

# Medium-Term Debt Management Strategy

## The Analytical Tool

User Guide

May 2012

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## I. Introduction

The World Bank and International Monetary Fund have developed a systematic and comprehensive framework to help countries develop an effective medium-term debt management strategy (MTDS). The framework is published as the “Guidance Note for Developing a Medium Term Debt Management Strategy” (February 2009).<sup>1</sup> The Guidance Note is accompanied by the Analytical Tool (AT) that can be used to assist governments in their decision making on how financing needs can be met, taking into account macroeconomic constraints and potential sources of financing. The steps involved in designing an MTDS are discussed in detail in the Guidance Note and is summarized below. Although these steps are presented in a specific sequence, this is only indicative. In practice, the distinction between each step will not be so clear, several steps may be undertaken simultaneously, and / or in a different order:

1. *Identify the objectives for public debt management and scope of the MTDS.*
2. *Identify the current debt management strategy and analyze the cost and risk of the existing debt.*
3. *Identify and analyze potential funding sources, including their cost and risk characteristics.*
4. *Identify baseline projections and risks in key policy areas—fiscal, monetary, external, and market.*
5. *Review key longer-term structural factors.*
6. *Assess and rank alternative strategies on the basis of the cost-risk trade-off.*
7. *Review implications of candidate debt management strategies with fiscal and monetary policy authorities, and for market conditions.*
8. *Submit and secure agreement on the MTDS.*

The AT is used to conduct quantitative analysis set out in step 6: to assess and rank alternative strategies on the basis of the cost-risk trade-off. This user’s guide introduces the reader how to use the AT for the MTDS, referred to as MTDS AT.

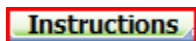
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<sup>1</sup> World Bank and IMF. “Developing a Medium –Term Debt Management Strategy (MTDS)-Guidance Note for Country Authorities.” February 24, 2009.

## II. General Structure of the MTDS Analytical Tool (MTDS AT)






The MTDS AT is an Excel-based application, which contains 1) the instruction sheet, 2) several interrelated worksheets for inputting data, 3) worksheet that performs calculations to generate cash flows, 4) an intermediate output worksheets, and 5) output worksheets.

### 1. Instruction worksheet

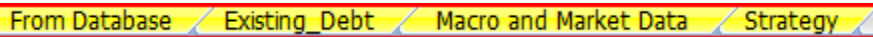


The instructions tab is in green.

This sheet provides a brief guidance on how to operate the AT and specifies the color coding rule, whereby:

-  Cells to be filled in or updated by the user (including the area in which shocks and alternative strategies are stored)
-  Consistency checks
-  Cells with formulas or values that must not be changed by the user
-  The area in which shocks and alternative strategies are pasted by the user or by the Macro and calculations are made by the model
-  These are country-specific manual adjustments to formulas in cells. Please only use in exceptional circumstances and document below why they have been made  
Tab \*\*\* Adjustment \*\*\*  
Tab \*\*\* Adjustment \*\*\*

## 2. Input worksheets

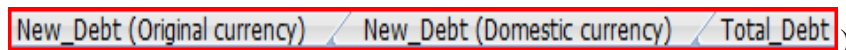


The input worksheet tabs are marked in yellow.

These sheets require data to be filled in or updated by users in the yellow cells.

- (i) Sheet *From Database*: data on the existing debt portfolio in millions of original currency aggregated in up to 15 stylized instruments including projections of principal, interest payments, and debt outstanding and disbursed (DOD);
- (ii) Sheet *Existing\_Debt*: general parameters and parameters on the 15 stylized debt instruments (their financing terms, which are necessary to simulate cash flows when the instruments are issued to cover the gross financing needs over the projection period) and the exchange rates and discount rates at cut-off date;
- (iii) Sheet *Macro and Market Data*: projections of fiscal revenues and expenditure, macroeconomic, and financial variables, including baseline and shock scenarios for exchange rates and interest rates (yield curves);
- (iv) Sheet *Strategy*: the 4 alternative future financing strategies.

## 3. Calculation worksheets



The calculation worksheet tabs are marked in grey, with no data entry required.

In the sheets *New\_Debt (Original currency)* and *New\_Debt (Domestic currency)*, the MTDS AT automatically simulates cash flows generated by the new debt issued to cover the gross financing needs over the projection period, disaggregated into the 15 stylized debt instruments, given a certain borrowing strategy and a certain scenario for exchange rates and interest rates, in original currency and domestic currency, respectively. By ‘cash flows’ we refer to cash disbursements (inflows), principal and interest payments (outflows), and debt stock (nominal DOD and present value of debt).

In the sheet *Total\_Debt*, the MTDS AT calculates the total cash flows generated by both the existing debt and the new debt, disaggregated into the 15 stylized debt instruments, given a certain borrowing strategy and a certain scenario for exchange rates and interest rates, in domestic currency.

The MTDS AT uses an automated procedure (implemented in Excel Macros) to combine the 4 borrowing strategies with 5 scenarios for exchange rates and interest rates. For each of the 20 possible combinations, the three calculation sheets compute the cash flows corresponding to new and total debt, using the 15 stylized debt instruments and their financing terms.

The set of cash flows for total debt thus obtained – reported in the output-by-strategy worksheets (see below) - is used to compare the performance of the 4 financing strategies and to calculate cost-risk indicators - reported in the output worksheets.<sup>2</sup>

#### 4. Output-by-Strategy worksheets



The output-by-strategy worksheet tabs are marked in blue, with no data entry required.

In these sheets, the MTDS AT reports the cash flows for total debt (computed in the sheet *Total\_Debt*), for a given strategy and the 5 scenarios for exchange rates and interest rates. All figures in these sheets are saved as value (no formulas). This preserves the output of the specific calculation involved.

#### 5. Output worksheets



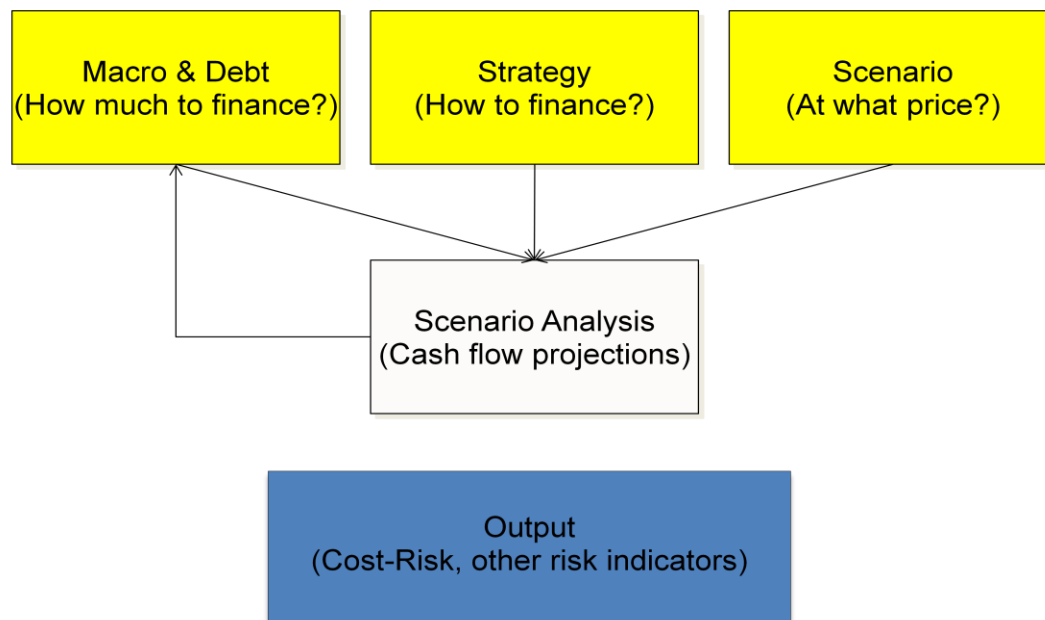
The output worksheet tabs are marked in orange.

In these sheets, the MTDS AT reports the cost-risk indicators (computed on the basis of cash flows for total debt reported in the strategy sheets). The cost-risk indicators allow for a quantitative comparison of the performance of the 4 borrowing strategies. The template accommodates MTDS projection periods of 3, 4, 5, and 8 years, customizable on a case by case basis.

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<sup>2</sup> Excel Macros automate several rounds of copying and pasting involved in two instances: (i) combining the 4 borrowing strategies with 5 scenarios for exchange rates and interest rates, in order to have the calculation sheets computing the corresponding cash flows; and (ii) transferring results from the calculation sheets to the strategy sheets, in order to report them. See Appendix I for more information on Excel Macros and other Excel functions used in the MTDS AT.

### III. Process Overview



The model consists of three types of inputs: 1) the overall quantity that requires financing (gross financing requirement), 2) how this will be financed (strategies), and 3) the price for the different financing options (scenarios). Once the gross financing requirement is determined, multiplying this by a strategy (e.g. Strategy 1) that is defined in terms of proportions (e.g., 20% domestic T-bills, 30% in domestic 3 year bonds, 20% concessional external loans, and 30 percent external commercial) will produce the amounts of financing to be raised by each type of debt instrument. The terms of the different type of debt instrument is then specified to enable the calculation of debt service (principal and interest payment) and the outstanding amounts over time, as they change with time as repayments are made. The new debt that is calculated in aggregated with the cash flows of the existing debt portfolio to come up with the cash flows for the total debt portfolio under a specific debt management strategy and a specific pricing scenario. This cash flow result for the total debt is saved as an output for this strategy (e.g., Strategy 1 under baseline pricing assumption). The process is repeated for a different pricing assumption (e.g. an exchange rate shock scenario), and the result for the total debt is saved as a separate output for the same strategy (e.g., Strategy 1 under exchange rate depreciation assumption). Several more alternative pricing assumptions are examined under the same strategy and saved as results for that strategy (e.g., Strategy 1).

