Measuring Argentina's GDP Growth

Myths and facts

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Key points

- Since 2007, official economic statistics in Argentina, particularly on consumer inflation and GDP, have been subject to political manipulation.
- This paper reproduces Argentine national income from 2007 using standard methods and original sector data and finds that declared GDP is 12.2% higher in 1993 prices due to political intervention.
- The paper finds that the distortion is mainly due to changes in accounting methodology across industries and not to changes in inflation estimates.
- The reproduced GDP data dispels the myth that Argentina has been the fastest growing South American economy in recent years.

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[1] The main results published here have already been presented in several workshops and conferences at ECON2011, AAEP, IARIW, IADB, Harvard University and the University of Buenos Aires. The opinions expressed herein are the author's, and do not necessarily reflect those of the institutions to which he belongs.

[2] This paper has been written as a tribute to Alberto Fracchia who recently died, who was a well-recognised expert on national accounts and statistics of Argentina and Latin America. He was the founder of the National Accounts Bureau in Argentina, and an expert for several Latin American countries. He transmitted to me the 'love' of numbers and economic series. After 2007, his pupils had to follow their careers outside the official institutions of Argentina or in other countries.

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Introduction

During the last two decades, Argentina has experienced several significant structural changes that have affected its macroeconomic policy regime. The consequent economic instability had a strong impact on the sustainability of long-term growth.

Since its last economic depression period (1998–2002), the Argentine economy has experienced an important recovery in its GDP level, which was particularly strong until 2007. This process was partially due to an initially successful 'mega-devaluation' of the domestic currency, and to the 'tail winds' of the most favourable terms of trade of the last decades. The depression followed the period of the exit of the so-called 'Convertibility Plan' (1991–2001), and the economic policy regime shifted dramatically from trade openness, privatisation, deregulation and supply-side policies to a 'competitive real exchange rate' and demand-driven policies. But since 2006, in spite of positive external tail winds, populist political interventions such as the freeze of public utilities tariffs, restrictions on imports and, later, extreme exchange rate controls, an acceleration of inflation was generated to an annual double-digit rate, and later to a black market for foreign currency.

> **In 2007 the administration decided to hide inflation by intervening in the construction of the official consumer price inflation index estimated by the National Statistics Institute.**

At the beginning of 2007, the administration decided to hide inflation by intervening in the construction of the official consumer price inflation (CPI) index estimated by the National Statistics Institute (INDEC). This process continues although, in 2014, INDEC will issue inflation data according to a reformed methodology following censure by the IMF.[3] Since the beginning of the intervention, several academic and private analysts have estimated that the actual CPI has been considerably higher than the one reported on the official series. The consequences opened up a 'Pandora's Box', which distorted the measurement of other important economic indicators, such as the poverty rate and income distribution. At present, for example, Argentina has an official poverty rate at a lower level than those of many developed countries such as Sweden, Finland and other Nordic European countries.

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[3] See http://en.mercopress.com/2014/01/15/argentine-annual-inflation-28.38-according-to-the-congressional-index.

The political intervention in the construction of the CPI began in January 2007, but a few months later the wholesale price index (WPI) was also modified, as were the official household and employment, manufacturing and other surveys. All these interventions had a profound influence on many Argentine economic indicators since the estimations of GDP, employment and inflation are linked in several ways. The only exception to this 'chain of distortions' is probably statistics on registered employment, which come from fiscal records. One of the reasons for the political intervention was to reduce the amount of public debt indexed by the CPI 'to increase public savings'. Paradoxically, at the same time, the positive bias that occurred on GDP growth has generated some substantial 'extra payments' of the public debt linked to GDP growth.[4]

The evidence of the political manipulation of statistics creates both economic and academic incentives to produce alternative 'non-official' estimates of GDP in order to estimate and analyse more accurately the country's growth profile, productivity and competitiveness of Argentina using the ARKLEMS database. ARKLEMS+LAND is a research project on the measurement, analyses and international comparisons of the sources of economic growth, productivity and competitiveness of the Argentinean economy at macro and industry level.[5]

The purpose of this paper is to report on the use of the ARKLEMS database to estimate indicators of economic activity that reproduce GDP growth in Argentina from 1993 to 2012 in very high detail,[6] following the same traditional sources of information and methodology followed by the Argentine National Accounts System during the 25 years prior to the INDEC intervention. By showing this, we will also be able to measure the macroeconomic and sector-level distortions induced by the intervention.

