL 06	PG TF GL 08	PG TV GL 08	PG TF GL 09	PG TV GL 09	PGTF GL10	PGTV GL10	PGTF GL12	PGTV GL12	PGTF GL15	PGTV GL15	PGTF GL17
Old Instruments														
Issue date	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001
Maturity date	12/4/2008	10/9/2009	10/9/2009	12/19/2011	12/19/2011	5/7/2012	5/7/2012	3/15/2013	3/15/2013	2/21/2012	2/21/2012	6/15/2015	6/15/2015	1/30/2017
Coupon (percent)	L + 300	7	L + 300	7	L+300	7	L+300	7	L+300	7	L+300	7	L+300	7
Average remaining life (years) 1/	6.84	7.68	7.68	8.58	8.58	10.26	10.26	11.12	11.12	10.05	10.05	13.37	13.37	15.00
Present value on Feb. 3 (U$S per 100 principal)	59.0	69.4	58.9	67.4	53.0	63.6	48.0	62.1	45.8	64.3	41.7	57.5	39.7	56.9
Discount rate used (in percent) 2/	14.5	14.5	14.5	14.6	14.6	14.7	14.7	14.8	14.8	14.7	14.7	14.9	14.9	15.0
New Instruments														
Maturity	12/4/2008	10/9/2009	10/9/2009	12/19/2011	12/19/2011	5/7/2012	5/7/2012	3/15/2013	3/15/2013	2/21/2012	2/21/2012	6/15/2015	6/15/2015	1/30/2017
Present value on Feb. 3 (ARS$ per 100 principal)	78.6	74.2	78.3	69.9	69.6	70.2	69.9	67.3	67.1	71.1	59.4	59.5	59.2	58.4
Discount rate used (yield, in percent)	15.8	15.9	15.9	15.9	15.9	16.1	16.1	16.1	16.1	16.0	16.0	16.3	16.3	16.4
Present value on Feb. 3 (U$S per 100 principal)	41.4	39.1	41.2	36.8	36.6	37.0	36.8	35.4	35.3	37.4	31.2	31.3	31.2	30.7
Haircut (in %)	29.9%	43.7%	29.9%	45.5%	30.9%	41.9%	23.3%	42.9%	23.0%	41.8%	25.1%	45.6%	21.6%	46.0%

Table 9. Argentina "Phase 2" Exchange (Pesification) (cont.)

03 - February , 2002

	PGTV GL17	PGTF GL18	PGTV GL18	PGTF GL27	PGTV GL27	PG TF GL 31 mega	GL 31 mega	PG TF Bonte 02	PG TV Bonte 02	PG TV Bonte 03 F	PG TF Bonte 04	PG TV Bonte 04	PG TF Bonte 05	PG TV Bonte 05
Old Instruments														
Issue date	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001
Maturity date	1/30/2017	7/19/2018	7/19/2018	9/19/2027	9/19/2027	6/19/2031	6/19/2031	5/9/2005	5/9/2005	7/21/2006	5/24/2007	5/24/2007	5/21/2008	5/21/2008
Coupon (percent)	L + 300bp	7	L + 300bp	6.825	+ 287.1bp	7	L+300	6.125-7	L+300	L+300	7	L+300	7	L+300
Average remaining life (years) 1/	15.00	15.33	15.33	25.64	25.64	29.39	29.39	3.26	3.26	4.46	5.30	5.30	6.30	6.30
Present value on Feb. 3 (U$S per 100 principal)	38.9	45.2	29.4	49.5	30.3	37.6	20.4	81.2	74.1	66.3	71.5	61.2	74.0	61.9
Discount rate used (in percent) 2/	15.0	15.1	15.1	15.3	15.3	15.2	15.2	15.7	15.7	16.1	16.4	16.4	14.4	14.4
New Instruments														
Maturity	1/30/2017	7/19/2018	7/19/2018	9/19/2027	9/19/2027	6/19/2031	6/19/2031	5/9/2005	5/9/2005	7/21/2006	5/24/2007	5/24/2007	5/21/2008	5/21/2008
Present value on Feb. 3 (ARS$ per 100 principal)	58.1	41.3	41.2	49.0	48.8	30.8	30.7	105.3	104.9	92.8	90.7	90.3	83.1	82.8
Discount rate used (yield, in percent)	16.4	16.4	16.4	16.7	16.7	16.6	16.6	14.8	14.8	15.2	15.5	15.5	15.7	15.7
Present value on Feb. 3 (U$S per 100 principal)	30.6	21.8	21.7	25.8	25.7	16.2	16.2	55.4	55.2	48.8	47.7	47.5	43.8	43.6
Haircut (in %)	21.3%	51.8%	26.2%	47.9%	15.3%	56.8%	20.7%	31.8%	25.5%	26.4%	33.2%	22.3%	40.9%	29.6%

	PG TF Bonte 06	PG TV Bonte 06	PG TV FRB	Capitalizable 2020	PGTV Pre4	PGTV Pre4	PGTV Pro2	PGTV Pro4	PGTV Pro6	PGTF RA$08
Old Instruments										
Issue date	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001
Maturity date	5/15/2009	5/15/2009	3/31/2008	6/29/2020	9/1/2005	1/1/2013	4/1/2010	12/28/2013	4/15/2010	9/19/2011
Coupon (percent)	7	L+300	L+300	7	L+300	L+300	L+300	L+300	L+300	7
Average remaining life (years) 1/	7.28	7.28	6.16	18.41	3.21	8.96	5.46	7.25	5.54	9.63
Present value on Feb. 3 (U$S per 100 principal)	70.6	57.5	52.2	27.1	73.2	38.2	53.3	47.9	52.7	65.3
Discount rate used (in percent) 2/	14.5	14.5	16.6	15.3	15.7	14.6	16.4	14.5	16.4	14.7
New Instruments										
Maturity	5/15/2009	5/15/2009	3/31/2008	6/29/2020	9/1/2005	1/1/2013	4/1/2010	12/28/2013	4/15/2010	9/19/2011
Present value on Feb. 3 (ARS$ per 100 principal)	76.5	76.2	72.4	23.2	104.5	51.3	88.8	78.1	70.9	65.3
Discount rate used (yield, in percent)	15.9	15.9	15.7	16.6	14.8	16.0	15.5	15.9	15.5	16.0
Present value on Feb. 3 (U$S per 100 principal)	40.3	40.1	38.1	12.2	55.0	27.0	46.7	41.1	37.3	34.4
Haircut (in %)	43.0%	30.2%	26.9%	54.9%	24.8%	29.3%	12.3%	14.2%	29.2%	47.3%

