



From surpluses to deficits: the effect of dark matter on Latin America

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Del superávit al déficit: el efecto de la materia oscura en América Latina
Dos excedentes aos défices: o efeito da matéria escura na América Latina

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In previous work we have defined “dark matter” as the difference between the capitalized value of net investment income of a country and the official measure of its net foreign assets. In this paper we estimate dark matter assets for Latin American countries. We find that official current account dynamics follow reasonably well the evolution of dark matter inclusive net foreign assets in the region over relatively long periods such as the last two decades. However in the period 2002–2004 official statistics suggest a current account surplus that becomes a deficit of close to 300 billion once dark matter is included. This happens because official numbers underestimate current account imbalances for commodity producers who experienced significant capital losses as a result of the recent commodity boom.

En trabajos anteriores, hemos definido «materia oscura» como la diferencia entre el valor capitalizado del rendimiento neto de la inversión de un país y la medición oficial de sus activos externos netos. En este artículo, calculamos los activos de materia oscura para los países de América Latina. Constatamos que la dinámica oficial de las cuentas corrientes sigue de forma aceptable la evolución de la materia oscura, incluidos los activos externos netos de la región a lo largo de periodos relativamente largos (como las dos últimas décadas). No obstante, en el periodo comprendido entre 2002 y 2004, las estadísticas oficiales sugieren un superávit en las cuentas corrientes que se transforma en un déficit del orden de 300.000 millones al incluir esta materia oscura. Esto sucede porque las cifras oficiales subestiman los desequilibrios de las cuentas corrientes para los productores de bienes que hayan sufrido pérdidas de capital significativas como resultado del reciente boom de este tipo de bienes.

Em trabalhos anteriores, definimos «matéria escura» como a diferença entre o valor capitalizado do rendimento líquido de investimento de um país e a avaliação oficial dos seus activos externos líquidos. No presente relatório, estimamos os activos de matéria escura para os países da América Latina. Constatamos que a dinâmica oficial de contas correntes acompanha razoavelmente bem a evolução da matéria escura, incluindo os activos externos líquidos na região ao longo de períodos relativamente longos, como as duas últimas décadas. No entanto, no período de 2002–2004, as estatísticas oficiais sugerem um excedente nas contas correntes que se transforma num défice da ordem dos 300 mil milhões quando se inclui a matéria escura. Isto acontece porque os números oficiais subestimam os desequilíbrios nas contas correntes para os produtores de bens que sofreram perdas de capital significativas em resultado da recente expansão na disponibilidade de mercadorias.

1. Introduction

Economists pay attention to the current account as a way of keeping track of the change in net foreign assets for any given country over time. Large deficits signal that a country is running up its foreign liabilities. For example, it is well known that the US economy has been running increasingly large current account deficits since the early 1980s. Current account deficits signal an economy that is spending beyond its means, so it comes as no surprise that the accumulation of deficits during this period, adding up to 5.27 trillion

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dollars between 1982 and 2005, have significantly increased US net foreign debt. If those trends were not in themselves cause for concern, in recent years the deficits have escalated in both nominal value and as a percentage of GDP suggesting that the process cannot continue much longer and that a large and painful reversal may be near.

In fact, the current account deficit by measuring the increase in debt should predict the change in income payments made by each country. For example, between 1992 and 2000 Argentina ran a current account deficit of 84.9 billion dollars. In 1992 it had paid 4.8 billion in net financial expenses on its foreign asset position and by 2000 this number had gone up to 14.9 billion. If you assume an average interest rate paid by Argentina of about 12 percent, the 85 billion dollars of extra debt should have implied an increase in payments of about 10 billion, explaining why Argentina ended the decade with that much extra payments to make every year.

In a series of articles Hausmann and Sturzenegger (2005, 2006, 2007a, 2007b) (HS, 2005, 2006, 2007a, 2007b hence), we have argued that, in some cases, this logic, that relates current account deficits so naturally with net external payments, can fail. We use the case of the US to explain why. The Bureau of Economic Analysis (BEA) indicates that in 1980 the US had about 365 billion dollars of net foreign assets (that is the difference between the foreign assets owned abroad and the local assets owned by foreigners). These assets rendered a net return of about 30 billion dollars. Between 1980 and 2004, the US accumulated a current account deficit of 4.5 trillion dollars. You would expect the net foreign assets of the US to fall by that amount, to say, minus 4.1 trillion. If it paid 5 percent on that debt, the net return on its financial position should have moved from a surplus of 30

billion in 1982 to minus 210 billion dollars a year in 2004. But the truth is that by 2004 the payments had remained virtually unchanged. So, how can the difference be reconciled? Paraphrasing Bill Cline (2005) we asked in our work if it made sense to call a country that makes money on its net foreign position a debtor. The question we raised in our studies was whether there were hidden assets or services provided by the US economy, -the size of which had increased steadily over recent decades-, explaining why the net income flow had remained stable in spite of the increase in measured debt. We proposed to measure real assets as the capitalized value of net investment income and we called the difference between this measure and official measures of net foreign assets “dark matter”. In the case of the US the example above suggests that the US has a large quantity of “dark matter assets”.