The paper is structured as follows. Next, we present the framework of the production of national income accounts in Argentina in an international context prior to the INDEC intervention. Then, we explain the

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[4] The 2005 debt restructuring following the Argentine debt default introduced an innovative GDP-linked warrant. See http://embassyofargentina.us/embassyofargentina.us/en/news/120725debtrestructuring.htm.
[5] The methodology is based on the KLEMS framework (Capital, Labour, Energy, Material and Service Inputs) in coordination with the WORLDKLEMS Project led by Pr. Dale Jorgenson (Harvard University), Marcel Timmer (Groningen University) and Bart Van Ark (Conference Board and Groningen University). The ARKLEMS+LAND project is organised by a team of Argentinean academics and researchers from the University of Buenos Aires with 15 years' experience in KLEMS measurement of the sources of growth, national accounts and input–output matrices. The project is audited by a prestigious academic committee.
[6] Measured by the International Standard Industrial Classification.

national accounts methodology traditionally employed in the country. After that, we disclose the results derived from the correct replication of that methodology using our database which contains similar and published basic series followed by the original Argentinean national accounts during the intervention period, and compare reproducible GDP to official figures in aggregate and on a sector-by-sector basis. Next, we discuss the differences between our results (the facts) and investigate several of the myths that have grown up around Argentina's economic growth. Finally, we present the conclusions.

The production of national accounts in Argentina

Diewert and Fox (1999) have discussed how measurement error can bias the measurement of output and productivity above all in the service sector. However, failures to adjust prices of inputs and outputs as a result of inflation are 'legitimate' errors, not manipulations aimed at showing political results.

Problems existing with official statistics and the creation of 'Pandora's Box' effects to show political results mostly on GDP have been well documented for countries such as China. Maddison and Wu (2008), for example, found several biases when they recalculated China's GDP in comparison to official estimations, including a clear positive bias on official GDP for the period 1993–2003 (mostly due to distortions in the measurement of non-material services, based on inconsistencies in labour input indicators). Ren (1997), Jorgenson and Vu (2001) and Young (2000) discuss the problems with the official estimates of real GDP and make their own estimates using alternative deflators, which show lower relative economic performance.

Similar issues arise in other countries such as in the recent case of Greece. Sturgess (2010), for example, reports distortions related to the measurement of public debt and public finance indicators, in order to show a deficit figure below the 3% of GDP required to enter the Eurozone. The accumulated consequence of those distortions was dramatic during the European crisis of 2009. In the case of Chile, Streb (2010), Cortázar and Marshall (1980) and Cortázar and Meller (1987) detected discrepancies in the last quarter of 1973 and for the 1976–78 period, while García and Freyhoffer (1970) found underestimations of official inflation in the period 1964–68 – a period where there were price controls.

The political distortion of the Argentinean CPI has been reported in Cavallo (2012).[7] Many academics share the view that not only the CPI[8] but also real GDP growth has been significantly lower in Argentina than the official publications report, but up to now these differences have not been systematically estimated, verified and reported. This paper demonstrates that Argentina is another example of the consequences of the 'Pandora's box' effects of distorting an economic series to show political results. But in the case of Argentina the problem may be worse since the country was well known in Latin America for the quality and skills of the human capital applied to statistical tasks in its public institutions. The Argentine National Accounts and Statistics Systems background was well recognised for its professionalism, consistency and credibility. Several statistics and national accounts professionals studied and benefited from the experience of Argentine experts from INDEC, and from the Economic Commission for Latin America and the Caribbean (ECLAC) Buenos Aires office until the intervention in 2007.

The background to Argentina's estimation of GDP based on several versions of the United Nation's System of National Accounts (SNA) before the intervention is well documented. Since Alberto Fracchia and Manuel Balboa founded the department 'National Accounts: GDP and Balance of Payments' in the Central Bank of Argentina at the beginning of the 1950s, Argentina had been a leader in applying the SNA in its official statistics. Several important projects helped to update base years in the last five decades: 1950, 1970, 1986 and, most recently, in 1993.[9] The latest experience in updating the base year of the national accounts has been documented in ECLAC (1991), PNUD-BIRF (1992), SNA Argentina (1999), IO97 Argentina (2001) and Coremberg (2009, 2011, 2012a).