F. Uruguay[27]

As a result of a string of negative output shocks and deposits withdrawals related to the crisis in Argentina, Uruguay's banking system came under pressure in 2002, and the largest domestically owned banks (two public and four private) began to experience difficulties. Rating agencies downgraded Uruguay below investment grade, further fuelling the crisis. Liquidity assistance by the Central Bank resources led to a quick depletion of reserves and eventually a currency crisis. On June 19, 2002, the government decided to move to a floating exchange rate regime. The 50 percent exchange rate depreciation that followed led to a large increase in the debt to GDP ratio, raising doubt about the ability of the government to service the public debt, even after the banking crisis was brought under control by the end of the year.

In early 2003, the government decided then to launch a debt exchange, geared to making debt payments sustainable and improve the liquidity of existing instruments. The exchange targeted all traded debt (about half of total debt). Eligible securities comprised (i) forty six domestically issued bonds and treasury bills, accounting for US$ 1.6 billion in principal; (ii) eighteen international bonds issued under foreign law, account for US$3.5 billion; and (iii) one "Samurai" bond issued in Japan, accounting for 250 US million.

The international exchange offer was launched on April 10, 2003, and settlement took place on May 29. Participation was high (about 93 percent of eligible bonds). A combination of the use of exit consents to change the non-payment terms of the old bonds and regulatory incentives contributed to the high acceptance rate (see Sturzenegger and Zettelmeyer, 2004, for details).

The exchange offered most bondholders a choice between two options:

- a *maturity extension option*, under which each bond could be exchanged by another with similar coupon and extended maturity (in general, 5 years longer than the original), mixed in some cases with a 30 year bond, which capitalized part of the interest earned over the first four years.

- A *benchmark bond option*, under which investors received one of a smaller number of new bonds that were longer dated but more liquid (also mixed with a 30 year bond). Three external and four domestic benchmark bonds were introduced, with maturities ranging from seven to 30 years. Some of the bonds had step up coupons, to match the expected increase in floating rate and were geared to those trading out of floating rate bonds. These bonds were designed to be attractive not only to institutional investors

[27] Complete information on the Uruguayan exchange can be obtained from Republica Oriental del Uruguay (2003a, 2003b).

but also to index-tracking funds, assuming the new international bond issues were large enough to be included in international indices.

In addition, some bondholders were offered small upfront cash payments to compensate for accrued interest on the old bonds (there was no past due interest or principal). Holders of two collateralized Brady bonds (the 2021 "Series A" and "Series B bonds") also received the present value of the principal repayment in cash.

Table 10 shows the precise terms of the exchange and computes haircuts for the 18 exchanged international bonds. As in the case of the Argentina, the computations are complicated by the large number of bonds and options offered, as well as by the fact that secondary market prices are not available for some of the new bonds that were part of the menu (either because they were illiquid or because they were in fact not issued due to lack of interest). However, prices and hence exit yields are available for all fixed coupon US dollar denominated and for the two Euro denominated bonds. Using these, Table 11 computes the haircuts, for each old instrument and each of the two exchange options, under two alternative approaches: First, using the yield of the new instrument actually received to discount the old cash flows, regardless of differences in maturity; second, using a yield corresponding to the remaining life of the old instrument interpolated from the available yields of the new US dollar bonds, with a maturity correction based on the US yield curve at the short end. The latter can be used for all dollar denominated old bonds; while the use of the former depends on whether secondary market prices were available for the new instruments. Since this was always the case under the "benchmark option" but not necessarily under the "extension option," our haircut estimates for the latter are somewhat less complete.

The main result is that the haircuts for the Uruguay exchange were substantially lower than in any of the other exchanges studied in this paper, namely in the range of 10-15 percent. Between the two options available, the minimum haircut faced by investors never exceeded 20 percent, and may have been as low as 7 percent or lower.[28] While there is some variation in the haircuts across old instruments, this does not appear to have been very large, and a pattern relating the remaining life of the old instrument to the haircut suffered, as observed for Ukraine and Ecuador, is not discernible.

[28] There is one outlier at the low end—the 2002 convertible US$ bond. This is likely due to the fact that the PV of the cash flow of this bond is currently computed under the assumption that it is held until maturity, i.e. ignoring any option for early repayment, which would tend to raise the value of the bond and hence the haircut. We are in the process of revising this.

Table 10. Uruguay Debt Exchange (International Bonds)
(April 10-May 29, 2003)