In HS (2007b) we expanded our analysis to the whole set of countries in order to compute dark matter for all countries for which data was available but we did not focus on Latin American countries. As we will argue below, there are significant reasons why dark matter dynamics may alter significantly the assessment of external results for the region. This paper attempts to explain why and to measure the effects.

The paper is organized, very simply, as follows. Section II defines and explains how to compute dark matter. Section III shows the results for the region and Section IV for individual countries, comparing official measures of the current account with those that include dark matter as well as an analysis of the evolution of dark matter assets over time. Section V concludes with the main lessons for the region.

KEY WORDS
**Dark Matter,
 Latin America,
 Current Account Imbalances**

PALABRAS CLAVE
*Materia oscura,
 América Latina,
 Desequilibrios de cuentas corrientes*

PALAVRAS-CHAVE
*Matéria escura,
 América Latina,
 Desequilibrios de conta corrente*

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2. What is dark matter?

Let us first briefly clarify the meaning of dark matter. As mentioned above our motivating fact is that net income from foreign assets seems to be poorly accounted by the change in foreign assets obtained from accumulating the current account or from direct measures of the stock of net foreign assets that some countries estimate. Thus, we propose an alternative way of measuring the current account, one that starts by defining the stock of net foreign assets (NFA) as the capitalized value of the net investment income (NII), discounted at a constant rate of interest (r):

$$NFA_t^{DM} = \frac{NII_t}{r} \quad (1)$$

The superscript DM corresponds to dark matter, a term that we have chosen to reflect the discrepancy between our measure of net foreign assets and the measure that can be obtained from official figures or from accumulating the current account imbalances. The name is taken from a term used in physics to account for the fact that the world is more stable than you would think if it were held together only by the gravity emanating from visible matter. In the same way that physicists infer matter in the world from its gravitational pull, and not from adding up the visible matter, we infer the assets from their returns, and not from adding the current account imbalances. As a result countries with net investment income larger than what is presumed on the basis of their asset base will have dark matter assets, while countries where the net investment income is too low will have dark matter liabilities.

In turn, we define the current account as the change in net foreign assets defined in (1):

$$CA_t = NFA_t^{DM} - NFA_{t-1}^{DM} = \frac{NII_t - NII_{t-1}}{r} \quad (2)$$

This way of computing the current account has been suggested by Cline (2005) and previously by Ulan and Dewald (1989). It was discussed by US government officials, but the Bureau of Economic Analysis (BEA) eventually discarded it because it was difficult to choose a discount rate (see Landefeld and Lawson, 1991).

This estimation suffers from all the same problems that we confront when estimating the value of a firm using price-earnings ratio, such as making sure the earnings are relatively stable, that earnings show up as earnings and not as capital gains, that the earnings data be of good quality, and that the discount rate appropriately reflects expected growth and the opportunity cost of time. Even though the discounting interest rate can be taken from an estimation of the typical return on net foreign assets (HS, 2007b find this to be close to 5%) and even if in the estimation it appears to be relatively stable over the sample period, the relevant rate may change over time (with changes in expected growth or interest rates). One potential advantage of applying this methodology to the overall earnings on net foreign assets is that we average over a large number of firms and agents, so that the resulting earning flow may be relatively stable. Yet, if the earnings of any given year still give an unreliable measure of its true earning potential, if we average over an economy and look at trends over a couple of years, we should obtain reasonable results.

To further understand the sources of the stock of dark matter (DM) it is useful to write it as

$$DM = NFA_t^{DM} - NFA_t = \frac{NII_t}{r} - NFA_t = \frac{\tilde{r}(NFA_t + \mu_t)}{r} - NFA_t = \frac{\tilde{r}}{r} \mu_t + \frac{(\tilde{r} - r)}{r} NFA_t \quad (3)$$

where NFA_t stands for the official measure of net foreign assets as estimated from the accumulation of the current account. In this expression we allow for assets to be mismeasured, with μ indicating that error in measurement. In addition we assume assets to yield a rate of return different from the constant rate used for discounting. The two terms in the last expression of equation (3) allow to visualize that dark matter may have two origins: the capitalized return to unaccounted assets and to yield “privileges”. This makes sense to the extent that ex-post returns reflect expected returns and the return premium is consistently paid, i.e. when the return privileges appear to be stable.

Why would the dynamic of income flows diverge from what we should expect from current account dynamics? As we mentioned above the literature has stressed two main reasons: valuation effects that change the value of the assets independently of the current account, and yield privileges that imply that some countries exhibit abnormal returns. The first has received substantial attention, as it is potentially relevant for explaining the US current account imbalance. Because the US economy can issue liabilities in its own currency, a dollar depreciation implies a capital gain by diminishing the value of net foreign liabilities (see for example Blanchard, Giavazzi and Sa, 2005) thus easing the burden of an adjustment. But, of course, that channel plays only a limited role when explaining the discrepancies for a much wider range of countries many of whom cannot even issue debt in their own currency. There are multiple other reasons why income flows may not track current account dynamics closely. Some of these reasons have been the object of a recent and intense debate, and therefore deserve a brief review here.