Next, a different debt management strategy is examined (e.g., Strategy 2), that comprise different mix of borrowing instruments (e.g., 20% domestic T-bills, 30% in domestic 5 year bonds, 10% domestic 10 year inflation indexed bonds 40% semi-concessional external loans). The process described above is repeated for this alternative strategy, multiplying the gross financing

requirement with this second strategy and alternative pricing assumptions. The same set of pricing assumptions must be applied to make the different strategies comparable.

Four alternative strategies are then examined under different pricing assumptions and output is saved. These are saved as intermediate outputs. The output that is used for analysis is based on calculations of cost and risk indicators as well as other indicators that draw from the cash flows saved as intermediate output.

The following text describes the structure of the Analytical Tool that follows the process described above:

**Input:** Input data is entered into 4 separate worksheets. The current debt portfolio data is entered in the *From Database* sheet, macroeconomic and market assumptions in the *Macro and Market Data* sheet, financing strategies are in the *Strategy* sheet. The user (or the Excel Macro) selects a debt strategy from the 4 alternative choices available (e.g., Strategy 1), pasting it in the appropriate (purple) area of the *Strategy* sheet. The user (or the Excel Macro) selects the baseline exchange rate and interest rate scenario, pasting it in the appropriate (purple) area in the *Macro and Market Data* sheet.

**Calculation (cash flow projection):** The MTDS AT calculates the total cash flows for Strategy 1 under the baseline exchange rate and interest rate scenario, using the *Total\_Debt* sheet.

**Output:** The user (or the Excel Macro) saves the output from the *Total\_Debt* sheet in the *Strategy 1* sheet. The resulting output contains information on the cost of debt under the baseline scenario for Strategy 1. The user (or the Excel Macro) repeats the calculation of cash flows for alternative market scenarios to generate the output for Strategy 1 under risk scenarios. The user repeats the calculations for the remaining 3 alternative strategies. Overall, the user will calculate 20 possible combinations of borrowing strategy and macro-market scenario. The user compares and evaluates the cost-risk indicators for each strategy in the *XY\_Output* sheet to assess the preferred financing strategy.

The following are broad steps that the user should follow:

1. Enter all key parameters, instruments, existing debt, macro data, pricing scenarios consisting of baseline and shocks, and strategies.
2. Run the Initialization macro
3. Then run the macros for Strategies 1, 2, 3 and 4
4. Evaluate the output tables and charts
5. If adjustments to a specific strategy (either affecting the external-domestic financing mix or the distribution within domestic and external) or make any change to other data (debt, macro, fiscal or financial baseline or shocks), it is important to rerun initialization and the macro of that strategy



Typical interpretation of the data:

1. Check the amortization profile of each strategy and compare to the initial profile. Do you see any improvement?
2. Check the cost and risk indicator table
3. Check the cost-risk charts
4. Check the feasibility of each strategy in terms of gross or net financing. Go to the Strategy sheet for each strategy between rows 62 to 148.

*Note:* All yellow cells have to be filled in or updated. Cells that are not colored in yellow contain formulas and therefore should not be overwritten.

*Note:* Alternative financing strategies, as well as baseline assumptions and stress tests scenarios for exchange rates and interest rates are copied in the areas highlighted in purple.

## IV. Getting Started

This section will guide the user to enter the data sheet by sheet so that results can be obtained.

### Sheet From Database

The user inputs data on the existing debt portfolio<sup>3</sup>, aggregated in 15 stylized instruments, in millions of original currency units. Projections of principal payments (up to maturity), interest payments, and DOD must be prepared outside the MTDS AT, using the original loan by loan data extracted from the debt database. Interest payments must be the 'full interest bill' for fixed rate instruments and the 'fixed spread-only interest bill' for floating rate instruments -i.e. the interest payment due if the reference rates were zero.<sup>4</sup>

3	Figures in million units of original currency (1000000)												
4	PRINCIPAL PAYMENTS										2011	2012	2013
5	Instrument	Instrument Type / Name	DX / FX	Currency	Fixed / Var	DX/FX and Fix/Var	Concess./Mkt	Maturity (y)	Grace (y)				
6	USD_1	IDA	FX	USD	Fix	External Fix	Concessional	40	10				
7	USD_2	AfDF	FX	USD	Fix	External Fix	Concessional	50	10				
20	UTP_15	20Yr ILB	DX	UTP	Var	Domestic Variable	Mkt	20	19				
23													
24	INTEREST PAYMENTS - For floating-rate instruments use only spread-based interest payment										2011	2012	2013
25	Instrument	Instrument Type / Name	DX / FX	Currency	Fixed / Var	DX/FX and Fix/Var	Concess./Mkt	Maturity (y)	Grace (y)				
26	USD_1	IDA	FX	USD	Fix	External Fix	Concessional	40	10				
27	USD_2	AfDF	FX	USD	Fix	External Fix	Concessional	50	10				
40	UTP_15	20Yr ILB	DX	UTP	Var	Domestic Variable	Mkt	20	19				
43													
44	DEBT OUTSTANDING										2011	2012	2013
45	Instrument	Instrument Type / Name	DX / FX	Currency	Fixed / Var	DX/FX and Fix/Var	Concess./Mkt	Maturity (y)	Grace (y)				
46	USD_1	IDA	FX	USD	Fix	External Fix	Concessional	40	10				
47	USD_2	AfDF	FX	USD	Fix	External Fix	Concessional	50	10				
60	UTP_15	20Yr ILB	DX	UTP	Var	Domestic Variable	Mkt	20	19				
61													

### Sheet Existing\_Debt

*Existing\_Debt* sheet consists of four sections: (i) Key Parameters & Instruments; (ii) Existing Debt Cash Flow in Original Currency; (iii) Existing Debt Cash Flow in Domestic Currency; and (iv) Cost Risk Indicators for Existing Debt.

<sup>3</sup> See separate manual on 'Data Preparation and Aggregation'.

<sup>4</sup> Spread is otherwise known as interest "margin" and is the fixed portion of the interest bill.

## (i) Key Parameters & Instruments

	A	B	C	D	E	F	G	H	K	L
4	<b>1. KEY PARAMETERS &amp; INSTRUMENTS</b>									
			Instrument	Instrument Type /		Concessional / Mkt			Curre	Currency
6	Time horizon (years)	5	Nr.	Name	Fixed / Var	instrument?	Maturity (y)	Grace (y)	ncy	(3-letter
7	Base year of data	2011	USD_1	IDA	Fix	Concessional	40	10	FX	USD
8	Start year of analysis	2012	USD_2	AfDF	Fix	Concessional	50	10	FX	USD
9	Calendar/fiscal year	Calendar	USD_3	IBRD/ADB/IDB_Fixed	Fix	Concessional	20	5	FX	USD
10	Country	Utopia	USD_4	IBRD/ADB/IDB_Floating	Var	Concessional	20	5	FX	USD
11	Local currency (name)	UTP	USD_5	Bilateral_Fixed	Fix	Concessional	20	7	FX	USD
12			USD_6	China	Fix	Concessional	10	3	FX	USD
13			USD_7	Commercial Bank_Fixed	Fix	Mkt	10	9	FX	USD
14			USD_8	Capital markets	Fix	Mkt	5	4	FX	USD
15			UTP_9	T bills	Fix	Mkt	1	0	DX	UTP
16			UTP_10	3Yr	Fix	Mkt	3	2	DX	UTP
17			UTP_11	5Yr	Fix	Mkt	5	4	DX	UTP
18			UTP_12	7Yr	Fix	Mkt	7	6	DX	UTP
19			UTP_13	10Yr	Fix	Mkt	10	9	DX	UTP
20			UTP_14	20Yr	Fix	Mkt	20	19	DX	UTP
21			UTP_15	20Yr ILB	Var	Mkt	20	19	DX	UTP

	N	O	P	Q
4				
6	Currency (3-letter code)	Exchange rate in currency unit per USD	Exchange Rate in UTP per currency unit	Discount Rate
7	USD	1	149.170	4%
8	EUR	0.815	183.031	
9	JPY	88.6	1.684	
10	GBP	0.666	223.979	
11	CNY	6.790	21.969	
12	UTP	149.17	1.000	

In this section, the user specifies a medium-term projection period for the MTDS. By default, the template is set to accommodate 3, 4, 5, and 8 years of projections. If a different projection period is chosen, then the user will need to adjust several formulas in the output sheets. Base year of data denotes the year for which existing debt characteristics and cash flows are provided. Start year of analysis is the first projection year of the model. The user needs to fill out the data on fiscal or calendar years, the country and domestic currency name or code.