	US$ 7.875 2003	€ 7.0 2005	US$ New Money	US$ 8.375 2006	US$ Convertible	£ Convertible
Characteristics of Old Instruments						
Issue Date	18/11/98	26/09/00	19/02/91	26/09/96	19/02/91	19/02/91
Amount issued (in US$ mn) 1/	200	266	90	100	335	93
Amount outstanding (in US$ mn) 1/	191	264	32	97	141	39
Coupon (in percent)	7.875	7.000	libor + 1.00	8.375	libor + 0.875	libor + 0.875
Maturity date	18/11/03	26/09/05	19/02/06	26/09/06	19/02/07	19/02/07
Average life (years) 2/	0.47	2.33	1.43	3.33	1.93	1.93
Present value (1) (per 100 of principal)	95.4	95.9	...	87.4	...	...
Discount rate used (in percent) 3/ 4/	18.7	11.4	...	14.2	...	...
Present value (2) (per 100 of principal)	98.1	94.6	88.8	92.1	85.0	89.6
Discount rate used (in percent) 5/ 4/	12.2	12.2	12.2	12.2	12.2	12.2
Present value (3) (per 100 of principal)	97.9	...	88.0	89.0	83.8	...
Discount rate used (in percent) 6/ 4/	12.6	...	12.9	13.5	13.1	...
New Instruments and Cash obtained						
1. "Extension Option"						
Cash obtained (per 100 or principal)	5.0	0.0	5.0	0.0	5.0	5.0
Extension Bond (coupon/denomination like original bond).						
Amount issued (in US$ mn) 2/	83.6	111.0	1.4	60.8	5.4	--
Maturity	18/11/08	26/09/12	02/07/09	26/09/11	02/01/10	02/01/10
Price on issue date	65.05	79.25	...	73.77	...	...
Units obtained (per 100 of principal)	95	100	95	100	95	95
Value obtained (per 100 of principal)	61.8	79.3	...	73.8	...	...
Long Bond (7.875 maturing in 2033; total issue US$ 1055.6 million)						
Price on issue date						
Units obtained (per 100 of principal)						
Value obtained (per 100 of principal)						
Total Value Extension Option	66.8	79.3	...	73.8	...	...
2. "Benchmark Option"						
Cash obtained (per 100 or principal)	7.0	0.0	5.0	0.0	5.0	5.0
Benchmark Bond (US$; total issue $500 mn for 2011 and $1059.5 mn for 2015 bond)						
Coupon	7.25	7.25	7.25	7.25	7.25	7.25
Maturity	15/02/11	15/02/11	15/02/11	15/02/11	15/02/11	15/02/11
Price on issue date	76.9	76.9	76.9	76.9	76.9	76.9
Units obtained (per 100 of principal)	109.0	100.0	93.9	107.0	92.9	92.9
Value obtained (per 100 of principal)	83.9	76.9	72.3	82.3	71.5	71.5
Long Bond (7.875 maturing in 2033; total issue US$ 1055.6 million)						
Price on issue date						
Units obtained (per 100 of principal)						
Value obtained (per 100 of principal)						
Total Value Benchmark Option	90.9	76.9	77.3	82.3	76.5	76.5
Haircut based on extension option (percent)						
Based on Present Value (1)	0.3	0.2	...	0.2	...	...
Based on Present Value (3)	0.3	...	...	0.2	...	...
Haircut based on benchmark option (percent)						
Based on Present Value (2)	7.4	18.7	13.0	10.7	10.0	14.6
Based on Present Value (3)	7.2	...	12.2	7.5	8.7	...

1/ Evaluated using February 4, 2000 market exchange rates
2/ Weighted average of time of amortization, using percent amortization in each time period as weights.
3/ Average yield to maturity (YTM) of new instruments actually obtained in extension option.
4/ For 2021 Series A and B, collateralized principal discounted using US 20 year Treasury Bond rate
5/ Average yield to maturity (YTM) of new instruments actually obtained in benchmark option.
6/ YTM corresponding to average life of old bond, using interpolation of yield of new US$ bonds.

Table 10. Uruguay Debt Exchange (International Bonds) (cont.)
(April 10-May 29, 2003)

	US$ Convertible	CLP 7.0 2007	US$ 7.0 2008	US$ 7.875 2009	US$ 7.25 2009	US$ 8.75 2010
Characteristics of Old Instruments						
Issue Date	26/04/02	29/11/00	06/04/98	25/03/02	04/05/99	22/06/00
Amount issued (in US$ mn) 1/	150	118	250	250	250	300
Amount outstanding (in US$ mn) 1/	150	118	240	248	15	274
Coupon (in percent)	libor + 0.559	7.000	7.000	7.875	7.250	8.750
Maturity date	26/04/07	29/05/07	7/4/2008	25/03/09	4/5/2009	22/06/10
Average life (years) 2/	3.17	4.00	4.83	5.83	5.92	7.08
Present value (1) (per 100 of principal)	...	...	82.3	83.7	79.8	87.1
Discount rate used (in percent) 3/ 4/	...	...	12.4	12.5	12.4	12.7
Present value (2) (per 100 of principal)	87.4	85.9	84.0	86.0	81.7	90.1
Discount rate used (in percent) 5/ 4/	12.2	11.8	11.8	11.9	11.9	11.9
Present value (3) (per 100 of principal)	84.5	...	77.8	78.7	74.6	82.6
Discount rate used (in percent) 6/ 4/	13.4	...	13.9	14.1	14.0	13.9
New Instruments and Cash obtained						
1. "Extension Option"						
Cash obtained (per 100 or principal)	0.0	0.0	0.0	0.0	0.0	0.0
Extension Bond						
Amount issued (in US$ mn) 2/	--	--	64.2	20.0	31.5	50.6
Maturity	26/04/12	29/05/12	01/04/13	25/03/14	04/05/14	22/06/15
Price on issue date	...	...	70.65	74.04	70.66	76.72
Units obtained (per 100 of principal)	100	100	100	80	80	70
Value obtained (per 100 of principal)	...	...	70.7	59.2	56.5	53.7
Long Bond						
Price on issue date				64.3	64.3	64.3
Units obtained (per 100 of principal)				20	20	30
Value obtained (per 100 of principal)				12.9	12.9	19.3
Total Value Extension Option	...	...	70.7	72.1	69.4	73.0
2. "Benchmark Option"						
Cash obtained (per 100 or principal)	0.0	0.0	0.0	0.0	0.0	0.0
Benchmark Bond						
Coupon	7.25	7.5	7.5	7.5	7.5	7.5
Maturity	15/02/11	15/03/15	15/03/15	15/03/15	15/03/15	15/03/15
Price on issue date	76.9	74.2	74.2	74.2	74.2	74.2
Units obtained (per 100 of principal)	110.0	95.0	101.0	85.0	80.0	78.0
Value obtained (per 100 of principal)	84.6	70.5	74.9	63.1	59.3	57.9
Long Bond						
Price on issue date				64.3	64.3	64.3
Units obtained (per 100 of principal)				20.0	20.0	30.0
Value obtained (per 100 of principal)				12.9	12.9	19.3
Total Value Benchmark Option	84.6	70.5	74.9	75.9	72.2	77.1
Haircut based on extension option (percent)						
Based on Present Value (1)	...	...	14.1	13.9	13.1	16.2
Based on Present Value (3)	...	...	9.2	8.5	7.0	11.6
Haircut based on benchmark option (percent)						
Based on Present Value (2)	3.2	18.0	10.9	11.7	11.6	14.4
Based on Present Value (3)	-0.2	...	3.7	3.6	3.2	6.6