A first channel involves the notion that foreign direct investment (FDI) abroad is a vehicle for two income flows that are very imperfectly captured in official statistics. First, the valuation effects that are associated to the fact that FDI allows for the dissemination of ideas, blueprints and knowledge. The valuation effects are not picked up because market value adjustments to FDI assets that do not have visible market prices occur at best on the basis of the host (not source) country characteristics, and these are not likely to be strongly related to the earnings potential of the firm¹. Second, the return to unrecorded exports of services from headquarters to their affiliates around the world. These are missed simply because there is no registration of the services shared across national borders within the firm.

A second channel may come from the underlying stability or instability of a given economy that may allow some economies to sell some of this stability to the rest of world, and charge for it, while other countries pay to diversify away some of their own instability. This is just the standard risk premia argument (dating back to Frankel, 1982), which will persist in equilibrium. The payments corresponding to this risk premia are akin to the trading of insurance services. Some of the most innovative recent interpretations to explain the US current account imbalance rely on this channel. Mendoza, Quadrini and Rios Rull (2006) provide a story where agents in financially sophisticated markets can insure their local and worldwide claims, something that agents in less financially developed countries cannot do. In equilibrium assets in the less financially developed country must earn a higher return, because

1. For a description of the methodological approach see Kozlow (2002) on US data, and Simard and Boulay (2006) on Canadian data.

local agents are unable to fully insure their claims there.

The Mendoza et alii (2006) approach directly derives the risk premia resulting from financial backwardness. The related perspective of Caballero, Farhi and Gourinchas (2005) focuses on financial backwardness in some fast-growing countries, such as China. Underdeveloped financial systems can prevent agents in those countries from writing claims on their own productive assets. This forces residents in those countries to use their savings to buy foreign assets while allowing foreign companies to own their productive assets. The superior financing /corporate governance technology provides a return differential. In their interpretation financially developed countries sell financial services and charge for them.

Another explanation, though focused on the US, is provided by Michael Dooley, David Folkerts-Landau and Peter Garber (2004) who argue that current imbalances are sustained by peripheral countries adopting export-led strategies with undervalued pegged exchange rates and capital controls. In this approach, dubbed Bretton Woods II, some countries are willing to purchase specifically US assets at lower (expected) returns as part of an implicit contract with the US, whereby they are guaranteed access to its domestic market. To the extent that this is a “purchase” of the access to the US market, it is another reason for a yield differential.

Alternatively a yield differential may arise from the provision of liquidity services, basically through the use of a foreign currency or by paying a premium for purchasing instruments in liquid financial markets. The simplest example is when people around the world need liquid assets and choose to hold a particular currency, dollars, pounds or euros in cash, that earns them a zero interest rate. By having foreigners accumulate this currency, and by paying no interest

on this, the source country can accumulate current account deficits, in the amount of the demand of this currency, without deteriorating its net investment income account. But liquidity services do not only originate from seignorage. Deep financial markets may also carry a liquidity premia advantage that allows paying lower returns for the issuers in those markets. This is likely relevant for the few countries that issue vehicle currencies for global or regional markets (the dollar, the pound, the euro, the Swiss franc and the rand are natural examples).

Finally, the empirical results that identify very poor countries that have been the target of debt relief as showing high return privileges suggests that an additional channel is debt relief that also allows large deficits to be accumulated but never repaid.

There are several reasons why dark matter dynamics are particularly relevant for Latin America. First, because by computing net foreign assets by capitalizing net investment income we can provide an alternative, probably more realistic, measure of the net foreign assets, and therefore of the current account. This will allow us to assess, perhaps under a different light, at least relative to standard measures, the evolution on the net external position of the region and of individual countries. Second, because the channels discussed above are likely to be important for the region. For example, changes in the risk premia on emerging market debt are likely to have significant impact on the size of dark matter imports by the region, particularly for the many large and financially integrated countries in the region. In periods in which the cost of capital is high will translate into imports of dark matter (the economy will be buying insurance abroad) and whatever improvement in the current account will be muted by these changes in financial costs. Third, because dark matter appears and disappears regularly in the presence of natu-

ral resources, as the value of net foreign investments changes hand in hand with commodity prices. Thus, the value of foreigner's investments in a country may differ from measured values for countries heavily dependent on natural resources a feature that is relevant to many countries in the region. In fact, it could be argued that terms of trade gains are lost as dark matter imports thus diluting their beneficial effect. Fourth, because debt forgiveness is an important driver of dark matter accumulation and several countries in our sample have been important beneficiaries of debt relief.

3. A brief survey of results for Latin America

In this section we begin our analysis by providing an estimate of dark matter for the region as a whole. Our group of countries includes Argentina, Bolivia, Brazil, Chile, Costa Rica, Colombia, Dominican Republic, Ecuador, El Salvador, Honduras, Jamaica, Mexico, Nicaragua, Paraguay, Peru, Trinidad and Tobago, Uruguay and Venezuela.

In order to organize the discussion, let us focus on two questions. First, whether the estimated stock of assets represents a good measure of actual foreign liabilities for countries in Latin America. Second, whether Latin America has been an importer or exporter of dark matter in recent years.

Figures 1-4 try to address this question by slicing the data in different ways. Figure 1 compares the measure of net assets stocks which results from capitalizing the net investment income at a 5% rate (vertical axis), with the Milessi-Ferreti wealth of nations estimate of these net assets (horizontal axis). The graph shows that with the few exceptions of some countries that have been able to export dark matter as debt relief, Latin American countries typically are importers of dark matter and therefore their actual net foreign assets are lower than those registered in official accounts.

