CASH FLOW VALUATION IN AN INFLATIONARY WORLD. THE CASE OF WORLD BANK FOR REGULATED FIRMS

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1. INTRODUCTION

This paper shows that the Net Present Value (NPV) criterion for project evaluation should be based on estimates of free cash flows at nominal prices. In particular, we present a case where the results from the constant price method are biased upwards and there is a risk to accept bad projects. If the expected inflation rates over the life of the project are high, which is typically the case in emerging and transitional markets, the use of the constant prices methodology could lead to serious mistakes in project selection.

Unquestionably, before the advent of the personal computer, modeling the impacts of inflation in investment appraisal was an enormous task. Currently, with the widespread availability of personal computers, conducting investment appraisal by constructing financial statements with nominal prices is a straightforward and simple task. In this paper, we would like to persuade the reader that conducting investment appraisal based on financial statements with real or constant prices is potentially misleading and under certain circumstances, the adverse effects of inflation could result in the selection of "bad" projects. Estimated financial statements are managerial tools that help the manager to control and follow up any activity. Financial statements at constant prices will be useless when the project is implemented because what occurs in reality is very different from what is written in the final report of a project evaluation. Some of the items are deflated while others (say depreciation charges and interest payments) are in nominal prices. Hence, for managerial purposes, it is of no use to have this mixed information in the financial statements. In addition, we intend to convince the reader that investment appraisal with nominal prices is feasible and is a relatively simple task with a spreadsheet program on a personal computer. The difficulty in modeling and using nominal prices for constructing financial statements has been greatly exaggerated.

The NPV for project evaluation should be based on estimates of free cash flows at nominal prices. It is a widespread practice to evaluate projects at constant or real prices but it is an

[1] This work is based on Vélez-Pareja 1999 and Vélez-Pareja and Tham 2002 and Vélez-Pareja, 2004b.

unnecessary oversimplification. With an example presented in the training material on economic regulation of public utilities developed by the World Bank Institute we asses the proposed methodology.

Vélez-Pareja 1999 and Vélez-Pareja and Tham, 2002, warn about the overvaluation of a project when appraised at constant prices.

In this paper we show how in the case of the example from WB, they present several conceptual mistakes such as valuation at constant prices and using constant leverage when in the forecasted financial statements it is not constant. This analysis shows an overvaluation of more than 21% when the constant prices methodology is compared with the current prices methodology and using market values[2] to calculate the WACC.

We analyzed the Excel file titled model.xls for electric infrastructure that is in a CD from International Bank for Reconstruction and Development – The World Bank 2002.

The paper is organized as follows. Section One describes the different approaches to valuation in the presence of inflation: nominal prices, real prices and constant prices methodologies. In Section Two we review the literature in the finance textbooks also we discuss the common arguments for using the constant and real prices methodologies. In Section Three we present some conditions that have to be satisfied in order that the results by the three methods are the same. In Section Four we study the tax savings concept and its implications in the cost of capital calculation. In Section Five we present and critically analyze in detail the example used by the World Bank for training purposes. In this section we make some reflections regarding inflation and its effects on value. In Section Six we reconstruct the WB example to properly calculate the value using nominal prices (assuming neutral inflation) and market values to calculate the WACC and compare it with the value calculated in the example at constant prices In Section Seven we summarize and conclude.

SECTION ONE

2. APPROACHES TO VALUATION IN AN INFLATIONARY ENVIRONMENT

There are three main approaches to project evaluation under inflation. In the first method, the *nominal prices approach*, we estimate the actual prices for inputs and outputs over the

[2] By market value we understand the present value of the future cash flows at the proper discount rate. This might generate circularity because the market values depend on the discount rate (cost of capital) and at the same time it depends on market values.

life of the project, construct the financial statements in nominal terms, and discount the nominal free cash flows with the nominal discount rate. In the second method, the *real prices approach*, we estimate the changes in relative prices for the inputs and outputs over the life of the project, construct the financial statements in real terms, taking into account the changes in relative prices, and discount the real free cash flows with the real discount rate. The third method, *the constant prices approach*, is a special case of the real prices approach. It assumes that changes in relative prices are zero, and discounts the real free cash flows with the real discount rate.