By default, the MTDS AT allows for a maximum of 15 stylized debt instruments. Instruments may represent the financing terms of debt instruments in the existing portfolio - and can also be issued as new debt over the projection horizon. They may also represent debt with new financing terms that are different from the existing instruments and are of special interest for the user. These instruments can be also issued at will over the projection horizon. If the range of future

financing strategies will consist of instruments similar to those in the existing portfolio, the last 5 instruments need not be used.

*Note:* The first instrument represents a multilateral concessional debt instrument similar to IDA loans and the second instrument represents instrument similar to ADF loans. The MTDS AT has already pre-defined the amortization profile of this instrument following the IDA and ADF loans' stepped-up amortization profile. If a country does not have debt from multilateral concessional sources, then the first two instruments should not be used and the user should work from the third instrument onwards. Alternatively, the formula for principal repayment can be modified to eliminate these special features by deleting \*30\*2% cell by cell in the column F37 to F46 and then the new formula in F37:F46 can be copied across from column G through BM. The same can be done for the second instrument: delete \*40\*1% in each of the cells in column F116 to F125, then copy the new equation across from column G through BM.

*Note:* Even though all instruments might not be used, in the table shown all the cells in yellow must be filled with arbitrary values (e.g. Fix, Mkt, FX, USD). This avoids problems with lookup functions used extensively in the MTDS AT.

Instruments' identifier and financing terms (particularly grace period and final maturity) must be entered by the user. Coding is important. For variable rate instruments, use code "Var" and for fixed rate instruments, use code "Fix". For concessional instruments (whose present value (PV) will be below face value), use code "Concessional" and for instruments with market-based profile (with PV equal to face value) use code "Mkt". For domestic-currency denominated debt instruments use code "DX" and for foreign-currency denominated debt instruments use code "FX".

The MTDS AT allows for five foreign currencies—one base currency (USD) and four other foreign currencies—and the domestic currency (identified in the cell N12). If the existing debt portfolio has more currencies than programmed in this template, then the user needs to assign them to one of the six main currencies as their proxy. The currency codes must consist of three letters. Exchange rates are initially expressed in units of foreign or domestic currency per USD (cells O8 to O12), while the USD exchange rate is always '1' (cell O7). Exchange rates in units of domestic currency per unit foreign currency are calculated by the AT (cells P7 to P11).

Discount factors are used to calculate PV of concessional debt instruments only. Discount rates on external concessional debt are currently set at 4% as a default. This matches the rate used in the Debt Sustainability Framework (DSF). The user can enter any desired discount rate on domestic concessional debt (and there are no default discount rates), but these instruments are rare.

(ii) Existing Debt Cash Flow in Original Currency

	A	B	C	D	E	F	G
22							
23	<b>2. EXISTING DEBT CASH FLOW IN ORIGINAL CURRENCY (Millions) - Interest payments for fixed</b>						
24							
25							
26		<b>Principal Payments in Original Cu</b>	<b>Sum Principal Rep</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	
27	Fix	USD_1	3,761		41	55	
28	Fix	USD_2	374		3	4	
41	Var	UTP_15	0		-	-	
43							
44		<b>Outstanding Stock in Original Currency</b>		<b>2011</b>	<b>2012</b>	<b>2013</b>	
45	Fix	USD_1	3,761		3,720	3,665	
46	Fix	USD_2	374		371	368	
59	Var	UTP_15		-	-	-	
61							
62		<b>Interest Payments in Original Currency - Interest pay</b>	<b>Implied IR</b>	<b>2012</b>	<b>2013</b>		
63	Fix	USD_1		0.76%	28.5	28.2	
77	Var	UTP_15		0.00%	-	-	
79							
80		<b>Total Debt Service in Original Currency</b>		<b>2011</b>	<b>2012</b>	<b>2013</b>	
81	Fix	USD_1			69	83	
82	Fix	USD_2			6	7	
95	Var	UTP_15			-	-	
97							
98		<b>Total PY in Original Currency</b>		<b>2011</b>	<b>2012</b>	<b>2013</b>	
99	Concessional	USD_1	2,288		2,310	2,320	
100	Concessional	USD_2	214		217	219	
112	Mkt	UTP_15		-	-	-	

In this section, the MTDS AT reports cash flows corresponding to the existing debt computed using the original projections (inputted in the sheet *From Database*) and the projections of interest rates (inputted in the sheet *Macro and Market Data*, rows 68-136). The interest payment cash flows reported here take due consideration of the effect of non-zero reference rates on the interest payment due on floating rate debt instruments. In this regard, recall that the original projections (inputted in the sheet *From Database*) assumed zero-reference rates because interest payments were only the ‘spread-based interest bill’ for floating rate debt instruments.<sup>5</sup>

<sup>5</sup> As a reminder of this fact, the template reads “EXISTING DEBT CASH FLOW IN ORIGINAL CURRENCY (Millions) - Interest payments for fixed-rate instruments are taken from sheet *From Database* - Interest payments for floating-rate instruments are computed using spread-based figures in sheet *From Database* and market interest rates in sheet *Macro and Market Data*.”

(iii) Existing Debt Cash Flow in Domestic Currency

	A	B	C	D	E	F	G
115	<b>3. EXISTING DEBT CASH FLOW IN DOMESTIC CURRENCY (Millions) - Exchange rates for convert</b>						
117		<b>Principal Payments in Domestic C</b>	<b>Sum principal repa</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	
118	Fix	USD_1	USD	642,894	6,266	8,867	
119	Fix	USD_2	USD	64,027	460	608	
132	Var	UTP_15	UTP	0	0	0	
133	<b>Total</b>			<b>5,277,262</b>	<b>1,489,108</b>	<b>504,921</b>	
134							
135		<b>Outstanding Stock in Domestic C</b>	<b>implied IR on DX c</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	
136	FX	USD_1	USD	560,994	570,882	593,700	
137	FX	USD_2	USD	55,839	56,987	59,542	
150	DX	UTP_15	UTP	0.00%	0	0	
151	<b>Total</b>			<b>5,180,997</b>	<b>3,711,853</b>	<b>3,244,685</b>	
152							
153		<b>Interest Payments in Domestic C</b>	<b>implied IR on FX d</b>	<b>Implied IR</b>	<b>2012</b>	<b>2013</b>	
154	FX	USD_1	USD	0.78%	4,380	4,571	
155	FX	USD_2	USD	0.77%	430.85	451.12	
168	DX	UTP_15	UTP	0.00%	0	0	
169	<b>Total</b>				<b>398,135</b>	<b>286,805</b>	
170							
171		<b>Total Debt Service in Domestic Currency</b>		<b>2011</b>	<b>2012</b>	<b>2013</b>	
172	Fix	USD_1	USD		10,646	13,438	
173	Fix	USD_2	USD		891	1,059	
186	Var	UTP_15	UTP		0	0	
187	<b>Total</b>				<b>1,887,244</b>	<b>791,725</b>	
188							
189		<b>Total PY in Domestic Currency</b>		<b>2011</b>	<b>2012</b>	<b>2013</b>	
190	Concessional	USD_1	USD	341,322	354,550	375,759	
191	Concessional	USD_2	USD	31,963	33,308	35,504	
204	Mkt	UTP_15	UTP	0	0	0	

In this section, the MTDS AT reports cash flows presented in the section immediately above, converted into millions of domestic currency units using the projections of exchange rate (inputted in the sheet *Macro and Market Data*, rows 46-51). The cash flows reported here take due consideration of the valuation effect of exchange rate dynamics on the cash flows generated by foreign currency-denominated debt instruments.<sup>6</sup>

<sup>6</sup> As a reminder of this fact, the template reads “EXISTING DEBT CASH FLOW IN DOMESTIC CURRENCY (Millions) - Exchange rates for converting figures are taken from sheet Macro and Market Data - Interest payments for fixed-rate instruments are taken from sheet From Database - Interest payments for floating-rate instruments are computed using spread-based figures in sheet From Database and market interest rates in sheet Macro and Market Data.”

#### (iv) Cost and Risk Indicators for Existing Debt

In this section, the MTDS AT calculates the cost-risk indicators for the existing debt stock, at the cut-off date (i.e. the beginning of the projection horizon).

	A	B	C	D	E
207	<b>4. COST AND RISK INDICATORS FOR EXISTING DEBT AS AT END 2011</b>				
209					
210	Risk Indicators		External debt	Domestic debt	Total debt
211	Amount (in millions of USD)		4,647.9	30,084.3	34,732.2
212	Nominal debt as % GDP		2.4	15.4	17.7
213	PV as % of GDP		1.5	15.4	16.9
214	Cost of debt	Weighted Av. IR (%)	1.1	8.7	7.7
215	Refinancing risk	ATM (years)	16.4	5.0	6.5
216		Debt maturing in 1yr (% of total)	4.6	32.4	28.7
217		ATR (years)	16.4	5.0	6.5
218		Debt refixing in 1yr (% of total)	5.6	32.4	28.9
219	Interest rate risk	Fixed rate debt (% of total)	98.1	100.0	99.7
220	FX risk	FX debt (% of total debt)			13.4
221		ST FX debt (% of reserves)			0.7

### Sheet Macro and Market Data

*Macro and Market Data* sheet consists of two sections: (i) Macro Information; and (ii) Market Rates, which includes two sub-sections on (ii.a) exchange rates and (ii.b) interest rates.