(See Figure 1, next page)

Figure 1. Net asset stocks with and without dark matter

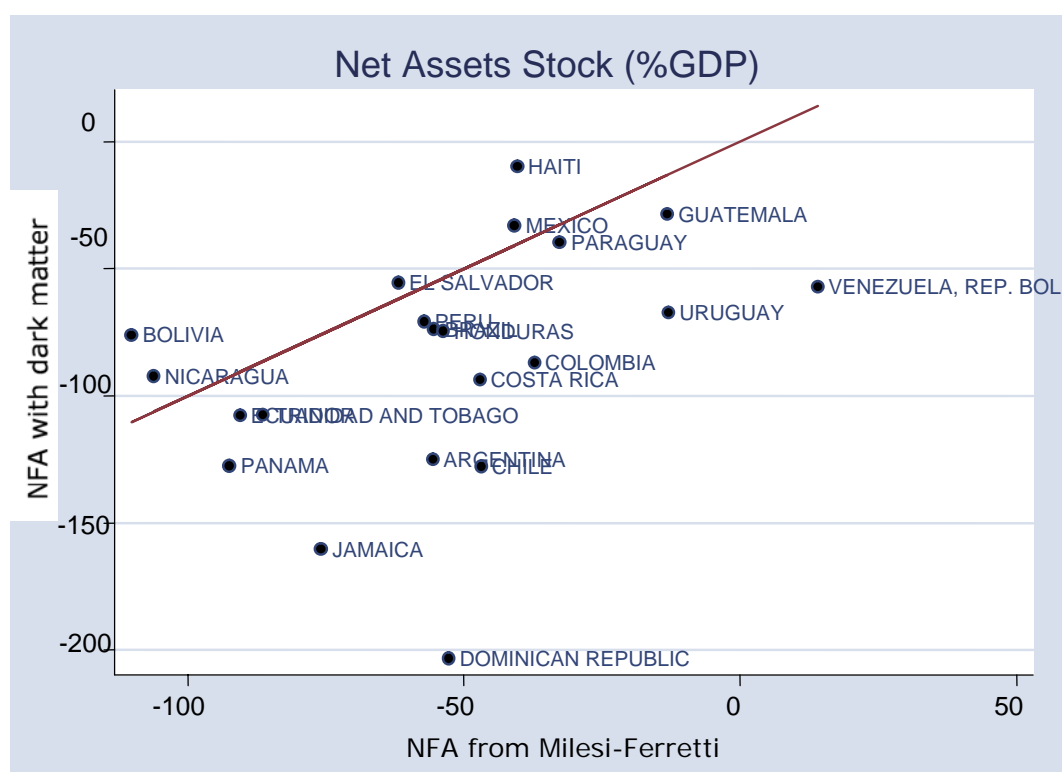


Figure 2, 3 and 4 focus on the time dimension, and show the evolution of the stock of dark matter in billions of US dollars, as a percentage of GDP, as well as the evolution of net foreign assets both when computed from accumulating the official current account as when computed from our measure inclusive of dark matter assets.

The results are somewhat predictable. Figure 2 shows the stock of dark matter liabilities that increases abruptly at the beginning of the 1980s, when interest payments on net foreign liabilities skyrocket in the wake of the Volker disinflation and the debt crisis. Official figures do not register this increase, because debt is typically measured at face value, but the sharp increase in interest rates (most of this debt had been contracted on floating rates) implied that the burden of this debt had risen significantly. This process was undone (not without ups and downs) through 2003, a reduction that was initially due to the debt relief associated to the Brady deals and then to reductions in interest rates. Since then there has been a reversal. Figure 3 shows the stock of dark matter as a percentage of GDP. The process is one of a smooth reduction in dark matter liabilities which in have remained stable between 10 and 20% of GDP since the early 1990s (though again there is a large 10% increase in the last year of the sample).

Figure 4 provides a comparison between the evolution of net foreign assets as could be inferred from the official current account with the one that originates from our measure inclusive of dark matter. Both measures follow a similar trend, one of persistent current account deficits in the region with differences. These differences between the two series mirror our explanation above. They point to a much larger increase in the imbalances in the early 80s in the region according to our measure (a reflection of the large increases in dark matter liabilities during this period) that gets mostly undone in the following ten years. Starting around 1992 and for about a decade (i.e. until around 2002) both series show a similar trend, according to which both series show an increase in net foreign liabilities. The series diverge in recent years. According to official numbers, 2003 and 2004 have been two years with surpluses and declining net foreign liabilities, while our measure shows a significant deterioration. This shows that while the 90's was a period of relatively little action in the aggregate stock of dark matter, recent years have shown a large increase in the stock of dark matter potentially associated to the commodity boom. Table 1 shows the current account under both definitions and shows the discrepancy in recent years.