In the presence of inflation, the project analyst is faced with two formidable tasks. First, the analyst must estimate the changes in relative prices for the inputs and outputs over the life of the project. Second, the analyst must estimate the expected inflation rates over the life of the project. It is generally believed that estimating the expected inflation rates is more difficult than estimating changes in relative prices. Without easy availability of computing power, it is understandable that analysts made simplifying assumptions to tackle the equally difficult tasks.

The constant price approach "solves" both of the difficult tasks by making one key assumption. Actually, it avoids the difficult tasks of estimating changes in relative prices and the expected inflation rates by assuming that there are no changes in relative prices. Furthermore, if there are changes in nominal prices, the changes in nominal prices are equal to the expected inflation rates. In other words, there is neutral inflation. With this assumption, there are no changes in the real prices, and consequently, the financial statements are constructed in real terms, and the free cash flows are discounted with the real discount rate. On the other hand, interest rates have to be considered without the inflationary component and hence, the discount rate will be the real rate of interest. This methodology sets an initial price for inputs and outputs and keeps them constant during the planning horizon.

The real prices approach recognizes that relative prices may change and solves the "easier" of the two tasks by estimating the changes in relative prices over the life of the project. The analyst constructs the financial statements in real terms, taking into account the estimated changes in relative prices and discounts the real free cash flows with the real discount rate. The constant dollar or real prices approach estimates the increases in relative prices and

discount future free cash flows at the real discount rate. This means that the financial model assumes that the actual prices will be modified in the future, but only in the differences between the inflation rates and the nominal increases in price. This means non-neutral inflation. As price increases do not include the inflationary component, interest rates have to be considered without the inflationary component and hence, the discount rate will be the real rate of interest. This methodology set an initial price for inputs and outputs and applies the real increases to the initial prices, during the planning horizon.

The nominal prices approach tackles the two tasks head-on. It estimates the nominal prices for the inputs and outputs and the expected inflation rates over the life of the project. Unlike the constant prices approach, it does not solve the tasks by assuming them away. In the days before personal computers, estimating changes in relative prices and the expected inflation rates required enormous computing resources. These days, with data and easily available computing power, both of these tasks are still difficult and should not be under-estimated. However, with computing power, we can conduct sensitivity and scenario analyses and examine the impacts of different scenarios for the expected inflation rates on the outcomes of the project. The nominal or current prices approach estimates prices for inputs and outputs and discount future free cash flows at the nominal discount rate. This means that the financial analyst tries to estimate the actual prices and interest rates that will occur in the future and based on the estimates, specifies and conducts the relevant scenario analyses.

There exist some appeal and some weaknesses of the constant prices and real prices methodologies. First, many analysts believe that all three approaches give the same results. Second, analysts believe that even if the results are not identical, the error in using the real or constant prices methods is sufficiently small and acceptable. Third, analysts believe that the "simplicity" of real or constant prices outweigh any marginal benefits of using the nominal prices approach. Fourth, analysts believe that it is too difficult to "forecast" future inflation rates and consequently, they prefer to do the analysis in real or constant terms. In Vélez-Pareja and Tham, 2002, they briefly comment on the strength of these reasons.

SECTION TWO

3. A REVIEW

The three methods look very similar, and one would be tempted to assume that all three methods give the same results. In fact, the authors of many textbooks assert that the nominal prices and real and constant prices approach give the same results, with one important caveat: The methods will give the same results as long as the nominal free cash flows are discounted with the nominal discount rate, and the real and constant free cash flows are discounted with the real discount rate. The cash flows and discount rates must be consistent. If the free cash flows are nominal, then the discount rate must be nominal, and if the free cash flows are real, the discount rate must be real. The nominal cash flows should not be discounted with real discount rates. However, simple consistency between the cash flows and the discount rate is not enough as will be proved in this paper. The result is that in practice, -and this is more critical in economies with relative high rates of inflation- practitioners conduct project evaluation in the wrong manner.