In this sheet, the user specifies the macroeconomic scenario and baseline pricing assumptions as well as the shock scenarios (stress tests) with alternative assumptions. Shock scenarios (stress tests) permit testing the robustness of each financing strategy against adverse market conditions (e.g. exchange rate depreciation greater than that envisaged under the baseline scenario, interest rates higher than those envisaged under the baseline scenario).

(i) Macro Information

	A	B	C	D	E	F	G
1	<b>1. MACRO INFORMATION</b>				Time horizon 5		
2			<b>Calendar</b>		<b>2011</b>	<b>2012</b>	<b>2013</b>
3			in UTP millions				
4			Public revenues (inc. grants)		3,089,200	3,348,120	3,644,660
5			Public sector primary expenditures		3,578,000	3,989,640	4,189,520
6			Public sector expenditure		3,993,000	4,484,740	4,749,100
7			Public sector interest expenditure		416,000	495,100	559,580
8			International reserves (USD million)		32,347	33,374	37,797
9			GDP		29,206,000	38,427,060	39,904,260
27							
28			Baseline exchange rate, national cur		149.17	153.47	161.98
29			Primary Deficit			641,520	544,860
30			Interest Payments			398,135	286,805
31			Interest on Existing Debt			398,135	286,805
32			Interest on New Debt			-	-
33			Amortization			1,489,108	504,921
34			Amortization on Existing Debt			1,489,108	504,921
35			Amortization on New Debt			-	-
36			Gross Financing Need			2,528,764	1,336,585
37			Gross Financing Need in USD millions			16,477.75	8,251.39
38			Gross Financing Need to GDP (%)			0.07	0.03
39			Primary Deficit (in % of GDP)		0.00	1.67	1.37
40			Fiscal Deficit (in % of GDP)			3	2

In this section, the user enters the baseline medium-term macro-framework in the yellow cells. The baseline macro-fiscal framework can be taken from the latest Budget projections prepared by the unit in the Ministry of Finance responsible for fiscal forecasting. The MTDS AT accommodates up to a ten-year projection horizon. Blank rows (in yellow) are available for inputting additional budgetary or macroeconomic information.

The MTDS AT calculates the three variables underlying the gross financing needs that the borrowing strategies must meet. These variables are the following: (i) the primary deficit, calculated as the difference between the Public Sector primary expenditure and total revenue (i.e. including grants); (ii) the principal payments on the existing debt and the new debt issued going forward; and (iii) the interest payments on the existing debt and the new debt issued going forward. The gross financing needs are the sum of these three variables.

While the primary deficit is an exogenous variable, the other two are endogenous and depend on the borrowing strategy and the scenario for exchange rates and interest rates. For instance, the domestic currency value of the principal and interest payments corresponding to the existing external debt depends on the exchange rates and interest rates; e.g. the loan contracts typically



stipulate payments in the original currencies, the floating interest rate instruments stipulate reference rates and spread whose values are uncertain. The principal and interest payments corresponding to the new debt issued going forward depend on the borrowing strategy and the market scenario.

## (ii) Market Rates

### (a) Exchange Rates

In the section Exchange Rate Projections (range Q45:BB51), the user enters exchange rate depreciation/appreciation assumptions under the baseline and two shock scenarios (which are in addition to the baseline appreciation/depreciation).<sup>7</sup> A positive number implies nominal depreciation of the domestic currency against the foreign currency, whereas a negative number implies nominal appreciation. The Excel Macros copy the three scenarios into the range F45:O51 (purple cells) when computing combinations of strategies and scenarios. The exchange rates thus obtained, reported in range E57:BM62, are expressed in units of domestic currency.

	2012	2013	2014	2015		2012	2013	2014	2015		2012	2013	2014	2015
Baseline FX depreciation					FX 15% depreciation in year 2					FX 30% depreciation in year 2				
USD	2.9%	5.6%	1.9%	1.9%	15.00%	USD	2.9%	20.6%	1.9%	1.9%	30.00%	USD	2.9%	35.6%
EUR						EUR	0.0%	0.0%	0.0%	0.0%		EUR	0.0%	0.0%
JPY						JPY	0.0%	0.0%	0.0%	0.0%		JPY	0.0%	0.0%
GBP						GBP	0.0%	0.0%	0.0%	0.0%		GBP	0.0%	0.0%
CNY						CNY	0.0%	0.0%	0.0%	0.0%		CNY	0.0%	0.0%
UTP	0.0%	0.0%	0.0%	0.0%		UTP	0.0%	0.0%	0.0%	0.0%		UTP	0.0%	0.0%

<sup>7</sup> The second shock (30% by default) is the only FX shock that is reported as a stand-alone shock. The first shock (by default 15%) is only displayed as a combo shock with interest rate shock 1.

	A	B	C	D	E	F	G
41	<b>2. MARKET RATES</b>						
42	<b>2.1. EXCHANGE RATE PROJECTIONS</b>						
44						2012	2012
45				<b>% CHANGE TO EXCHANGE RATE PROJECTIONS</b>			
46				USD		2.9%	5.6%
47				EUR			
48				JPY			
49				GBP			
50				CNY			
51				UTP		0.0%	0.0%
52	(Positive number implies nominal depreciation, negative number implies nominal appreciation)						
53							
54							
55				<b>EXCHANGE RATE PROJECTIONS</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
56							
57		USD	UTP/USD		149.2	153.5	162.0
58		EUR	UTP/EUR		183.0	183.0	183.0
59		JPY	UTP/JPY		1.7	1.7	1.7
60		GBP	UTP/GBP		224.0	224.0	224.0
61		CNY	UTP/CNY		22.0	22.0	22.0
62		UTP	UTP/UTP		1.0	1.0	1.0

### *(b) Interest Rates*

In the section Interest Rate Projections (range D68:BM136), the user enters interest rate assumptions under the baseline and two shock scenarios. The interest rate is computed as the sum of (i) the reference interest rate (e.g., the cost of borrowing facing the United States government on USD-denominated bonds, for any given maturity), (ii) the risk spread (e.g., the additional cost facing the country, over and above the reference rate, reflecting credit risk premium, for any given maturity), and (iii) a shock that equals zero under the baseline or a positive value under the two shock scenarios (for example, the yield curve could shift upwards or could become steeper). The Excel Macros copy the three scenarios into the range F68:O82 (purple cells) when computing combinations of strategies and scenarios. The interest rates thus obtained, reported in range E122:BM136, are expressed as percentages.

**Note: It is essential to fill out the reference interest rate projection and the risk spread projection for all 11 columns (so for the base year and the 10 following years, regardless of the projection horizon of the strategy). This is needed so that the cash flows are calculated until the longest maturing debt is repayed.**

	D	E	F	G	H	I
65						
66			2012	2013	2014	2015
67	% SHOCK TO INTEREST RATE PROJECTION					
68	USD_1		0.00%	0.00%	0.00%	0.00%
69	USD_2		0.00%	0.00%	0.00%	0.00%
82	UTP_15		0.00%	0.00%	0.00%	0.00%
83						
84						
85	REFERENCE INTEREST RATE PROJECTION	2011	2012	2013	2014	2015
86	USD_1	0.75%	0.75%	0.75%	0.75%	0.75%
87	USD_2	0.75%	0.75%	0.75%	0.75%	0.75%
100	UTP_15	10.90%	10.90%	9.30%	7.50%	6.50%
101						
102						
103	RISK SPREAD	2011	2012	2013	2014	2015
104	USD_1	0.00%	0.00%	0.00%	0.00%	0.00%
105	USD_2	0.00%	0.00%	0.00%	0.00%	0.00%
118	UTP_15	3.00%	3.00%	3.00%	3.00%	3.00%

	D	E	F	G	H	I
121	INSTRUMENT INTEREST RATE PROJECTION	2011	2012	2013	2014	2015
122	USD_1	0.75%	0.75%	0.75%	0.75%	0.75%
123	USD_2	0.75%	0.75%	0.75%	0.75%	0.75%
124	USD_3	2.00%	2.00%	2.00%	2.00%	2.00%
125	USD_4	1.10%	1.10%	1.34%	1.61%	2.38%
126	USD_5	3.00%	3.00%	3.00%	3.00%	3.00%
127	USD_6	3.00%	3.00%	3.00%	3.00%	3.00%
128	USD_7	7.19%	7.19%	6.46%	6.72%	6.97%
129	USD_8	4.36%	4.36%	4.84%	5.39%	5.86%
130	UTP_9	16.43%	16.43%	14.68%	12.93%	14.05%
131	UTP_10	14.67%	14.67%	13.88%	13.57%	13.81%
132	UTP_11	14.36%	14.36%	13.81%	13.55%	13.73%
133	UTP_12	14.12%	14.12%	13.75%	13.62%	13.73%
134	UTP_13	14.01%	14.01%	13.68%	13.51%	13.49%
135	UTP_14	13.19%	13.19%	12.86%	12.69%	12.67%
136	UTP_15	13.90%	13.90%	12.30%	10.50%	9.50%

## Sheet Strategy

In this sheet, the user defines the 4 alternative financing strategies that define how the gross borrowing requirement will be financed.