Table 10. Uruguay Debt Exchange (International Bonds only) (cont.)
(April 10-May 29, 2003)

	CLP 6.375 2011	€ 7.00 2011	US$ 7.625 2012	US$ 6.75 Series A	US$ 6.75 Series B	US$ 7.875 2027
Characteristics of Old Instruments						
Issue Date	15/03/01	28/6/01	21/11/01	18/02/91	02/12/91	15/07/97
Amount issued (in US$ mn) 1/	127	237	410	331	199	510
Amount outstanding (in US$ mn) 1/	127	65	410	110	8	30
Coupon (in percent)	6.375	7.000	7.625	6.750	6.750	7.875
Maturity date	15/03/11	28/6/11	20/01/12	19/'02/21	21/03/21	15/07/27
Average life (years) 2/	7.79	8.08	8.67	17.75	17.83	24.17
Present value (1) (per 100 of principal)	...	87.2	78.5	97.5	95.7	71.2
Discount rate used (in percent) 3/ 4/	...	10.7	12.6	12.2	12.2	12.2
Present value (2) (per 100 of principal)	74.4	82.1	81.0	97.5	95.7	71.2
Discount rate used (in percent) 5/ 4/	12.0	11.8	12.0	12.2	12.2	12.2
Present value (3) (per 100 of principal)	...	...	74.0	96.5	94.7	73.7
Discount rate used (in percent) 6/ 4/	...	...	13.7	12.6	12.5	11.8
New Instruments and Cash obtained						
1. "Extension Option"						
Cash obtained (per 100 or principal)	0.0	0.0	0.0	38.0	38.0	0.0
Extension Bond						
Amount issued (in US$ mn) 2/	2.12415	139.3	41.1	...	...	...
Maturity	15/03/16	28/6/19	20/01/17	...	...	...
Price on issue date	...	72.35	66.84	...	...	...
Units obtained (per 100 of principal)	100	100	60	0.0	0.0	0.0
Value obtained (per 100 of principal)	...	72.4	40.1	0.0	0.0	0.0
Long Bond						
Price on issue date			64.3	64.3	64.3	64.3
Units obtained (per 100 of principal)			40	70	70	100
Value obtained (per 100 of principal)			25.7	45.0	45.0	64.3
Total Value Extension Option	...	72.4	65.8	83.0	83.0	64.3
2. "Benchmark Option"						
Cash obtained (per 100 or principal)	0.0	0.0	0.0	38.0	38.0	0.0
Benchmark Bond						
Coupon	...	7.5	7.5	...	...	...
Maturity	...	15/03/15	15/03/15	...	...	...
Price on issue date	...	74.2	74.2	...	...	...
Units obtained (per 100 of principal)	0.0	85.0	60.0	0.0	0.0	0.0
Value obtained (per 100 of principal)	0.0	63.1	44.5	0.0	0.0	0.0
Long Bond						
Price on issue date	64.3	64.3	64.3	64.3	64.3	64.3
Units obtained (per 100 of principal)	95.0	0.0	40.0	70.0	70.0	100.0
Value obtained (per 100 of principal)	61.0	0.0	25.7	45.0	45.0	64.3
Total Value Benchmark Option	61.0	63.1	70.2	83.0	83.0	64.3
Haircut based on extension option (percent)						
Based on Present Value (1)	...	17.1	16.2	14.9	13.3	9.8
Based on Present Value (3)	...	...	11.1	14.0	12.4	12.8
Haircut based on benchmark option (percent)						
Based on Present Value (2)	17.9	23.2	13.3	14.9	13.3	9.8
Based on Present Value (3)	...	...	5.1	14.0	12.4	12.8

Table 11 shows the results of a similar restructuring applied to the Uruguayan domestic bonds that included a total of forty six bonds. Treasury bills were paid 15% in cash the remained being traded either into a fixed rate bond with a coupon of 5.25% and maturing in 2006, or into a step up coupon with a maturity in 2010. Coupons increased from 4% to 7% with an annual increase of 0.5% between 15 June 2004 and through 2009. For briefness in the table we only show the first T-bill maturing in any month in which a T-bill was restructured.[29]

Fixed rate bonds included bonds numbered 29, 30 and 31. Government bonds numbered 29, originally maturing in 2005, could be converted into a fixed rate bond maturing in 2010 with a coupon of 7.5% or into a step up coupon as above with a negative nominal haircut of 5%. Number 30, originally maturing in 2011, was traded into a fixed coupon rate maturing in 2019 with a fixed rate of 7.5% and number 31, originally maturing in 2012, was either traded by a fixed rate bond maturing in 2020 and a rate of 9.75% or into a bond with a fixed rate of 7.5%, maturing in 2019 and with a negative nominal haircut of 115%.

Bonds associated to the social security system (previsionales) maturing in 2007 were exchanged by a fixed rate bond maturing in 2012 with a coupon of 7.625% or a step up coupon bond as above (coupon increases in may of each year) maturing in 2013 and with a negative haircut of 110%. Those maturing in 2010 were trade either by a fixed coupon bond with a 8% rate maturing in 2018 or a 2019 bond with a coupon of 7.5% and a negative nominal haircut of 5%.

Floating rate bonds numbered 32 through 54 received in general two options. One was a floating rate bond paying Libor + a premia of between 175 and 200bps and, typically (but not always) a maturity extension of five years. The alternative was a step up coupon with rates ranging from 4 to 7% with annual increases of 0.5% between 2004 and 2009. Bonds maturing in 2003 receive some cash payments, but those maturing in 2004 or later did not.

Table 11 shows the haircuts involved. As can be seen they fall very much in line with those suffered by international investors, thus Uruguay seems to have avoided the domestic-foreign distinction typical of other exchanges.