For instance, Belli et al 2001[3], Brealey and Myers, 1995 and 2003, Brealey, Myers and Marcus, 1996, Canada and White, 1996, Copeland, Koller and Murrin, 2000, Damodaran, 1996, Dixon and Hufschmidt, 1986, Grinblatt and Titman, 2002, Levy and Sarnat, 1995, Ross et al. 1999, and Weston and Copeland, 1992, among others warn the reader not to mix real rates and nominal free cash flows and vice versa and that the same NPV is obtained either with nominal free cash flows, discounted with the nominal discount rate, or real free cash flows discounted with the real discount rate.

Very few authors (Arzac[4], 2005, Van Horne, 1997, Vélez-Pareja, 1983, 1987, 1998, 1999, 2004a, Vélez-Pareja and Tham, 2002, and 2004 and Tham and Vélez-Pareja 2002, 2004a and 2004b) clearly commit to the right approach: future estimates for the free cash flows have to be made at nominal or current prices, and future free cash flows have to be discounted with the nominal rate of return.

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[3] They say: "Setting up the cash flow of a project in nominal prices requires an inflation forecast. This is a difficult, if not impossible, task. (pg 42)"

[4] This author offers a website where inflation forecasts can be found (http://www.phil.frb.org/econ/spf/index.html). However, he "shows" that valuating at nominal cash flows we obtain the same result as valuating with real cash flows; this is true as long as the cash flows are in nominal terms and then they are deflated as well as the discount rate. Of course it gives the same result because it means that we are dividing and multiplying every cash flow by the same amount, this is, $(1 + i_f)^j$, where i_f is inflation rate and j is the period. This is not constant nor real prices methodology; this is just deflation of cash flows and discount rates.

The later positions are very significant. And they are important because practitioners have the idea (at least as it can be seen from the recommendations of financial institutions such as, the Inter American Development Bank, IADB and the World Bank, WB and domestic central banks) that the right procedure is the constant or the real price approach. The IADB and the WB support the constant dollar or the constant price approach.

There are subtle differences among the methods and as we will show in the example analyzed below, the methods do not always give the same results. Under certain restrictive conditions and assumptions, it may be possible to derive the same results for all methods. However, the special conditions and assumptions rarely hold in practice, and it would be unrealistic to assume that they do.

SECTION THREE

4. IMPLICIT ASSUMPTIONS FOR IDENTICAL NPVS

Next, we state the conditions under which the three methods give the same values. (For details see Vélez-Pareja, 1999, Vélez-Pareja, 2005 (forthcoming) and Vélez-Pareja and Tham 2002).

1. *No taxes.*
2. *All cash excess* is distributed to the equity and debt holders.
3. *Price increases that actually occur (current or nominal) will be equal to the inflation rate,* included in the current or nominal discount rate.
4. *Income and payments* for goods and services are in cash, *no credit*.
5. *No salvage or terminal value.*
6. There is no *price-demand elasticity* effect.
7. The *discount rate* at current or nominal prices is exactly equal to

(1+ real rate of interest)(1+ inflation rate)-1 and at constant or real prices, the discount rate has to be equal to i_r, the real rate of interest.

8. The cost of debt, Kd must be *deflated*.

These eight *conditions* have to be included in all the analyses –constant, real and current or nominal prices- in order to obtain identical NPV with both methodologies[5]. And the adjustments to be made are of such complexity that the supposed simplification of the constant price methodology is eliminated. In addition, the adjustments require the estimation of the expected inflation rate and one of the reasons for using the constant price approach was to "avoid" the estimation of the expected inflation rate! The conclusion is that when evaluating projects the current prices have to be estimated and the constant price and constant dollar methodologies have to be rejected.

In the next sections, using the WB example, it will be shown that the constant price approach changes the decision: a bad project becomes a good project, just by changing the methodology of analysis. We also discuss the effect of the tax savings, the cost of capital and the proper way to calculate it.