1. For each strategy, choose which variable (using the dropdown menu in row 35) to target to achieve the desired external-domestic gross financing mix. This can be External (% of total gross financing), Net Domestic Financing (% of GDP), Net Domestic Financing (millions of local currency) and Gross External Financing (millions of USD).
2. Fill out the desired variable for each projection year.
3. Fill out the desired mix of external instruments as a percentage of total external borrowing and domestic instruments as a percentage of total domestic borrowing.

A strategy consists of a ‘shopping list’ indicating how much to issue of each of the 15 stylized debt instruments in each year of the projection period. The strategy is expressed as a percentage, which will determine how the gross financing needs will be financed. The shares for domestic debt instruments will be expressed as a share of total domestic debt to be issued, and for external debt instruments, they will be expressed as a share of total domestic debt to be issued. For Strategy 1, the information is entered in cells S42:AB56, for Strategy 2 in cells AF42:AO56, for Strategy 3 in cells AS42:BB56, and for Strategy 4 in cells BF42:BO56.

The domestic-external mix is automatically calculated using the options for operational target available as drop down menu in cell Q35 (for Strategy 1). The existing options are amount of external debt as proportion of gross borrowing requirement, net domestic financing as percentage of GDP, net domestic financing in millions of local currency, or gross external borrowing in millions of USD. Once a quantity or ratio is entered, for instance, gross external borrowing in millions of USD, its equivalent in local currency is derived in the corresponding cell in the area S63:AB72, and the difference between the gross financing needs and the selected operational target will be the gross domestic financing. Dividing the gross domestic (external) financing by the total gross financing needs will give the share of domestic (external) financing in total gross borrowing, enabling the derivation of the domestic-external mix.

	Q	R	S	T	U	V	W
3	<b>Strategy 1:</b>						
4			2012	2013	2014	2015	2016
34	<b>Operational target to fix overall external-domestic gross financing mix for Strategy</b>						
35	NDF (millions of UTP)		852,270	794,440	751,410	660,720	514,030
36							
37	<b>Strategy</b>		<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
38	External		8.7%	14.1%	11.5%	14.9%	19.2%
39	Domestic		91.3%	85.9%	88.5%	85.1%	80.8%
40			OK	OK	OK	OK	OK
41	<b>Strategy</b>		<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
42	USD_1	External	20.0%	20.0%	20.0%	20.0%	20.0%
43	USD_2	External	5.0%	5.0%	5.0%	5.0%	5.0%
44	USD_3	External	5.0%	5.0%	5.0%	5.0%	5.0%
45	USD_4	External	0.0%	0.0%	0.0%	0.0%	0.0%
46	USD_5	External	0.0%	0.0%	0.0%	0.0%	0.0%
47	USD_6	External	35.0%	35.0%	35.0%	35.0%	35.0%
48	USD_7	External	35.0%	35.0%	35.0%	35.0%	35.0%
49	USD_8	External	0.0%	0.0%	0.0%	0.0%	0.0%
50	UTP_9	Domestic	60.0%	60.0%	60.0%	60.0%	60.0%
51	UTP_10	Domestic	10.0%	10.0%	10.0%	10.0%	10.0%
52	UTP_11	Domestic	10.0%	10.0%	10.0%	10.0%	10.0%
53	UTP_12	Domestic	0.0%	0.0%	0.0%	0.0%	0.0%
54	UTP_13	Domestic	10.0%	10.0%	10.0%	10.0%	10.0%
55	UTP_14	Domestic	0.0%	0.0%	0.0%	0.0%	0.0%
56	UTP_15	Domestic	10.0%	10.0%	10.0%	10.0%	10.0%
57	<b>Total</b>	<b>External</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
58	<b>Total</b>	<b>Domestic</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

62	<b>Financing</b>		<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
63	<b>Gross financing</b>		2,528,764	3,101,292	3,635,336	3,788,811	3,972,244
64	External rollover		33,092	29,751	31,005	27,586	29,287
65	Domestic rollover		1,456,016	1,870,329	2,465,947	2,562,546	2,693,950
66	NDF as % GDP		2.2%	2.0%	1.6%	1.2%	0.8%
67	NDF in local currency (U		852,270	794,440	751,410	660,720	514,030
68	GDF in local currency (U		2,308,286	2,664,769	3,217,357	3,223,266	3,207,980
69	GEF in local currency (U		220,477	436,523	417,979	565,545	764,264
70	GEF in USD		1,437	2,695	2,532	3,361	4,457
71	NEF in local currency (U		187,385	406,772	386,974	537,959	734,977
72	Net Financing in local cu		1,039,655	1,201,212	1,138,384	1,198,679	1,249,007

Since the percentage entered in cells S42:AB56 was as a proportion of total external or domestic borrowing, this is converted to percentage of total by multiplying the external instrument proportions with the share of total external in total borrowing (S38), or the domestic instrument proportions with the share of total domestic in total borrowing (S39). This is automatically calculated and is reported in range S18:AB32 (for Strategy 1). The 15 shares in a certain year must add up to 100%, meaning that debt issuances fully cover the gross financing needs.<sup>8</sup> The Excel Macros copy the 4 strategies into the range F18:O32 (purple cells) when computing combinations of strategies and scenarios.


	Q	R	S	T	U	V	W
3	<b>Strategy 1:</b>						
4			<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
17	<b>Financing strategy</b>						
18	USD_1	External	1.7%	2.8%	2.3%	3.0%	3.8%
19	USD_2	External	0.4%	0.7%	0.6%	0.7%	1.0%
20	USD_3	External	0.4%	0.7%	0.6%	0.7%	1.0%
21	USD_4	External	0.0%	0.0%	0.0%	0.0%	0.0%
22	USD_5	External	0.0%	0.0%	0.0%	0.0%	0.0%
23	USD_6	External	3.1%	4.9%	4.0%	5.2%	6.7%
24	USD_7	External	3.1%	4.9%	4.0%	5.2%	6.7%
25	USD_8	External	0.0%	0.0%	0.0%	0.0%	0.0%
26	UTP_9	Domestic	54.8%	51.6%	53.1%	51.0%	48.5%
27	UTP_10	Domestic	9.1%	8.6%	8.9%	8.5%	8.1%
28	UTP_11	Domestic	9.1%	8.6%	8.9%	8.5%	8.1%
29	UTP_12	Domestic	0.0%	0.0%	0.0%	0.0%	0.0%
30	UTP_13	Domestic	9.1%	8.6%	8.9%	8.5%	8.1%
31	UTP_14	Domestic	0.0%	0.0%	0.0%	0.0%	0.0%
32	UTP_15	Domestic	9.1%	8.6%	8.9%	8.5%	8.1%

A borrowing strategy is just a ‘shopping list’ expressed in percentages, but nevertheless its analytical derivation becomes somewhat difficult if the country faces quantitative restrictions on the amounts that can be borrow in certain instruments. Appendix II illustrates some key cases.

<sup>8</sup> It is possible to enter the absolute amounts to be issued only in the first year of the projection period, because the gross financing needs that such amounts must cover are known in advance -as they depend on the primary deficit and the debt service corresponding to the existing debt portfolio at the cut-off date. It is not possible, instead, to enter the absolute amounts to be issued in the second year (or any subsequent year) of the projection period, because the gross financing needs that such amounts must cover are not known in advance -as they depend on the primary deficit and the debt service corresponding to both the existing debt portfolio at the cut-off date and the new issuance in the first year. Therefore, if one wants to characterize the borrowing strategy over the whole projection horizon in one shot, the recursive nature of the problem forces one to characterize the borrowing strategy in terms of shares of the (still not computed) gross financing needs, which will always be numbers between 0 and 1 that add up to 1. If one solves the problem iteratively (finding the absolute amounts for the first year, computing the gross financing need for the second year, finding the absolute amounts for the second year, and so on), then one can characterize the borrowing strategy in terms of absolute amounts, step by step (i.e. year by year).

Once the strategies have been defined and proportions entered, it is necessary to “Initialize” the model. To do this, click on the button in cell A33/A34 “Run all strategies”. This will run the model with the newly defined strategies under the baseline and alternative scenarios. This will enable the user to assess whether the proportions entered for the alternative strategies make numeric sense. This process is necessary as in the initial instance, the gross borrowing requirement for the future years are unknown until a strategy is defined and new borrowing is made. In the first instance, only the gross borrowing requirement for the first projection year is known, as the debt service obligations arise only from the existing debt. If the user only wishes to update the information in Strategy 1 only, the user can just click on the button in cell A35 “Run strategy 1 only”.

	A	B	C	D
3	<b>1. STRATEGIES</b>			
4				
33	Run all strategies			
34				
35	Run strategy 1 only			
36				
37	Run strategy 2 only			
38				
39	Run strategy 3 only			
40				
41	Run strategy 4 only			

*Note:* In order for the buttons to function, the user must ensure that the “Excel Macros” are enabled. To enable Macros, go to , and click on Excel Options -> Trust Center -> Trust Center Settings -> Macro Settings -> select “Enable all Macros” and “Trust Access to the VBA Project object model”. Click on OK twice. Then save the model, and close the Excel all together. Reopen the Excel and the model, and the buttons should work.

## Sheet New\_Debt (Original currency)

No data entry required in this sheet.

Here the MTDS AT automatically simulates cash flows generated by the new debt issued to cover the gross financing needs over the projection period, disaggregated into the 15 stylized debt instruments, given a certain borrowing strategy and a certain scenario for exchange rates and interest rates, in original currency.