[29] The complete table can be found in www.utdt.edu/~fsturzen.

Table 11. Uruguay Debt Exchange (Domestic Bonds)

(April 10-May 29, 2003)

Characteristics of Old Instruments	32a. TV	33a. TV	34a. TV	35a. TV	36a. TV	37a. TV	38a. TV	39a. TV	40a. TV	41a. TV	42a. TV
Issue date	6/15/1993	9/22/1993	12/27/1993	3/22/1994	6/27/1994	9/27/1994	11/7/1994	12/20/1994	3/27/1995	6/23/1995	9/29/1995
Amount outstanding (US$ mn)	39.2	37.9	40.1	40.4	25.5	29.6	12.2	29.1	35.0	53.9	31.3
Amount exchanged (US$ mn)	37.8	36.6	39.0	37.4	24.8	28.9	12.0	28.6	34.7	52.6	31.1
Maturity date	6/15/2003	9/22/2003	12/27/2003	3/22/2004	6/27/2004	9/27/2004	11/7/2004	12/20/2004	3/27/2005	6/23/2005	9/29/2005
Coupon (percent)	A L +175	6M L+175	6M L+175	6M L+175	6M L+150	6M L+150	6M L+150	6M L+150	6M L+150	6M L+150	6M L+150
Average remaining life (years) 1/	0.05	0.32	0.58	0.82	1.08	1.33	1.45	1.56	1.83	2.07	2.34
Present value on 29/05/03 (per 100 principal)	102.5	99.5	99.8	96.6	96.5	94.5	93.1	95.2	92.3	93.2	90.1
Discount rate used (in percent) 2/	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
New Instruments and Cash obtained											
1. "Extension Option"											
Cash obtained (per $100 of Principal)	15	10	5	0	0	0	0	0	0	0	0
Extension Bond											
Amount issued (US$ mn)	101.0	41.1	41.1	41.1	20.1	20.1	20.1	20.1	20.1	32.5	32.5
Coupon	5.25	A L +175	A L +175	A L +175	6M L+150	6M L+150	6M L+150	6M L+150	6M L+150	6M L+150	6M L+150
Maturity	9/15/2006	12/27/2008	12/27/2008	12/27/2008	11/27/2009	11/27/2009	11/27/2009	11/27/2009	11/27/2009	9/29/2010	9/29/2010
Units obtained (per 100 of principal)	85.0%	90.0%	95.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Value Obtained (pero 100 principal)	69.5	72.7	76.8	80.8	76.2	76.2	76.2	76.2	76.2	72.0	72.0
Discount rate used (yield, in percent) 2/	14.5%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Total Value Extension Option	84.5	82.7	81.8	80.8	76.2	76.2	76.2	76.2	76.2	72.0	72.0
2. "Benchmark Option"											
Cash obtained (per 100 principal)	15	10	5	0	0	0	0	0	0	0	0
Benchmark Bond											
Amount issued (US$ mn)	184.6	184.6	184.6	184.6	184.6	184.6	184.6	184.6	184.6	323.7	323.7
Coupon	4 (up to 7)	4 (up to 7)	4 (up to 7)	4 (up to 7)	4 (up to 7)	4 (up to 7)	4 (up to 7)	4 (up to 7)	4 (up to 7)	4 (up to 7)	4 (up to 7)
Maturity	6/15/2010	6/15/2010	6/15/2010	6/15/2010	6/15/2010	6/15/2010	6/15/2010	6/15/2010	6/15/2010	5/15/2013	5/15/2013
Units obtained (per 100 of principal)	85.0%	90.0%	95.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Value Obtained (pero 100 principal)	54.9	58.2	61.4	64.6	64.6	64.6	64.6	64.6	64.6	60.1	60.1
Discount rate used (yield, in percent) 2/	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	13.7%	13.7%
Total Value of Benchmark Option	69.9	68.2	66.4	64.6	64.6	64.6	64.6	64.6	64.6	60.1	60.1
Haircuts (in %)											
if chose option 1	17.5%	16.9%	18.1%	16.3%	21.1%	19.4%	18.2%	19.9%	17.4%	22.8%	20.1%
if chose option 2	31.8%	31.5%	33.5%	33.1%	33.1%	31.6%	30.6%	32.1%	30.0%	35.5%	33.3%

1/ Weighted average of time of amortization, using percent amortization in each time period as weights.

2/ Discount rate corresponds to yield of international floating rate or fix rate bonds where applicable, following the exchange

Table 11. Uruguay Debt Exchange (Domestic Bonds) (cont.)

(April 10-May 29, 2003)