SECTION FOUR

5. TAX SAVINGS (TS) AND THE CALCULATION OF THE COST OF CAPITAL

The tax savings are a subsidy that the government gives to the firm (or individual, depending on the tax law) every time an expense is listed.

It is misleading to think that the tax saving is earned if the firm pays taxes or not. The critical value is if there is enough EBIT to offset the financial expense. We can explain this idea with two simple situations:

1. EBIT > Interest payments
2. EBIT < Interest payments

It should be said that this is a very important issue. When EBIT is less than the interest charges the tax savings are not the tax rate times the interest. The rule for this situation is:

If EBIT > Interest payments, then TS = T × Interest payments (1a)

If 0 < EBIT < Interest payments Then TS = T × EBIT (1b)

If EBIT < 0 then TS = 0 (1c)

[5] For the numerical example where this holds see Vélez-Pareja 1999 and Vélez-Pareja and Tham 2002.

The TS "lost" in one period can be recovered in future periods if losses carried forward are allowed (as they are in the example we will study).

The traditional Weighted Average Cost of Capital, $WACC = Kd \times D\% \times (1 - T) + Ke \times E\%$ applies only to case 1 if taxes are paid the same year as they are accrued. This is a very special and particular case of a more general formulation (see Vélez-Pareja and Burbano 2003 and Tham y Vélez-Pareja, 2004). The assumptions in the WACC formula are not met by the WB example as can be seen below, because they have some years with negative EBIT and losses carried forward (LCF).

In this case we have to use a more general formulation of WACC as will be shown below.

The proper cost of capital to discount the FCF varies depending of the market value of the firm and the value of TS. As we defined above, market value of firms or projects not traded in the market is the present value of the cash flows discounted at the proper discount rate. For a proper discount rate we understand the following (in the most general formulation)[6]:

1. If we use the FCF, we should discount it with

$$WACC_{adjusted} = Ku_i - \frac{TS_i}{V^L_{i-1}} - (Ku_i - \psi_i)\frac{V^{TS}_{i-1}}{V^L_{i-1}} \quad (2)$$

Where TS is the tax savings, ψ is the discount rate for the TS, Ku is the unlevered cost of equity, V is the total value and V^{TS} is the value of the future tax savings.

2. If we use the Capital Cash Flow CCF[7],

$$CCF = CFD + CFE = FCF + TS \quad (3)$$

we should discount it with

$$WACC_{for\ CCF} = Ku_i - (Ku_i - \psi_i)\frac{V^{TS}_{i-1}}{V^L_{i-1}} \quad (4)$$

3. If we use CFE we should discount it with (in this case we have to add the value of debt to obtain the total value)

$$Ke_i = Ku_i + (Ku_i - Kd_i)\frac{D_{i-1}}{E^L_{i-1}} - (Ku_i - \psi_i)\frac{V^{TS}_{i-1}}{E^L_{i-1}} \quad (5)$$

[6] Taggart 1991, Vélez-Pareja and Tham (2000), Tham, and Velez–Pareja, 2002, Vélez-Pareja and Burbano and Tham, Velez–Pareja, 2004a and 2004b, has derived independently the expression for Ke when there are finite cash flows.

[7] The Capital Cash Flow, CCF, is the essence of the original Modigliani and Miller proposal in 1958; however, it was popularized by Ruback, 2000.

Where E is the market value of equity and D is the market value of debt and Kd is the cost of debt; other variables have been defined previously.

Of course we have to make explicit the assumption on ψ, the discount rate for the TS. We have assumed the ψ is the unlevered cost of equity, Ku.

When the discount rate for the tax savings ψ is Ku the previous expressions are

$$WACC_{\text{for CCF}} = Ku_i \tag{6a}$$

$$WACC_{\text{adjusted}} = Ku_i - \frac{TS_i}{V^L_{i-1}} \tag{6b}$$

and

$$Ke_i = Ku_i + (Ku_i - Kd_i)\frac{D_{i-1}}{E^L_{i-1}} \tag{7}$$

From year 1 up to the last year, this cost of equity is held constant in the WB example. When the leverage is not constant and hence the Ke should change accordingly.