For instance, for the debt instrument #1 –the IDA loan-like debt- issued in the first year of the projection period, the MTDS AT calculates and reports the initial cash inflow (at issuance date) and all the subsequent cash outflows (at principal and interest payment dates) associated with that instrument, in its original currency. The MTDS AT also reports the DOD and present value of debt, which are stock measures. Hence, the entire ‘history’ of this instrument can be tracked.

Notice that the aforementioned cash flows depend on: (i) the financing terms of instrument #1; (ii) the amount of instrument #1 in original currency issued in the first year of the projection period, as dictated by the borrowing strategy; and (iii) the scenario for exchange rates and interest rates.

The user can note that for all stylized debt instruments and years, the structure of rows is the same, covering new disbursement, principal repayment, total debt outstanding, interest payments, debt service, and present value of debt. The user can look at the Excel formulas to figure out how cash projections are carried out using the information (i)-(ii)-(iii).



## CASH FLOW FOR NEW DEBT

Instrument	USD_1	New disbursement		2011	2012	2013	2014
	USD_1_2011			-	-	-	-
	USD_1_2012			-	-	-	-
	USD_1_2013						
	USD_1_2014						
	USD_1_2015						
	USD_1_2016						
	USD_1_2017						
	USD_1_2018						
	USD_1_2019						
	USD_1_2020			-	-	-	-
<b>Total</b>	<b>USD_1</b>	<b>External New disbursement</b>		-	-	-	-
		<b>Principal repayment</b>	<b>Sum principal repayment</b>				
	USD_1_2011		-	-	-	-	-
	USD_1_2012		-	-	-	-	-
	USD_1_2013						
	USD_1_2014						
	USD_1_2015						
	USD_1_2016						
	USD_1_2017						
	USD_1_2018						
	USD_1_2019						
	USD_1_2020		-	-	-	-	-
<b>Total</b>	<b>USD_1</b>	<b>External Principal repayment</b>	-	-	-	-	-
		<b>Outstanding</b>					
	USD_1_2011			-	-	-	-
	USD_1_2012			-	-	-	-
	USD_1_2013						
	USD_1_2014						
	USD_1_2015						
	USD_1_2016						
	USD_1_2017						
	USD_1_2018						
	USD_1_2019						
	USD_1_2020			-	-	-	-
<b>Total</b>	<b>USD_1</b>	<b>External Outstanding</b>		-	-	-	-
		<b>Interest payment</b>	<b>Implied interest rate</b>				
	USD_1_2011	Fix	#DIV/0!		-	-	-
	USD_1_2012	Fix	#DIV/0!		-	-	-
	USD_1_2013						
	USD_1_2014						
	USD_1_2015						
	USD_1_2016						
	USD_1_2017						
	USD_1_2018						
	USD_1_2019						
	USD_1_2020	Fix	#DIV/0!		-	-	-
<b>Total</b>	<b>USD_1</b>	<b>External Interest payment</b>			-	-	-
		<b>Debt service</b>					
	USD_1_2011			-	-	-	-
	USD_1_2012			-	-	-	-
	USD_1_2013						
	USD_1_2014						
	USD_1_2015						
	USD_1_2016						
	USD_1_2017						
	USD_1_2018						
	USD_1_2019						
	USD_1_2020			-	-	-	-
<b>Total</b>	<b>USD_1</b>	<b>External Debt service</b>		-	-	-	-
		<b>NPV</b>	<b>Grant element</b>				
Concessional	USD_1_2011		#DIV/0!	-	-	-	-
Concessional	USD_1_2012		#DIV/0!	-	-	-	-
	USD_1_2013						
	USD_1_2014						
	USD_1_2015						
	USD_1_2016						
	USD_1_2017						
	USD_1_2018						
	USD_1_2019						
	USD_1_2020		#DIV/0!	-	-	-	-
<b>Total</b>	<b>USD_1</b>	<b>External NPV</b>		-	-	-	-

## Sheet New\_Debt (Domestic currency)

No data entry required in this sheet.

Here the MTDS AT converts the cash flows generated in the *New\_Debt (Original currency)* sheet into domestic currency. The user can note that for all stylized debt instruments and years, the structure of rows is the same as in the sheet *New\_Debt (Original currency)*, covering new disbursement, principal repayment, total debt outstanding, interest payments, debt service, and present value of debt.

At the top of the sheet the MTDS AT also reports a summary of cash flows aggregating all debt instruments, taking advantage of the fact that all cash flows are in local currency and therefore can be summed.

	A	B	C	E	F	G	H
1	<b>SUMMARY CASH FLOW FOR NEW DEBT</b>						
2	<b>in UTP millions</b>						
3				0	1	2	3
4	<b>Calendar</b>			2011	2012	2013	2014
5			Gross financing needs		2,528,764	3,089,511	3,608,822
6							
7	<b>Total new debt</b>		Total new disbursement		2,528,764	3,089,511	3,608,822
8			of which external		220,477	434,864	414,930
9			of which domestic		2,308,286	2,654,646	3,193,891
10			Total principal repayment		-	1,384,972	1,592,788
11			of which external		-	-	-
12			of which domestic		-	1,384,972	1,592,788
13			Total outstanding		2,528,764	4,245,540	6,274,350
14			of which external		220,477	667,579	1,095,286
15			of which domestic		2,308,286	3,577,961	5,179,064
16			Total interest payment		-	367,953	529,074
17			of which external		-	8,969	25,087
18			of which domestic		-	358,985	503,987
19			Total debt service		-	1,752,925	2,121,862
20			Total NPV		2,492,665	4,137,652	6,100,653
21			<b>CONTROL</b>		<b>OK</b>	<b>OK</b>	<b>OK</b>

## CASH FLOW FOR NEW DEBT

Instrument	USD_1	New disbursement		2011	2012	2013	2014
	USD_1_2011			-	-	-	-
	USD_1_2012			-	-	-	-
	USD_1_2013						
	USD_1_2014						
	USD_1_2015						
	USD_1_2016						
	USD_1_2017						
	USD_1_2018						
	USD_1_2019						
	USD_1_2020			-	-	-	-
Total	USD_1	External New disbursement		-	-	-	-
		Principal repayment	Sum principal repayment				
	USD_1_2011		-	-	-	-	-
	USD_1_2012		-	-	-	-	-
	USD_1_2013						
	USD_1_2014						
	USD_1_2015						
	USD_1_2016						
	USD_1_2017						
	USD_1_2018						
	USD_1_2019						
	USD_1_2020		-	-	-	-	-
Total	USD_1	External Principal repayment	-	-	-	-	-
		Outstanding					
	USD_1_2011			-	-	-	-
	USD_1_2012			-	-	-	-
	USD_1_2013						
	USD_1_2014						
	USD_1_2015						
	USD_1_2016						
	USD_1_2017						
	USD_1_2018						
	USD_1_2019						
	USD_1_2020			-	-	-	-
Total	USD_1	External Outstanding		-	-	-	-
		Interest payment	Implied interest rate				
	USD_1_2011	Fix	#DIV/0!	-	-	-	-
	USD_1_2012	Fix	#DIV/0!	-	-	-	-
	USD_1_2013						
	USD_1_2014						
	USD_1_2015						
	USD_1_2016						
	USD_1_2017						
	USD_1_2018						
	USD_1_2019						
	USD_1_2020	Fix	#DIV/0!	-	-	-	-
Total	USD_1	External Interest payment		-	-	-	-
		Debt service					
	USD_1_2011			-	-	-	-
	USD_1_2012			-	-	-	-
	USD_1_2013						
	USD_1_2014						
	USD_1_2015						
	USD_1_2016						
	USD_1_2017						
	USD_1_2018						
	USD_1_2019						
	USD_1_2020			-	-	-	-
Total	USD_1	External Debt service		-	-	-	-
		NPV	Grant element				
Concessional	USD_1_2011		#DIV/0!	-	-	-	-
Concessional	USD_1_2012		#DIV/0!	-	-	-	-
	USD_1_2013						
	USD_1_2014						
	USD_1_2015						
	USD_1_2016						
	USD_1_2017						
	USD_1_2018						
	USD_1_2019						
	USD_1_2020		#DIV/0!	-	-	-	-
Total	USD_1	External NPV		-	-	-	-

### Sheet Total\_Debt

No data entry required in this sheet. Here the MTDS AT simply consolidates the cash flows generated by the existing debt (calculated in the *Existing\_Debt* sheet) and by the new debt issued to cover the gross financing needs over the projection period (calculated in sheet *New\_Debt (Domestic currency)*), disaggregated into the 15 stylized debt instruments, given a certain borrowing strategy and a certain scenario for exchange rates and interest rates, in domestic currency. The user can note that for all stylized debt instruments and years, the structure of rows is the same, covering new disbursement, principal repayment, total debt outstanding, interest payments, debt service, and present value of debt.