Characteristics of Old Instruments	43a. TV	44a. TV	45a. TV	46a. TV	47a. TV	48a. TV	49a. TV	50a. TV	51a. TV	52a. TV	53a. TV
Issue date	12/22/1995	4/8/1996	6/12/1996	8/20/1996	12/2/1996	5/15/1997	6/30/1997	8/15/1997	9/22/1997	2/25/2000	3/23/2001
Amount outstanding (US$ mn)	25.6	35.1	50.7	129.1	48.7	32.3	48.0	28.4	34.3	82.8	10.9
Amount exchanged (US$ mn)	25.4	35.0	50.1	128.1	48.1	31.8	47.6	28.4	33.9	82.4	10.6
Maturity date	12/22/2005	4/8/2006	6/12/2006	8/20/2006	12/2/2006	5/15/2009	6/30/2012	8/15/2012	9/22/2012	2/25/2010	3/23/2011
Coupon (percent)	6M L+150	6M L+150	L+150	6M L+150	6M L+150	6M L+100	6M L+100	6M L+100	6M L+100	6M L+100	6M L+175
Average remaining life (years) 1/	2.57	2.86	3.04	3.23	3.52	5.97	9.10	9.22	9.33	6.75	7.82
Present value on 29/05/03 (per 100 principal)	91.4	87.5	89.8	86.9	87.7	75.0	70.0	64.7	63.9	72.1	72.8
Discount rate used (in percent) 2/	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	7.9%	7.9%	7.9%	8.0%	8.0%
New Instruments and Cash obtained											
1. "Extension Option"											
Cash obtained (per $100 of Principal)	0	0	0	0	0	0	0	0	0	0	0
Extension Bond											
Amount issued (US$ mn)	32.5	32.5	25.4	25.4	25.4	14.4	14.4	3.4	14.4	14.4	14.4
Coupon	6M L+150	6M L+150	6M L+150	6M L+150	6M L+150	6M L+100	6M L+100	6M L+200	6M L+100	6M L+100	6M L+100
Maturity	9/29/2010	9/29/2010	8/20/2011	8/20/2011	8/20/2011	6/30/2017	6/30/2017	3/24/2018	6/30/2017	6/30/2017	6/30/2017
Units obtained (per 100 of principal)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Value Obtained (pero 100 principal)	72.0	72.0	69.5	69.5	69.5	62.3	62.3	64.7	62.3	62.3	62.3
Discount rate used (yield, in percent) 2/	8.0%	8.0%	8.0%	8.0%	8.0%	7.9%	7.9%	7.9%	7.92%	7.9%	7.9%
Total Value Extension Option	72.0	72.0	69.5	69.5	69.5	62.3	62.3	64.7	62.3	62.3	62.3
2. "Benchmark Option"											
Cash obtained (per 100 principal)	0	0	0	0	0	0	0	0	0	0	0
Benchmark Bond											
Amount issued (US$ mn)	323.7	323.7	323.7	323.7	323.7	322.2	322.2	322.2	322.2	322.2	322.2
Coupon	4 (up to 7)	4 (up to 7)	4 (up to 7)	4 (up to 7)	4 (up to 7)	4 (up to 7)	4 (up to 7)	4 (up to 7)	4 (up to 7)	4 (up to 7)	4 (up to 7)
Maturity	5/15/2013	5/15/2013	5/15/2013	5/15/2013	5/15/2013	4/15/2018	4/15/2018	4/15/2018	4/15/2018	4/15/2018	4/15/2018
Units obtained (per 100 of principal)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Value Obtained (pero 100 principal)	60.1	60.1	60.1	60.1	60.1	57.2	57.2	57.2	57.2	57.2	57.2
Discount rate used (yield, in percent) 2/	13.7%	13.7%	13.7%	13.7%	13.7%	13.3%	13.3%	13.3%	13.3%	13.3%	13.3%
Total Value of Benchmark Option	60.1	60.1	60.1	60.1	60.1	57.2	57.2	57.2	57.2	57.2	57.2
Haircuts (in %)											
if chose option 1	21.3%	17.8%	22.6%	20.1%	20.8%	16.9%	11.0%	0.0%	2.5%	13.5%	14.3%
if chose option 2	34.3%	31.3%	33.1%	30.9%	31.5%	23.8%	18.4%	11.7%	10.6%	20.7%	21.4%

Table 11. Uruguay Debt Exchange (Domestic Bonds) (cont.)

(April 10-May 29, 2003)

Characteristics of Old Instruments	29a. TF	30a. TF	31a. TF	A.P. 2a.	A.P. 3a.	Letras 10121	Letras 10123	Letras 10127	Letras 10132	Letras 10137	Letras 10201
Issue date	12/16/1998	3/23/2001	2/28/2002	3/5/1999	2/25/2000	5/24/2001	6/7/2001	7/5/2001	8/9/2001	9/13/2001	3/14/2002
Amount outstanding (US$ mn)	25.0	299.1	40.0	108.5	46.2	5.3	5.3	5.3	5.3	5.3	5.3
Amount exchanged (US$ mn)	25.0	297.9	39.8	108.2	46.0	5.1	5.1	5.1	5.1	5.1	5.1
Maturity date	12/16/2005	3/23/2011	2/28/2012	3/5/2007	2/25/2010	5/22/2003	6/5/2003	7/3/2003	8/7/2003	9/11/2003	3/11/2004
Coupon (percent)	7.50	7.50	9.75	7.63	8.00	-	-	-	-	-	-
Average remaining life (years) 1/	2.55	7.82	8.76	3.77	6.75	0.00	0.02	0.10	0.19	0.29	0.79
Present value on 29/05/03 (per 100 principal)	92.8	74.7	87.0	85.0	80.2	100.0	99.4	98.7	98.1	97.5	93.8
Discount rate used (in percent) 2/	14.5%	13.8%	13.7%	14.3%	13.9%	-	8.0%	8.02%	8.0%	8.0%	8.0%
New Instruments and Cash obtained											
1. "Extension Option"											
Cash obtained (per $100 of Principal)	0	0	0	0	0	15	15	15	15	15	15
Extension Bond											
Amount issued (US$ mn)	25.0	324.2	21.9	98.0	40.6	101.0	101.0	101.0	101.0	101.0	101.0
Coupon	7.5	7.5	9.75	7.6	8.0	5.3	5.3	5.3	5.3	5.3	5.3
Maturity	12/16/2010	3/23/2019	2/28/2020	3/5/2012	2/25/2018	9/15/2006	9/15/2006	9/15/2006	9/15/2006	9/15/2006	9/15/2006
Units obtained (per 100 of principal)	100.0%	100.0%	100.0%	100.0%	100.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
Value Obtained (pero 100 principal)	72.2	66.2	82.1	70.8	69.8	69.5	69.5	69.5	69.5	69.5	69.5
Discount rate used (yield, in percent) 2/	13.8%	12.8%	12.7%	13.7%	12.9%	14.5%	14.5%	14.5%	14.5%	14.5%	14.5%
Total Value Extension Option	72.2	66.2	82.1	70.8	69.8	84.5	84.5	84.5	84.5	84.5	84.5
2. "Benchmark Option"											
Cash obtained (per 100 principal)	0	0	0	0	0	15	15	15	15	15	15
Benchmark Bond											
Amount issued (US$ mn)	184.6	324.2	324.2	323.7	324.2	184.6	184.6	184.6	184.6	184.6	184.6
Coupon	4 (up to 7)	7.5	7.5	4 (up to 7)	7.5	4 (up to 7)	4 (up to 7)	4 (up to 7)	4 (up to 7)	4 (up to 7)	4 (up to 7)
Maturity	6/15/2010	3/23/2019	3/23/2019	5/15/2013	3/23/2019	6/15/2010	6/15/2010	6/15/2010	6/15/2010	6/15/2010	6/15/2010
Units obtained (per 100 of principal)	105.0%	100.0%	115.0%	110.0%	105.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
Value Obtained (pero 100 principal)	67.9	66.2	76.2	66.1	69.5	54.9	54.9	54.9	54.9	54.9	54.9
Discount rate used (yield, in percent) 2/	14.0%	12.8%	12.8%	13.7%	12.8%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%
Total Value of Benchmark Option	67.9	66.2	76.2	66.1	69.5	69.9	69.9	69.9	69.9	69.9	69.9
Haircuts (in %)											
if chose option 1	22.2%	11.3%	5.6%	16.7%	13.0%	15.5%	14.9%	14.4%	13.8%	13.3%	9.9%
if chose option 2	26.9%	11.3%	12.4%	22.2%	13.3%	30.1%	29.6%	29.2%	28.7%	28.2%	25.4%