The National Accounts Bureau of Argentina has historically been subject to political pressures. It was born as an office of the Central Bank, but moved to the Ministry of the Economy at the beginning of the 1990s, and finally moved to INDEC at the beginning of the 21st century. But, both the National Accounts Bureau and the INDEC had always been independent

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[7] Another important and methodologically consistent alternative estimation has been made by G. Bevacqua, former Director of the CPI, published as CPI GB and issued by email.

[8] Since 2007, many consultants and other experts have been fined by the government; the Argentinean justice system has quashed these penalties only recently after more than four years of trials and judicial conflicts.

[9] See Table A1 in the Appendix for detailed references to the antecedents of National Accounts in Argentina.

until 2007.[10] This independence had been recognised by academia in Argentina and in Latin America as a whole until the intervention in 2007.

Methodology and data compilation

At present, the GDP growth of Argentina is estimated following an old approach: the Laspeyres volume index at 1993 prices. National accounts in most developed countries, and also in several Latin American countries such as Chile, have progressively moved to the so-called 'chain indices', such as the Fisher index, the chain Laspeyres index and other superlative indexes such as the Tornquist index, which has been used for the case of productivity measurement; OECD (2001); EUKLEMS (2007); Conference Board (Chen *et al.* 2010); and ARKLEMS+LAND project (Coremberg 2012a).

The National Accounts of Argentina lag behind those of many countries in terms of methodology, in the update of the base year (it uses an old set of relative prices and weights) and mostly now in terms of credibility. Many countries in Latin America, for example, have all updated the base year to more recent post-2000 years, as in the case of Chile (2008), Ecuador (2007), Nicaragua (2006), Colombia (2005), Uruguay (2005), Mexico (2003), Guatemala (2001), Brazil (2000) and Honduras (2000). In addition, Brazil, Chile, Colombia and Guatemala applied chain indices more than five years ago.

However, the official Argentine GDP growth positive bias has neither appeared because the base year is old nor as a consequence of the deflation of values by a biased CPI price index.[11] The main difference is due to the statisticians in charge of the production of national accounts having withdrawn the traditional methodology that Argentina followed for more than 25 years.

As reported in PNUD-BIRF (1992), SNA Argentina (1999), IO97 Argentina (2001) and Coremberg (2002, 2009, 2012a), most components of Argentine GDP were estimated using volume index indicators and not

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[10] CPI intervention began in January 2007. Full intervention in the national accounts bureau began during the last quarter 2007.

[11] The same reasoning could be applied to the case of the CPI. The distortions in the CPI are not because, prior to the intervention, the CPI was of a low quality because it was based on old weights derived from an old Household Expenses and Income Survey. The fact is that the basic price collection process and the publication of aggregates are manipulated. Also the publication of price levels for particular classes of goods was abandoned from 2007.

by deflating the value of production or value added at current prices (see Table A4 in the Appendix). This methodology was adopted more than two decades ago, and has been applied to the main basic series constituting the GDP of Argentina. These volume index indicators do not belong to INDEC, but mainly to other more representative public and private surveys carried out by different institutions. Checking the consistency of actual GDP estimations against official GDP data is therefore possible, but a difficult task that demands time as well as a detailed knowledge of the data sources and the methodology used for estimating the GDP figures.