When there are negative EBIT the TS are not earned in the period. If there is the possibility of losses carried forward then we can recover the TS not earned during the loss period. However, this means that the traditional WACC cannot be used.

SECTION FIVE

6. THE WORLD BANK CASE

In this section we present and critically analyze the example the World Bank has published for training purposes.

6.1. DESCRIPTION OF THE MODEL

This model deals with the calculation of a proper value for the tariff for the distribution of electric energy in such a way that the net present value of the cash flow for twenty years is zero.

In this model they use the constant prices methodology and discount the cash flows with a real (deflated) weighted average cost of capital (WACC). They construct the forecasted Income Statement and the Balance Sheet. From these financial statements they derive the free cash flow FCF and the cash flow to equity CFE.

6.2. Does Inflation Create Value?

Before we analyze the WB example let us make some reflections on the effects of the inflation upon value.

In order to gain insight into the relevance of including the forecasted inflation rate in the analysis we have to ask a simple question: does inflation create or destroy value?

1. If it creates value we should encourage it.
2. If it is innocuous, then we should not worry about it.
3. If it destroys value, we should combat it.

It is not difficult to accept that inflation destroys value. When valuing at constant prices value is not affected by inflation because it is out of the analysis. When valuing at nominal prices inflation is taken into account in the cash flows and the discount rates.

As we mentioned above most authors warn that the only care it has to be taken is to be consistent. If that is true, then inflation will not affect value because it is taken into account in that rule. However, inflation destroys value: the greater the inflation rate, the lower the value. Then, when valuing at constant prices (that does not take into account the inflation) there is an overvaluation because the value at nominal prices (that takes into account the inflation and intends to model what will occur in reality) decreases as long as the inflation rate increases (and in constant prices the value is invariable with inflation). This means that when inflation is present the difference between the value at constant prices and nominal prices is different from zero and it will increase with the inflation rate.

6.3. Valuation with Constant Prices Methodology.

When using the constant prices methodology we can incur in some typical practices that distort the value calculation: the amount of the depreciation charge is not affected by the constant price methodology and it undervalues the tax charges and hence overvalues the value calculation. The same effect occurs when we have accounts receivable AR, as it is the case in this model. In the WB example the overvaluation due to the depreciation is 6.61% and the overvaluation due to the AR is 6.37%. As there are no accounts payable (AP) in the case and hence, we have not estimated the over or undervaluation due to AP.

We have calculated the overvaluation due to the depreciation charges using the tax saving from that item (this is, T × Dep) and discounted it using the nominal cost of capital (WACCN) and the real cost of capital (WACC). The difference is the overvaluation.

In the case of AR we included inflation to adjust the sales for every year (this means that we assumed neutral inflation as is implicit in the constant prices methodology) and discounted the real AR and the nominal AR with the WACC and the WACCN respectively. The difference in the discounted values is the overvaluation.

When adjustments for inflation are included in the financial statements the effect of the tax saving for depreciation charges might be modified and eventually the overvaluation might disappear. In the case of AR if some interest is charged to the AR, then the overvaluation might disappear if the interest is identical to the inflation rate. If not, the differences will persist.

In general we should say that neutral inflation does not occur in reality. There is some real increase (positive and in some cases negative) that is not captured when constant prices methodology is used. And the net result will depend on the magnitude of and the items affected by them. This means that constant prices methodology might disguise the positive or negative effects of the real change in prices for inputs and outputs.

It has to be said that when applying adjustments for inflation to the financial statements there might be some charges related to the equity (all this might depend on the way the adjustments are designed) and these charges generate a tax savings associated to the equity[8]. In addition, it has to be said that not all the countries allow the adjustments for inflation to the financial statements. Usually these adjustments are done when hyperinflation is present. In a working paper from the World Bank by Goldschmidt and Yaron, 1991, it is said that " The Bank's draft Operational Directive on Financial Sector Operations requires the adjustment of financial statements in countries where the cumulative inflation rate over three years approaches or exceeds 100 percent." This means that some or many countries might not allow inflation adjustments to the financial statements. More, the fact that the WB "requires the adjustment of financial statements" does not mean that the distorting effects disappear. The distorting effects exist because reality is different of what is modeled when constant prices methodology is used. The

[8] See Vélez-Pareja and Tham, 2004.

adjustments reduce the distorting effects only if they really happen when the project is operating.