Table 1. Changes in Latin America's net external assets

	Official Current Account (Billions)	Matter Current Account
1970	-0.541	-3.615
1971	-0.625	-3.086
1972	-0.374	4.701
1973	0.675	-5.821
1974	4.994	-3.921
1975	-5.441	9.819
1976	-5.747	-5.401
1977	-9.493	-21.097
1978	-14.853	-13.725
1979	-19.368	-42.860
1980	-29.933	-81.368
1981	-43.080	-155.712
1982	-41.324	-144.325
1983	-8.123	88.694
1984	-1.487	-60.568
1985	-2.736	41.363
1986	-17.288	73.469
1987	-9.767	40.588
1988	-10.168	-64.252
1989	-8.472	-81.720
1990	-1.708	90.385
1991	-18.171	73.325
1992	-33.712	63.292
1993	-45.470	-37.802
1994	-51.443	13.427
1995	-37.887	-56.992
1996	-39.708	-0.098
1997	-66.751	-32.506
1998	-91.193	13.609
1999	-57.515	76.579
2000	-47.780	-2.360
2001	-52.933	36.153
2002	-16.004	51.500
2003	8.459	-89.343
2004	18.045	-235.277

In order to understand these discrepancies and particularly the differences over the recent two years, it is useful to analyze the evolution of these variables on a country specific basis.

Figure 2. Cumulative Dark Matter in billions of US dollars

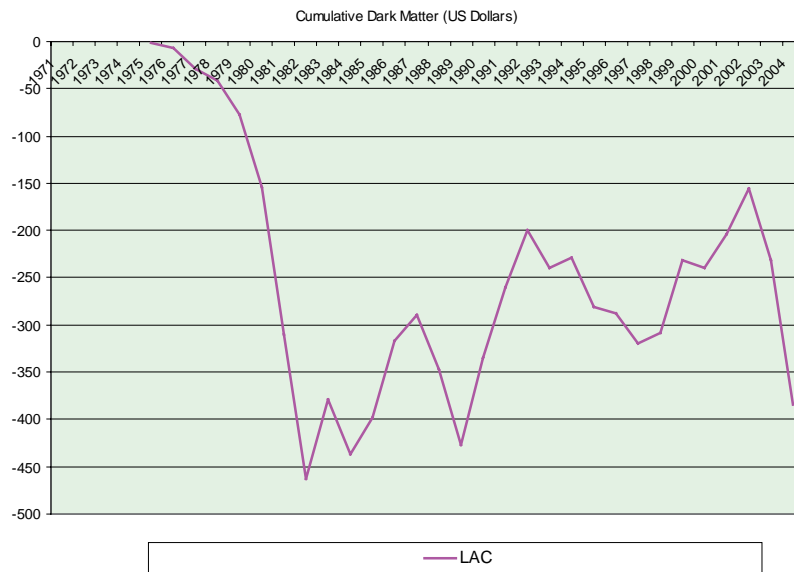


Figure 3. Cumulative Dark Matter in % of GDP

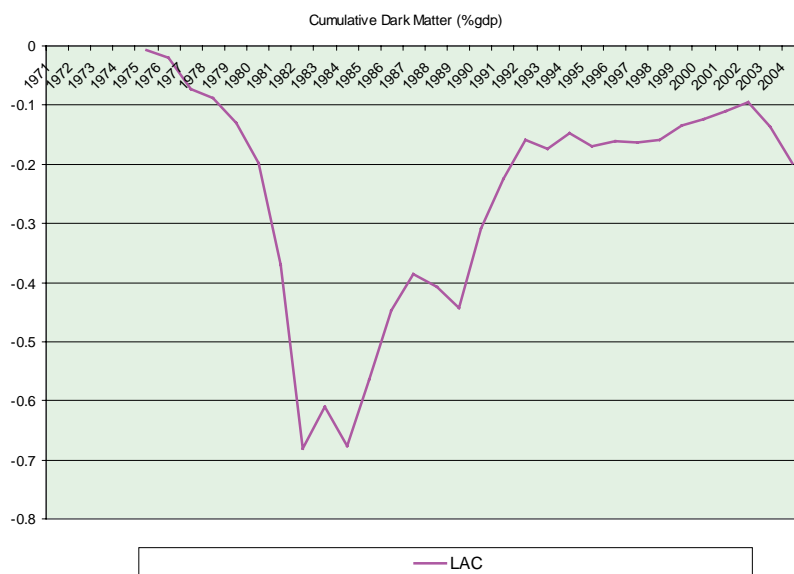
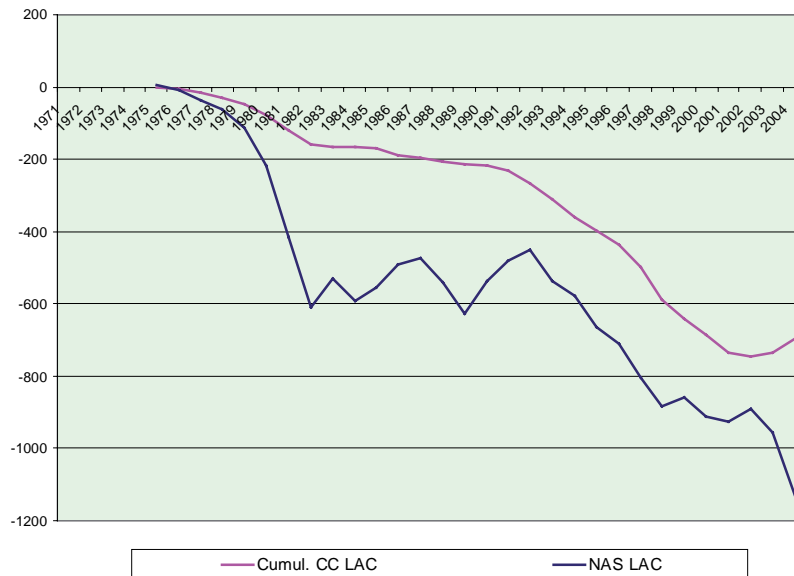