	A	B	C	D	E	F	G
2	<b>CASH FLOW FOR TOTAL DEBT</b>						
3	<b>in UTP millions</b>		<b>Calendar</b>				
4	<b>New disbursements</b>					<b>1</b>	<b>2</b>
5					<b>2011</b>	<b>2012</b>	<b>2013</b>
6	USD_1	External	Fix			44,095	86,973
7	USD_2	External	Fix			11,024	21,743
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20	UTP_15	Domestic	Var			230,829	265,465
21	<b>Total</b>					<b>2,528,764</b>	<b>3,089,511</b>
22	Gross borrowing requirement					2,528,764	3,089,511
23							
24	UTP/USD				149.17	153.47	161.98
25	<b>Principal Payments in Local Currency</b>						
26					<b>Sum principal pmt</b>	<b>2012</b>	<b>2013</b>
27	USD_1	External	Fix		1,115,717	6,266	8,867
28	USD_2	External	Fix		170,153	460	608
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41	UTP_15	Domestic	Var		1,405,736	0	0
42	<b>Total</b>				<b>21,686,660</b>	<b>1,489,108</b>	<b>1,889,892</b>
43							
44							
45	<b>Debt Outstanding in Local Currency</b>						
46					<b>2011</b>	<b>2012</b>	<b>2013</b>
47							
48	USD_1	External	Fix		560,994	614,977	727,216
49							
50							
51							
52							
53							
54							
55							
56							
57							
58							
59							
60							
61							
62	UTP_15	Domestic	Var		-	230,829	496,293
63	<b>Total</b>				<b>5,180,997</b>	<b>6,240,617</b>	<b>7,490,224</b>
64							
65							
66	<b>Interest Payments in Local Currency</b>						
67					<b>2011</b>	<b>2012</b>	<b>2013</b>
68							
69	USD_1	External	Fix			4,380	4,920
70							
71							
72							
73							
74							
75							
76							
77							
78							
79							
80							
81							
82							
83	UTP_15	Domestic	Var			-	32,085
84	<b>Total</b>					<b>398,135</b>	<b>654,758</b>
85							
86							
87	<b>Total Debt Service in Local Currency</b>						
88					<b>2011</b>	<b>2012</b>	<b>2013</b>
89							
90	USD_1	External	Fix			10,646	13,788
91							
92							
93							
94							
95							
96							
97							
98							
99							
100							
101							
102							
103							
104	UTP_15	Domestic	Var			-	32,085
105	<b>Total</b>					<b>1,887,244</b>	<b>2,544,651</b>
106							
107							
108							
109	<b>PV</b>	<b>Grant element</b>					
110					<b>2011</b>	<b>2012</b>	<b>2013</b>
111	USD_1	External	39.2		341,322	375,633	440,137
112							
113							
114							
115							
116							
117							
118							
119							
120							
121							
122							
123							
124							
125	UTP_15	Domestic	#DIV/0!		-	230,829	496,293

## Sheet Strategy 1-4

These sheets save results on cash flows on total debt, disaggregated by the 15 stylized financing instruments, for a given borrowing strategy and the 5 scenarios for exchange rates and interest rates, in local currency. The structure of these sheets is identical, with sets of 150 rows used to report result for the 5 scenarios.

## Sheet XY\_OUTPUT

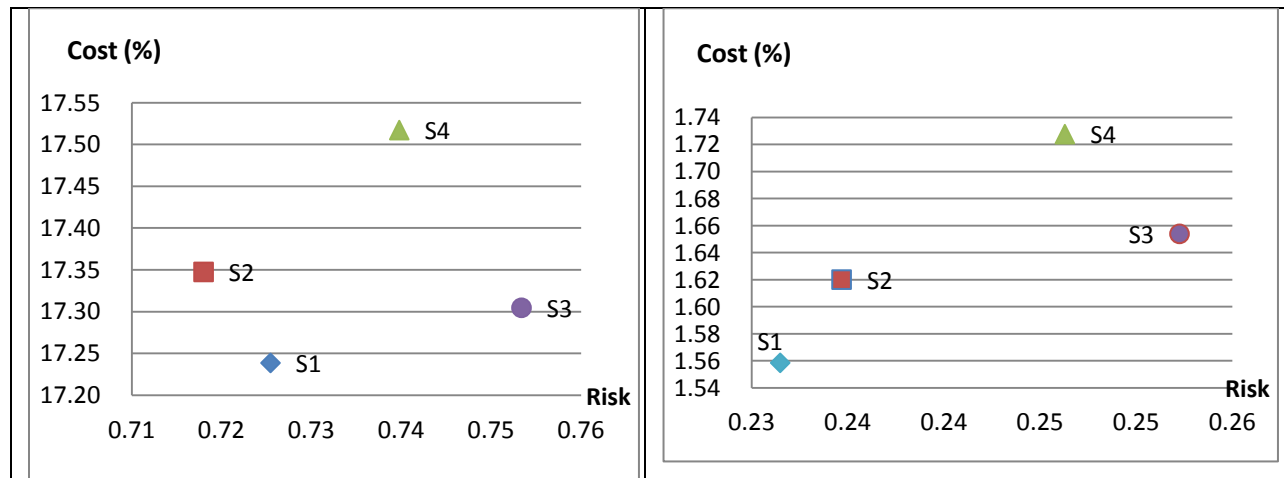
The MTDS AT calculates cost-risk indicators for the debt strategies with projection horizons of 3-4-5-8 years. For example, if the chosen time horizon of analysis is 5, then the 5 year output sheet should be used. The structure of output sheets is identical and consists of four sections: (i) Composition of Existing Debt & Alternative Strategies; (ii) Pricing Assumptions; (iii) Cost Risk Indicators & Graphs; and (iv) Redemption Profile. Several indicators are measured at the end of the projection period. Cash flows are used to calculate indicators of interest rate risk, refinancing risk, and exchange rate risk (some tables are reproduced below).

	A	B	C	D	E	F
6	% of gross borrowing - Over Projection Period					
7	New debt		S1	S2	S3	S4
8	IDA	FX	3%	2%	2%	2%
9	AfDF	FX	1%	0%	0%	1%
10	IBRD/ADB/IDB_Fixed	FX	1%	0%	0%	1%
11	IBRD/ADB/IDB_Floating	FX	0%	0%	0%	0%
12	Bilateral_Fixed	FX	0%	0%	0%	0%
13	China	FX	5%	2%	2%	3%
14	Commercial Bank_Fixed	FX	5%	0%	1%	3%
15	Capital markets	FX	0%	2%	1%	0%
16	T bills	DX	51%	56%	42%	55%
17	3Yr	DX	9%	17%	17%	17%
18	5Yr	DX	9%	12%	12%	12%
19	7Yr	DX	0%	0%	0%	0%
20	10Yr	DX	9%	8%	8%	8%
21	20Yr	DX	0%	0%	0%	0%
22	20Yr ILB	DX	9%	0%	15%	0%
23	External		14%	7%	6%	9%
24	Domestic		86%	93%	94%	91%
25			100%	100%	100%	100%

	A	B	C	D	E	F
63	Implied net borrowing					
64	(Average over		S1	S2	S3	S4
65	Net external		434,058	224,136	148,524	276,865
66	Net domestic		714,574	968,047	1,014,467	911,371
67	External net borrowing	2012	2013	2014	2015	2016
68	S1	187,385	405,178	378,288	511,269	688,169
69	S2	194,260	202,798	177,310	252,184	294,126
70	S3	219,784	124,145	136,696	128,933	133,059
71	S4	197,106	213,224	249,636	325,594	398,764
72	Domestic net borrowin	2012	2013	2014	2015	2016
73	S1	852,270	794,440	751,410	660,720	514,030
74	S2	845,395	997,607	981,001	986,192	1,030,040
75	S3	819,871	1,060,357	1,001,135	1,074,149	1,116,821
76	S4	842,549	986,846	908,558	906,733	912,167
77		OK	OK	OK	OK	OK

	A	B	C	D	E	F	G	H	I
102	COST-RISK INDICATORS & GRAPHS								
103									
104									
105	Risk Indicators				2010	As at end FY2016			
106					Current	S1	S2	S3	S4
107	Nominal debt as % of GDP				17.7	17.2	17.5	17.3	17.5
108	PV as % of GDP				16.9	16.3	16.8	16.7	16.8
109	Implied interest rate (%)				7.7	10.2	11.3	10.8	11.2
110	Refinancing risk	ATM External Portfolio (years)			16.4	12.9	13.4	13.5	13.6
111		ATM Domestic Portfolio (years)			5.0	6.9	3.9	7.8	4.0
112		ATM Total Portfolio (years)			6.5	8.6	5.6	8.6	5.9
113	Interest rate risk	ATR (years)			6.5	6.4	5.6	5.0	5.9
114		Debt refixing in 1yr (% of total)			28.9	33.8	30.9	40.3	29.8
115		Fixed rate debt (% of total)			99.7	87.4	100.0	79.4	100.0
116	FX risk	FX debt as % of total			13.4	27.4	17.4	14.2	19.8
117		ST FX debt as % of reserves			0.7	0.6	0.4	0.4	0.4

	A	B	C	D	E	F
121	<b>Debt Stock to GDP ratio as at end 2016</b>					
122						
123	Scenarios		S1	S2	S3	S4
124	Baseline		17.2	17.5	17.3	17.5
125	Exchange Rate Shock (30%)		17.7	18.0	17.8	18.0
126	Interest Shock 1		17.7	18.0	17.8	18.0
127	Interest Shock 2		17.6	17.9	17.7	17.8
128	Combined Shock (15% depreciation		18.0	18.3	18.1	18.3
129	Max Risk		0.7	0.7	0.8	0.7
130						
131	<b>Interest Payments to GDP Ratio as at end 2016</b>					
132						
133	Scenarios		S1	S2	S3	S4
134	Baseline		1.6	1.7	1.7	1.7
135	Exchange Rate Shock (30%)		1.6	1.8	1.7	1.7
136	Interest Shock 1		1.8	2.0	1.9	2.0
137	Interest Shock 2		1.8	1.9	1.9	1.9
138	Combined Shock (15% depreciation		1.8	2.0	1.9	2.0
139	Max Risk		0.2	0.3	0.3	0.2





## Appendix I – Deriving borrowing strategies under quantitative restrictions

Countries often face policy restrictions on the amounts in nominal terms of certain debt instruments that can be issued over the MTDS projection horizon. For instance, in the context of IMF programs, a country may agree to limit the net domestic financing sought in a certain year or have a good understanding of their target external borrowing quantities in US dollar terms. The country may also know the absorptive capacity of the domestic market and wish to maximize borrowing from that source by specifying net domestic financing in domestic currency terms.