In fact, some of the criteria for defining hyperinflation are, according to international accounting standards, as follows:

1. In general people prefer to keep non monetary assets or foreign exchange.
2. In general, people have as reference in prices not the local currency, but the foreign exchange.
3. Sales and purchases on credit have prices that compensate the loss in purchasing power of the local currency.
4. Interest rates, wages and prices are linked directly to the price index, and
5. The cumulated inflation rate during 3 years is near or above 100%.

It can be predicted that financial statements adjusted for inflation will disappear in the near future and will be replaced by an accounting system not based on historical prices but based on in fair values[9]. In fact, some countries like Argentina and Colombia eliminated or will eliminate the inflation adjustments to financial statements in the near future. Right now the practice of inflation adjustments is not homogeneous and some countries do not apply them; others use integral adjustments and others use partial adjustments. Clearly the case we are studying in this paper does not comply with the general criteria where inflation adjustments are expected.

We agree with, Coello, et al. (2003) when they say: "In reality, a firm will base its investment decisions on expected prices, which may or may not be realized, and thus an investment that is optimal ex ante can appear to be suboptimal ex post". The proper methodology for valuation is nominal or current prices. This implies expected inflation rates and real changes in prices. Indications from several explorations on this subject suggest that constant prices methodology tends to overvalue the project and this generates a tariff set (or price set) that is lower than the required. We wonder if this fact is one of the causes that some (or many) projects become a failure.

[9] These insights and the above mentioned criteria was mentioned by Professor Samuel Mantilla in private correspondence.

SECTION SIX

In this section we reconstruct the valuation using nominal prices (neutral inflation). We compare this result with the original result found in the example at constant prices.

7. VALUE USING NOMINAL PRICES

We have updated the revenues, expenses and investments using the inflation rate. We assumed no real increases in prices hence we deal with neutral inflation as is implicit in the constant prices methodology. Done this, we found that the overvaluation of the constant prices methodology compared with the nominal prices approach (and using the proper cost of capital based on market values) is 21.2%. This implies an underestimation of tariffs by 15.2% and 18.0%. For details see Vélez-Pareja 2004a.

The correct value can be calculated using three different approaches: using the FCF, the CFE and the CCF. In the next tables we show a partial view of those calculations. The underlying assumptions in the next tables is that the discount rate for the TS, ψ, is Ku. The complete tables are reported in Vélez-Pareja 2004a.

When calculating value using the CCF we discount it with the nominal Ku, in this case, 12.4%.

Table 1a: Calculation of value using the CCF

	0	1	2	3	4	…	17	18	19	20
Ku		12.4%	12.4%	12.4%	12.4%	…	12.4%	12.4%	12.4%	12.4%
CCF		−6.1	−2.6	4.4	6.7	…	31.7	36.2	42.4	81.3
PV(CCF)	76.5	92.2	106.2	115.0	122.5	…	123.0	102.0	72.3	
PV(CCF)-Debt	28.4	34.6	41.4	49.5	59.2	…	91.7	76.8	56.5	

For the calculation of the equity values (and total value adding the market value of the debt) we use Ku=12.4% to derive Ke and it is adjusted according to the proper market leverage.

Table 1b: Calculation of value using the CFE

	0	1	2	3	4	…	17	18	19	20
CFE		−0.5	0.1	−0.2	−0.6	…	24.8	27.6	31.0	64.2
Ke=Ku+−Ku-KdD/E		19.9%	19.8%	19.3%	18.2%	…	13.9%	13.9%	13.9%	13.6%
PV(CFE)	28.4	34.6	41.4	49.5	59.2	…	91.7	76.8	56.5	-
Debt	48.1	57.6	64.8	65.4	63.3	…	31.3	25.2	15.8	0.0
Total Value = PV(CFE) + Debt	76.5	92.2	106.2	115.0	122.5	…	123.0	102.0	72.3	

When calculating total value using the FCF, note that we do not use the traditional formulation for the WACC. Instead, we use the adjusted WACC mentioned above.