Figure 4. Official and dark matter inclusive cumulative current account in billions of US dollars



4. Country Results

Figure 5, 6 and 7 provide at the country level the same series that we described above for the region as a whole and allow to assess the very different country experiences in the region. Here we present first the evolution of net foreign assets according to both methodologies (Figure 5) and then the stocks of dark matter in millions of dollars and as percentage of GDP in figures 6 and 7. The country experiences can be split into roughly three main groups.

A group including the largest economies can be identified as the “normal pattern”. For this group, that includes Argentina, Brazil, Costa Rica, El Salvador, Jamaica and Mexico, the net foreign assets computed from net income roughly follows that predicted by the official current account, though there is a tendency for the dark matter inclusive figure to deteriorate somewhat more. The only exception to this, within, this group, are the cases of Mexico and Costa Rica where the estimated measure of net foreign assets improves at the end of the sample relative to what is measured by the current account.

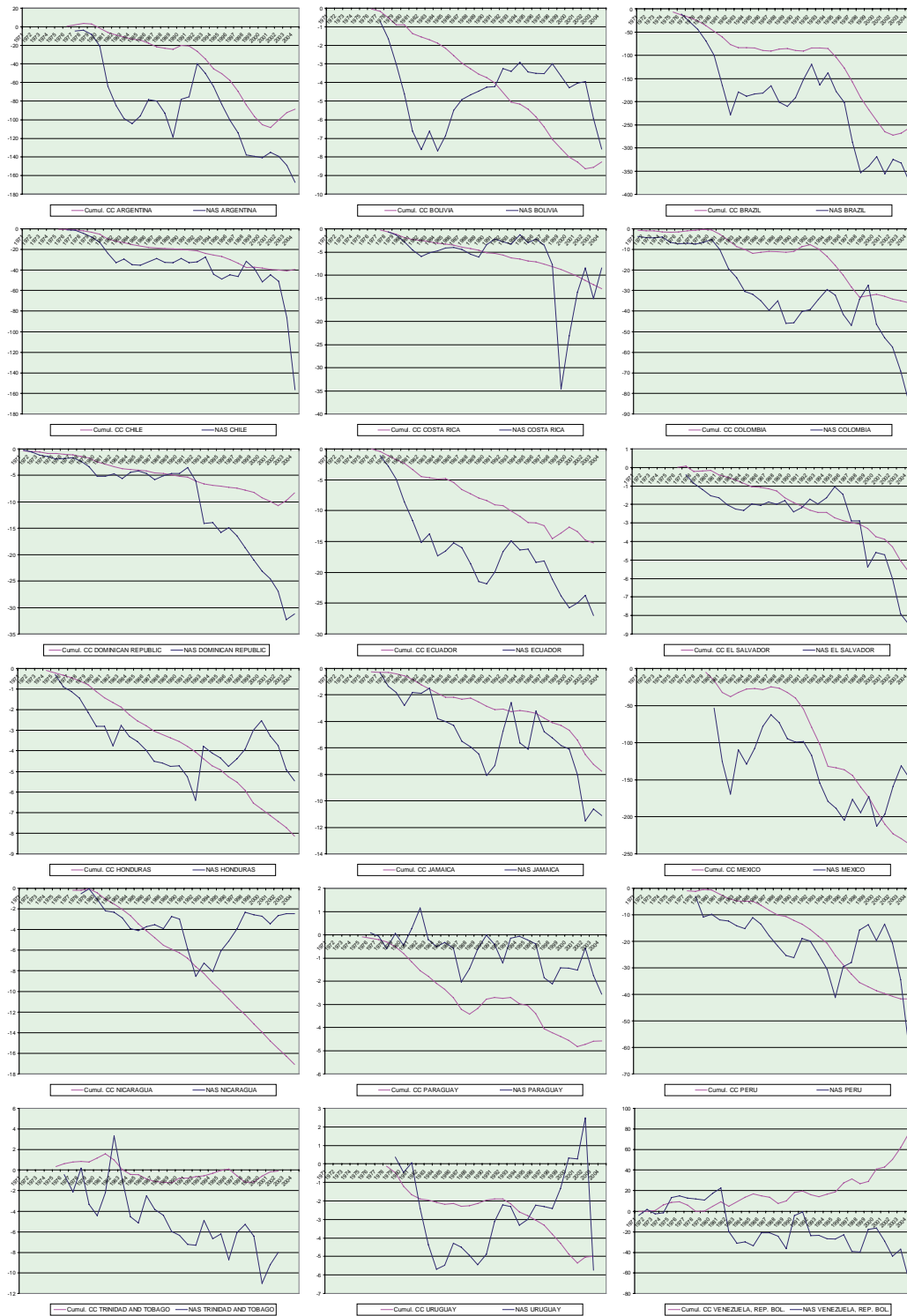
A second group of countries, including Chile, Colombia, Ecuador, Peru, Trinidad & Tobago and Venezuela, could be called the “natural resources” group, and show net foreign assets that perform much more poorly than what is computed by the current account, particularly towards the end of the sample, confirming that the commodity boom plays an important role in the recent deterioration in dark matter. There is a simple explanation for this. Capital inflows finance investment in the natural resource sector, and this investment becomes very profitable during a commodity boom which is tantamount to an increase in the value of these investments, representing a capital gain for the investors and a capital loss for the countries.