IV. CROSS COUNTRY COMPARISON

Table 12 juxtaposes the debt restructurings studied in this paper. In the table we present most of the relevant characteristics of each exchange, while trying to summarize its implications in terms of haircuts and intercreditor equity.

The table shows the size of the exchange, the number of instruments tendered, as well as the number of new instruments issued, and the number of options available to investors. It also identifies whether the exchange was domestic or international, whether it entailed currency conversion, whether payments had been defaulted, etcetera. The table computes the simple average of haircuts for each exchange, as well as the weighted average. The weights correspond to the share of the instrument in the total of instruments exchanged. Finally it shows the standard deviation of haircuts, a measure that is directly related to the amount of intercreditor equity, and the maximum and minimum haircut that may be useful reference point for other exchanges.

A few main facts emerge from the comparison. First, in terms of the NPV losses sustained, the Uruguay exchange was clearly the least coercive (13-15 percent) while the Russian international exchange was the most coercive (50 percent). However, if we acknowledge the fact that the Argentina exchange restructured the same instruments twice, with more than 35% haircut on each round, it is those bonds that suffered the largest restructuring. All others haircuts fall in the narrow thirty something range.

Particularly striking is the difference in the haircuts suffered by domestic and external bondholders in the Russian and the Ukraine exchanges. This pattern however was no longer present in the case of Uruguay. In addition, given the size of the restructuring on domestic bondholders, it seems unlikely that in the case of Argentina domestic bondholders may fare better.

The standard deviation of haircuts within each exchange in most cases is quite low. Thus our conclusion is that it is likely that governments may have tried to achieve some sort of inter-creditor equity. However, the existence of disparities in the haircuts implies that implementation fell short of achieving this objective. The most likely explanation for this is that governments probably also wanted to offer a few new instruments. This, in turn, reduced their ability to reduce inter-creditor inequalities.

Second, the magnitude of the NPV losses appear unrelated to whether there were reductions in principal payments, thus, there is no apparent relationship between the “NPV haircut” and the “nominal haircut”.

Table 12. Summary of Debt Restucturing

	Russia Novation Domestic 1998	Russia Novation Domestic 1998	Russia Min Fin3 International 2000	Russia Prin/Ian International 2000	Ukraine OVDPs Domestic 1998	Ukraine OVDPs International 1998	Ukraine International 1999
Face value of debt exchange (US$ bn)	4.93[1]		1.3	29	0.35[2]	0.345[3]	0.272
Number of intruments exchanged	21	21	1	2	all T-Bills	all T-Bills	2
Number of New Instruments	7	7	2	2	1	1	2
Number of exchange options offered	1	1	2	1	1	3	1
Was there past due principal?	yes	yes	yes	no	no	no	yes
Was there past due interest?	no	no	no	yes	no	no	no
Was cash paid?	yes	yes	no	yes	no	yes/no	yes
Was there face value reduction?	yes	yes	no	yes	no	no	no
Was there currency conversion?	no	no	yes/no	no	no	yes	yes/no
Non weighted haircut	17.7/19.5	17.9/19.6	57.1	49.7	7.4/7.8	52.5	33.1
Weighted haircut	17.1/18.9	17.4/19.1	57.1[4]	49.2	7.4/7.8	52.5	33.6
Standard deviation of haircut	2.9/2.8	2.7/2.7	20.3	1.48	nil	nil	3.4
Maximum haircut	22.4/24.0	22.4/24.0	57.1	50.8	7.4/7.8	52.5	35.5
Minimum haircut	12.9/14.7	13.2/15.1	28.3	49.7	7.4/7.8	52.5	30.7

1/ Corresponds to 112 bn rubles at the rate at the time of the exchange
2/ Corresponds to 0.8 bn hyrvnias at the rate at the time of the exchange
3/ Corresponds to 1.17 bn hyrvnias at the rate at the time of the exchange
4/ We take into account only one option, the other was ignored by bond holders

	Ukraine International 2000	Pakistan International 1999	Ecuador International 2000	Argentina Phase 1 Domestic 2001	Argentina Pesification Domestic 2002	Uruguay International 2003	Uruguay Domestic 2003
Face value of debt exchange (US$ bn)	2.8	0.6	6.3	41	n/a	2.5	1.5
Number of intruments exchanged	33	3	6	50	107	18	45
Number of New Instruments	2	1	2	106	107	18	15
Number of exchange options offered	2	1	1-2	1-3	1	2	2
Was there past due principal?	yes	no	yes	no	no	no	no
Was there past due interest?	yes	no	yes	no	no	no	no
Was cash paid?	yes	no	yes	no	no	yes	yes/no
Was there face value reduction?	yes	no	yes	no	yes	no	no
Was there currency conversion?	no	no	no	no	yes	no	no
Non weighted haircut	34.6	30.3	34.5	35.2/48.8	35.7	13.1	15.3
Weighted haircut	29.8	30.1	28.7	38.2/50.1	n/a	13	14.4
Standard deviation of haircut	12.2	2.7	10.3	10.7/21.8	14.4	4.5	4.7
Maximum haircut	54.4	33.3	47.7	74.0/81.0	88.6	23.2	22.8
Minimum haircut	21.7	27.8	19.7	18.8/16.3	12.3	3.2	0.00

In order to study this information in a more systematic fashion, we pooled the instrument level data and ran a few simple regressions with exchange-specific fixed effects. The results are shown in Table 13.