Table 1c: Calculation of value using the FCF and WACC

	0	1	2	3	4	…	17	18	19	20
FCF		-6.1	-3.6	2.7	4.9	…	30.8	35.3	41.7	80.8
TS		0.0	1.1	1.7	1.8	…	1.0	0.9	0.7	0.4
$WACC_{adjusted}$		12.4%	11.2%	10.8%	10.8%	…	11.7%	11.7%	11.7%	11.8%
Totval	76.5	92.2	106.2	115.0	122.5	…	123.0	102.0	72.3	0

As can be seen in the next table, there is consistency in values.

Table 1d: Consistency in value using nominal prices and proper WACC

PV(CCF) = PV(FCF)	76.5
Debt	48.1
PV(CCF)-Debt	28.4
PV(CFE)	28.4

In Vélez-Pareja 2004a we observe that the leverage using correct market values ranges from 0.22 to 0.63.

The value reported in the WB example is 92.82. The tariffs are defined setting the NPV to zero and calculating the tariffs for that value.

The tariffs defined by the WB and the tariffs defined with the nominal prices approach are shown in the next table:

Table 2a: Tariffs recalculated

Residential users		WB approach	Nominal prices approach
-First block	($/KWh)	0.055	0,0649
-Second block	($/KWh)	0.045	0,0549

The underestimation of tariffs and overestimation of value can be seen in the next table.

Table 2b: A measure of overestimation of value using nominal prices

Total overestimation of value (using constant versus nominal prices and constant WACC)	21.21%
Underestimation of tariffs (First block) using nominal prices	15.2%
Underestimation of tariffs (Second block) using nominal prices	18.0%

As can be seen the differences are relevant.

SECTION SEVEN

8. CONCLUDING REMARKS

We have analyzed different methods to value a firm or a project in an inflationary context: constant prices and nominal or current prices. We mentioned some conditions that have to be met in order to have identical NPV's for the three methods. We analyzed as well, that these conditions where unrealistic.

The consequences of this type of mistakes might result in acceptance of bad projects as good and in a misspecification of tariffs in the case of regulated firms. This fact might imply the failure of the project because tariffs might not be enough to make the project achieve the goals in economic terms.

The major failure of the constant price methodology is that the implicit assumptions distort the reality we wish to represent through the model. Hence, the validation of the model (the free cash flow) with reality is impossible. We have seen that it is possible to assign scarce resources to the wrong activities if they are evaluated at constant or real prices. Scarcity of resources is critical in emerging economies. Care has to be taken by financial analysts from international and domestic agencies in the process of project selection in those countries. We have shown that the magnitude of the errors when the wrong methodologies are applied might be considerable. It is not a small ±5%; it can mean that we accept a bad project as desirable.

It is not true that it is equivalent to evaluate projects with constant and real price or current or nominal price methodologies. The constant and real price methodologies produce an upward bias and overvalue a project. These methodologies are an oversimplification of reality and produce adverse results.

The proposal is very simple. The right approach is the current or nominal prices one and any other approach that does not represent the reality as closer as possible, should be discarded, right away.

The WB example is a case where severe deviations are found that might induce to select the wrong project or to establish wrong tariffs for regulated firms. The practice presented by the World Bank supports a tradition of doing project appraisal and firm valuation with conceptual limitations. The critical issue here is the intellectual authority that represents the

World Bank among practitioners and governmental agencies that support their practices in the well known reputation of international financial institutions such as the World Bank and similar. This practice has to be improved to reduce the probability to accept bad projects as good projects and miscalculate the proper tariffs in infrastructure projects for developing countries.

More, what is at risk is the enormous amount of funds that goes to emerging countries supported by appraisals that might favor inconvenient projects and the determination of tariffs for public services like water and electricity distribution. All these decisions are made in detriment of the less developed countries and their population.

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