Finally, there is a group of countries including Bolivia, Honduras and Nicaragua, that could be called the “debt relief” countries, where the computed stock of assets is consistently above that measured by the current account. Here the reason for the discrepancy is the debt relief that allows these countries to run a current account deficit and not having to pay for it.

As outliers from this general pattern, we find Uruguay and the Dominican Republic. The Dominican Republic appears with a deterioration of its net foreign assets several fold what could be inferred from the current account, which should be associated to large imports of dark matter into its tourism industry. Uruguay on the other hand shows an unstable pattern with large exports of dark matter (potentially the sale of financial services to Argentina) that collapse during the Uruguayan crisis in 2002, in part due to the high interest rates that Uruguay accepted during its voluntary debt renegotiation.

(See Figure 5, next page)

Figure 5. Official and dark matter inclusive cumulative current account per country (in billions of US dollars)



The discrepancies between these two net foreign asset series provide a measure of dark matter assets for each country, measured both in nominal dollars as well as in percentage of GDP. The description follows mostly the description presented above. As a percentage of GDP the “normal” cases had accumulated dark matter liabilities during the 1980s, but have mostly wiped out these liabilities during the 90s and are currently in balance, whereas the debt relief countries accumulate large dark matter assets and natural resource countries typically hold large dark matter liabilities.

(See Figure 6 and Figure 7, next page)