A borrowing strategy is a list of shares of gross financing needs to be financed with the 15 stylized debt instruments, for all the years over the projection horizon. Defining such a list, nevertheless, turns out to be more involving when it must also meet quantitative restrictions on the nominal amounts. But given that gross borrowing requirement is known for the first year, and having a policy constraint in domestic (or external) net or gross amounts, it is simple to calculate the residual difference between the gross borrowing requirement and the particular policy constraint as the net or gross and the A simple case presented below can help develop intuition on how to proceed.

Let us assume a country faces the restriction to keep the net domestic financing at a target of 1% of nominal GDP. Let us implement this restriction in the borrowing strategy for 2012, the first year of the projection period. The 2012 gross financing needs are pre-determined and amount to 2,528,764 local currency units (UTP).<sup>9</sup>

In the Input Strategy sheet (yellow tab) we enter the restriction by selection the “NDF (% of GDP)” option in the drop down menu in cell Q35 and type 1 in cell S35 (NDF stands for net domestic financing). Given the nominal GDP, the country will issue 384,271 UTP in new domestic debt instruments in order to increase the domestic debt stock by 1% of GDP. Furthermore, given the maturing principal of domestic debt (in cell S65), the country will need to borrow an additional 1,456,016,387 UTP in new domestic debt instruments in order to roll over that maturing principal.

---

<sup>9</sup> See footnote 6 for a discussion on how gross financing needs are calculated.

	Q	R	S	T	U	V	W
3	<b>Strategy 1:</b>						
4			<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
63	<b>Gross financing</b>		2,528,764	2,754,966	3,113,251	2,980,167	3,059,012
64	External rollover		33,092	29,751	31,005	27,586	57,601
65	Domestic rollover		1,456,016	1,579,342	2,042,355	1,889,579	1,922,440
66	NDF as % GDP		1.0%	1.0%	1.0%	1.0%	1.0%
67	NDF in local currency (U		384,271	399,043	467,143	547,884	643,775
68	GDF in local currency (U		1,840,287	1,978,385	2,509,498	2,437,464	2,566,215
69	GEF in local currency (U		688,477	776,581	603,753	542,704	492,796
70	GEF in USD		4,486	4,794	3,657	3,226	2,874
71	NEF in local currency (U		655,385	746,830	572,748	515,118	435,195
72	Net Financing in local cu		1,039,655	1,145,873	1,039,891	1,063,002	1,078,970

At this stage we note that the country will issue 1,840,287 (1,456,016+ 384,271) UTP in domestic debt (GDF stands for gross domestic financing). Having derived the gross domestic debt that will need to be contracted to meet the 1% NDF target, gross external borrowing can be calculated as the difference between gross borrowing requirement and the gross domestic borrowing 688,477 (2,528,764-1,840,287) UTP in external debt (GEF stands for gross external financing) so as to cover the gross financing needs.

So far, we have found that the GDF are 72.8% of gross financing needs while GEF are 27.2% (for 2012). Similar shares could be calculated for the remaining years in the projection period. These should then be ‘allocated’ among the individual financing instruments of each of the two types of debt.

	Q	R	S	T	U	V	W
3	<b>Strategy 1:</b>						
4			<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
35	NDF (% of GDP)	▼	1	1	1	1	1
36							
37	<b>Strategy</b>		<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
38	External		27.2%	28.2%	19.4%	18.2%	16.1%
39	Domestic		72.8%	71.8%	80.6%	81.8%	83.9%

Shares are allocated adding up to 100% within domestic debt instruments, as well as within external debt instruments.

	Q	R	S	T	U	V	W
3	<b>Strategy 1:</b>						
4			<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
42	USD_1	External	20.0%	20.0%	20.0%	20.0%	20.0%
43	USD_2	External	5.0%	5.0%	5.0%	5.0%	5.0%
44	USD_3	External	5.0%	5.0%	5.0%	5.0%	5.0%
45	USD_4	External	0.0%	0.0%	0.0%	0.0%	0.0%
46	USD_5	External	0.0%	0.0%	0.0%	0.0%	0.0%
47	USD_6	External	35.0%	35.0%	35.0%	35.0%	35.0%
48	USD_7	External	35.0%	35.0%	35.0%	35.0%	35.0%
49	USD_8	External	0.0%	0.0%	0.0%	0.0%	0.0%
50	UTP_9	Domestic	60.0%	60.0%	60.0%	60.0%	60.0%
51	UTP_10	Domestic	10.0%	10.0%	10.0%	10.0%	10.0%
52	UTP_11	Domestic	10.0%	10.0%	10.0%	10.0%	10.0%
53	UTP_12	Domestic	0.0%	0.0%	0.0%	0.0%	0.0%
54	UTP_13	Domestic	10.0%	10.0%	10.0%	10.0%	10.0%
55	UTP_14	Domestic	0.0%	0.0%	0.0%	0.0%	0.0%
56	UTP_15	Domestic	10.0%	10.0%	10.0%	10.0%	10.0%
57	<b>Total</b>	<b>External</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
58	<b>Total</b>	<b>Domestic</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

Finally, we combine the last two calculations to find the borrowing strategy. For instance, as instrument USD\_1 is 20% of the external debt issuance, and the external debt issuance is 27.2% of the total issuance, then the USD\_1 share in the borrowing strategy is 5.4% ( $=20\% * 27.2\%$ ). Similarly, as instrument UTP\_15 is 10% of the domestic debt issuance, and the domestic debt issuance is 72.8% of the total issuance, then the UTP\_15 share in the borrowing strategy is 7.3% ( $=10\% * 72.8\%$ ).

	Q	R	S	T	U	V	W
3	<b>Strategy 1:</b>						
4			<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
17	<b>Financing strategy</b>						
18	USD_1	External	5.4%	5.6%	3.9%	3.6%	3.2%
19	USD_2	External	1.4%	1.4%	1.0%	0.9%	0.8%
20	USD_3	External	1.4%	1.4%	1.0%	0.9%	0.8%
21	USD_4	External	0.0%	0.0%	0.0%	0.0%	0.0%
22	USD_5	External	0.0%	0.0%	0.0%	0.0%	0.0%
23	USD_6	External	9.5%	9.9%	6.8%	6.4%	5.6%
24	USD_7	External	9.5%	9.9%	6.8%	6.4%	5.6%
25	USD_8	External	0.0%	0.0%	0.0%	0.0%	0.0%
26	UTP_9	Domestic	43.7%	43.1%	48.4%	49.1%	50.3%
27	UTP_10	Domestic	7.3%	7.2%	8.1%	8.2%	8.4%
28	UTP_11	Domestic	7.3%	7.2%	8.1%	8.2%	8.4%
29	UTP_12	Domestic	0.0%	0.0%	0.0%	0.0%	0.0%
30	UTP_13	Domestic	7.3%	7.2%	8.1%	8.2%	8.4%
31	UTP_14	Domestic	0.0%	0.0%	0.0%	0.0%	0.0%
32	UTP_15	Domestic	7.3%	7.2%	8.1%	8.2%	8.4%
33			OK	OK	OK	OK	OK

It is then straightforward to combine the borrowing strategy and the gross financing needs of 2,528,764million units of local currency to compute the absolute amount issued in each instrument, in local currency.

	C	D	E	F	G	H	I	J
3								
4				<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
73	2,528,764 2,754,966 3,113,251 2,979,382 3,058,762							
74								
75								
76				<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
77	Externa			137,695	155,316	120,751	108,512	98,551
78	Externa			34,424	38,829	30,188	27,128	24,638
79	Externa			34,424	38,829	30,188	27,128	24,638
80	Externa			0	0	0	0	0
81	Externa			0	0	0	0	0
82	Externa			240,967	271,803	211,314	189,896	172,465
83	Externa			240,967	271,803	211,314	189,896	172,465
84	Externa			0	0	0	0	0
85	Domest			1,104,172	1,187,031	1,505,699	1,462,093	1,539,603
86	Domest			184,029	197,838	250,950	243,682	256,601
87	Domest			184,029	197,838	250,950	243,682	256,601
88	Domest			0	0	0	0	0
89	Domest			184,029	197,838	250,950	243,682	256,601
90	Domest			0	0	0	0	0
91	Domest			184,029	197,838	250,950	243,682	256,601