Table 13. Regression Results

	Domestic Investors				***International Investors***	
	Lower Bound	*Lower Bound*	*Upper Bound*	*Upper Bound*	*NPV Haircut*	*NPV Haircut*
ARGENTINA	35.278***	32.037***	40.460***	54.753***	0.000	0.000
	(0.931)	(1.519)	(1.121)	(2.001)	(0.000)	(0.000)
ECUADOR	0.000	0.000	0.000	0.000	33.474***	36.229***
	(0.000)	(0.000)	(0.000)	(0.000)	(3.968)	(7.160)
PAKISTAN	0.000	0.000	0.000	0.000	30.265***	30.152***
	(0.000)	(0.000)	(0.000)	(0.000)	(5.611)	(4.142)
RUSSIA	17.733***	15.260***	19.490***	21.100***	43.068***	33.502***
	(2.546)	(3.507)	(3.066)	(4.621)	(5.611)	(6.788)
UKRAINE	7.755	7.483	7.359	7.670	24.646***	35.645***
	(11.667)	(7.589)	(14.051)	(10.000)	(1.620)	(3.084)
URUGUAY	15.333***	13.747***	15.333***	16.739***	12.736***	15.212***
	(1.739)	(1.525)	(2.095)	(2.009)	(2.291)	(2.792)
AVERAGELIFE		0.379***		-0.394**		-0.326
		(0.124)		(0.163)		(0.246)
AMOUNTOUTSTANDING		0.000		-0.000		0.001*
		(0.001)		(0.001)		(0.001)
NH		0.099		-0.066		-0.003
		(0.139)		(0.183)		(0.167)
CC		0.000		0.000		6.123*
		(0.000)		(0.000)		(3.379)
Observations	224	116	224	116	66	37
R-squared	0.88	0.93	0.86	0.93	0.87	0.95

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

The table distinguishes between domestic exchanges and international exchanges. Furthermore, for the domestic exchanges, it is run both for the upper and lower bounds for the haircut computation. For some countries information is only available in a particular category. The first regression for each set uses the country dummies only. It confirms the ranking of average losses suggested in Table 12. Among international exchanges the Russian exchange shows the largest haircuts, with Ukraine, Ecuador and Pakistan in the 24-33% range. Finally, Uruguay (with 13 percent) shows the smallest haircuts. Among the domestic exchanges Argentina singles out, with an average haircut of 35% (with the clarification that such haircut was applied twice to the same instruments). In the cases where a comparison is feasible, it is easy to see that domestic exchanges have implied lower haircuts than their

international counterpart. The exception is Uruguay where domestic investors suffered larger haircuts.[30],

The second version of each regression, includes four characteristics of the instruments being exchanged: their average life, the amount issued, the nominal haircut and whether it was subject to currency conversion. As can be seen from the coefficients there is little evidence that certain instruments were hurt in a systematic fashion. No discernible pattern arises for domestic exchanges, and weak evidence for international exchanges suggests that larger instruments suffer a larger haircut. Similarly, it seems that currency conversion have been associated to larger haircuts. However, this last evidence should be read with care, as it relies on a few exchanges, all of them in Ukraine.

In summary we find little systematic evidence as to the nature of haircuts except for the fact that domestic exchanges seem to be associated to smaller haircuts.

[30] Though the difference in not statistically significant.

V. CONCLUSIONS

This paper has two main results: first, average NPV haircuts varied substantially between the debt restructurings studied, with the "toughest" exchange being Argentina´s domestic exchange with a combined haircut above 70%, followed by the Russian exchange (about 50%), the "softest" being Uruguay, with a haircut close to 10 percent. Second, large variations in haircuts existed within some of the exchanges, depending on the instrument tendered. The former is not surprising, since variations in haircuts across debt exchanges were to be expected as a result of differences in between countries' ability to pay, willingness to pay, and bargaining power. In contrast, large variations in haircuts within exchanges are surprising, as they appear to conflict with the notion of intercreditor equity, and the equal legal status of bondholders.

A potential "explanation" for the variations we find is that much lower discount rates than the market rates prevailing after the exchange may have been used in determining the value of each original instrument, and hence the compensation that each was offered. In particular, the use of a zero discount rate could be rationalized by the legal acceleration of payments, i.e. the legal principle, typically embodied in bond contracts, that once default has occurred, the original maturity is irrelevant and all principal becomes immediately due and payable. In this philosophy, intercreditor equity conditional on default would imply equal treatment not on an NPV basis but on a face value basis. Of course, at the rates prevailing after the exchange, this generates widely different NPV losses.

At any rate, the other significant regularity found was the fact that domestic exchanges implied initially (Russia and Ukraine) lower haircuts. It is not difficult to see why. A debt restructuring implies, in addition to the deadweight losses associated to the decision and its resolution, a decision on how to transfer resources among three different groups: domestic taxpayers, domestic bondholders and foreign bondholders. It is not difficult to see that governments may choose to benefit the former two at the expense of the latter. However, we must also acknowledge that in the case of Uruguay there was no distinction between bondholders.

In the recent discussion of new international financial architecture, and also to understand why countries choose to default several questions remain unanswered: What are the costs to bondholders from a default? What are the reputational costs faced by a country and how do they depend on the harshness of the debt restructuring pursued? What are the determinants of the game between creditors and governments. For example, do the terms of a restructuring depend on the time elapsed since default as a war of attrition model would suggest?

This paper, by estimating in a consistent and comprehensive manner the specific losses for each instruments defaulted in the seven countries considered, allows to tackle these research questions in a systematic fashion.

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