Figure 6. Cumulative Dark Matter in billions of US dollars per country

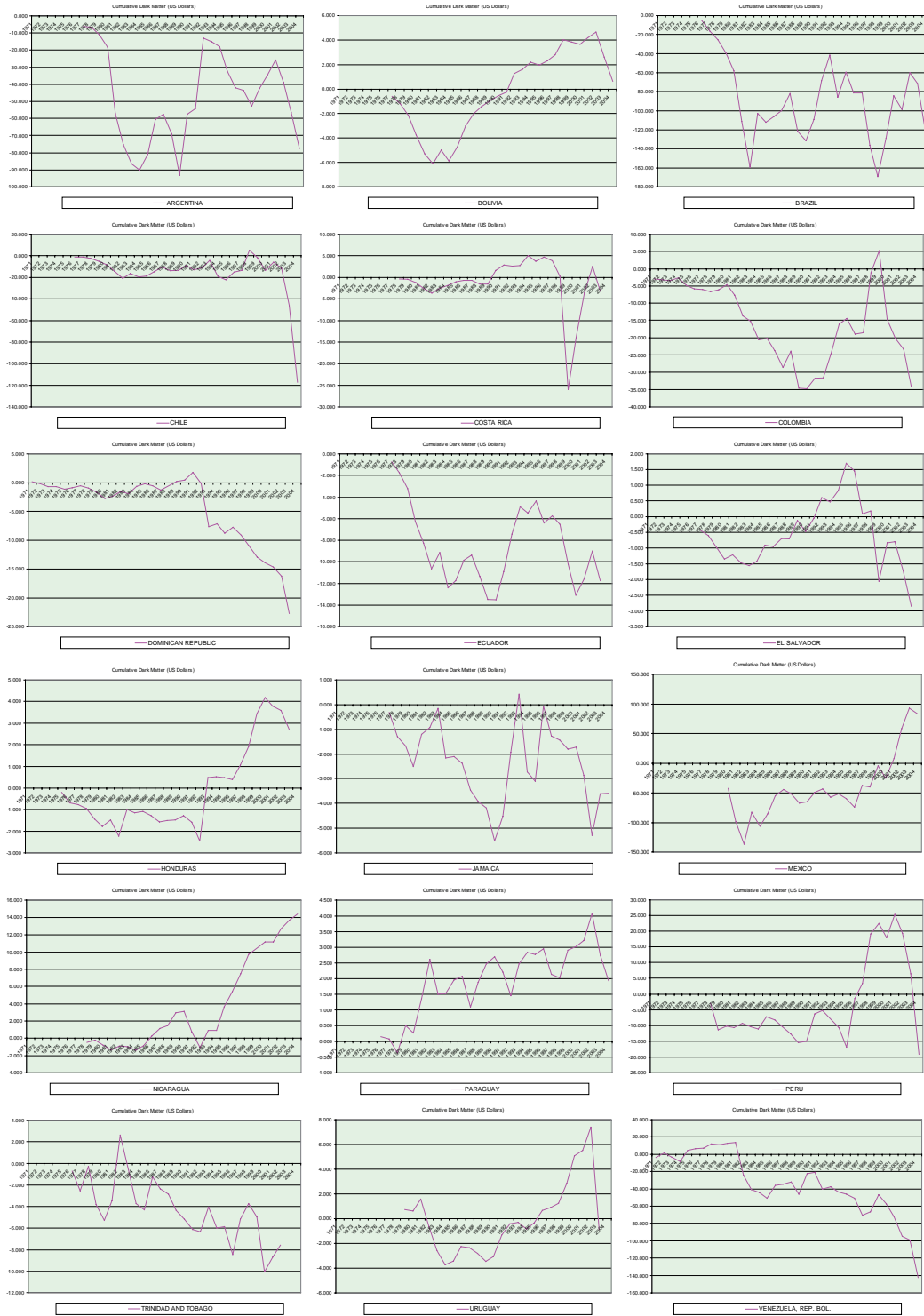
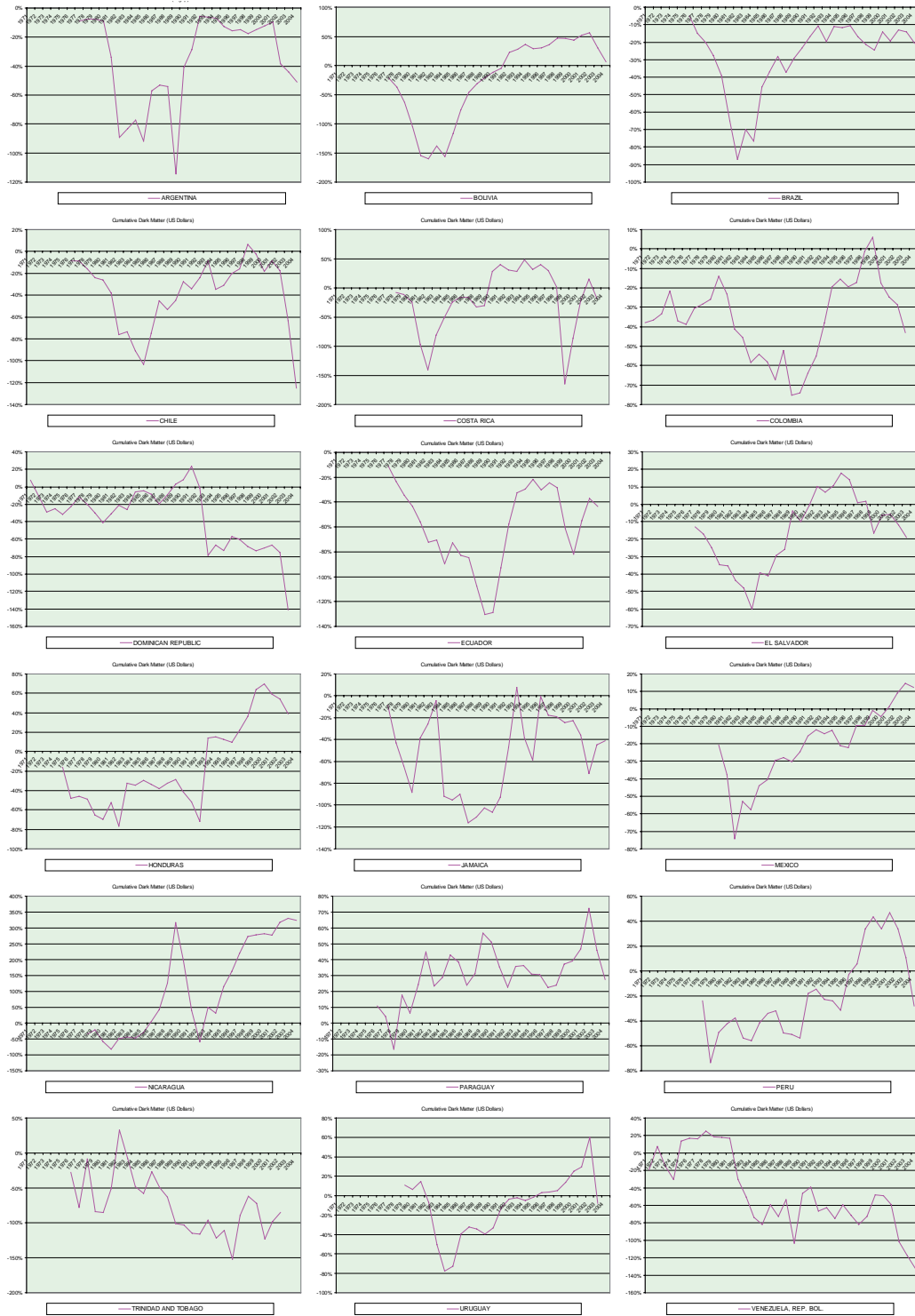


Figure 7. Cumulative Dark Matter in % of GDP



5. Conclusions

In short, we find that while official current account dynamics capture reasonably well the evolution of net foreign assets in the region as a whole, they massively underestimate current account imbalances for commodity producers that have experienced significant increases in the real value of their FDI liabilities as a result of the recent commodity boom. Thus, recent years that have been portrayed as years in which the current account situation of the region had improved considerably appear under a less favorable light once dark matter is taken into account. In fact, once dark matter is taken into account the data suggests that since 2002 the region has accumulated about 300 billion in foreign liabilities far away from the current account surpluses measured by official data. It is true that official numbers typically overestimate the current account deficits of those countries that have benefited from debt relief, as official numbers miss the capital gain associated to debt forgiveness, but this effect, is not sufficiently strong to overturn the previous effect.

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