In order to do that checking, we reproduce the GDP of Argentina following the traditional methodology followed by National Accounts. We compiled published and public series, which make up every industry's value added volume index of GDP at the 4–5 digit of the ISIC classification from 1993 up to the present. The series are mostly the same taken into account by the Standard National Accounts according to the published methodology (SNA Argentina 1999), as cited in Table A2 in the Appendix.
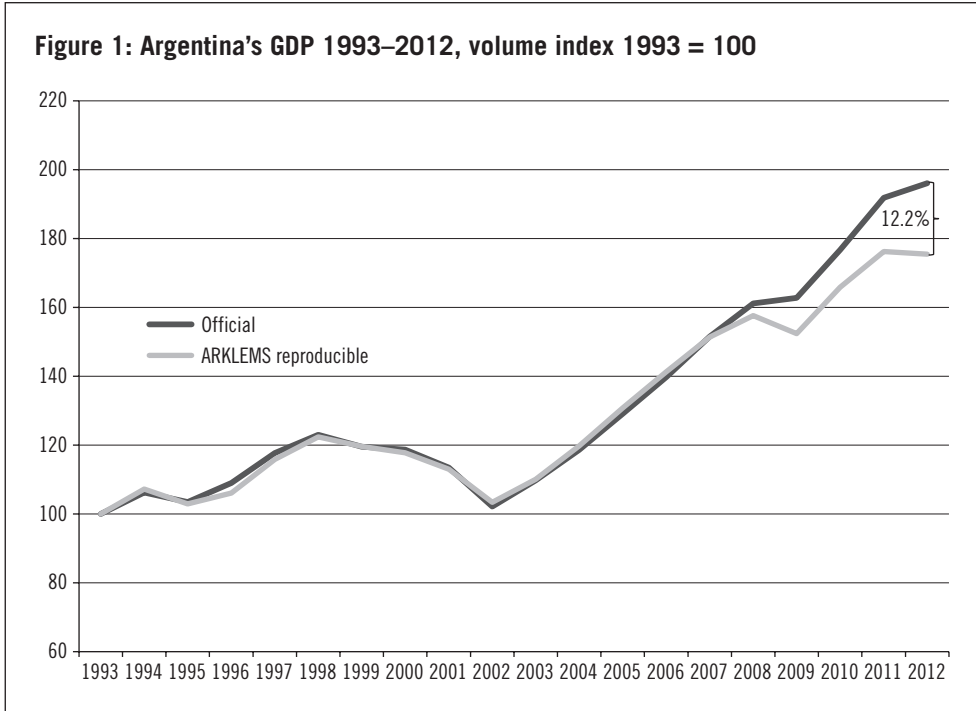
Reproducing Argentina's GDP: main results

We collected and compiled the same basic industry series, which in total constitute the GDP of Argentina according to published and public indicators before the 2007 statistics intervention, and we applied the traditional methodology to aggregate them.

The main result of this procedure is a reproducible GDP series that replicates almost exactly official Argentine GDP growth from 1993 to 2007. After that latter year, however, an important gap appears. This gap accumulates into a substantial difference increasing every year since then, as illustrated in Figure 1.

Official real GDP shows a positive gap of 12.2% for 2012 with respect to reproducible ARKLEMS GDP. This lower level of GDP at constant prices has several implications for macroeconomic analyses. Argentina, in fact, has had a more modest growth profile than official data have suggested, as will be analysed in the next section, but also a lower level of non-price competitiveness due to lower capitalisation, and both labour and total factor productivity.

> **Official real GDP shows a positive gap of 12.2% for 2012 with respect to reproduced GDP by the author.**

Figure 1: Argentina's GDP 1993–2012, volume index 1993 = 100

There are also differences revealed in real growth rates between the series. Our estimation of GDP growth, following the traditional methodology and the usual data sources, shows that GDP has grown by less, year on year, than the official figures have suggested since 2007. As we will see in the following section, during the period of intervention of official statistics, according to our reproduced data, Argentina's GDP grew 15.9% between 2007 and 2012 (3% at an average annual rate), an outstanding GDP deceleration with respect to the prior period 2002–07 of 47% (8.1% at an annual average rate), before intervention. However, official figures show a double rate of higher GDP growth in the period 2007–12: 30% (5.3% annual average rate). Moreover, the official figures change the sign of the rate of change of the GDP cycle, showing a positive rate of growth during the 2009 and 2012 recessions.

Several discrepancies by industry explain this macroeconomic difference between both GDP estimates. It is worth pointing out, however, that not all the differences at the industry level are positively biased in the official indicator: in some years, some of our series grew more. This occurred in the case of freight services in 2010 and 2011, construction in 2011 and 2012,

Figure 2: Argentina GDP growth 2007–2012, annual rates

and public administration during the whole period under analysis. This fact shows that our indicator does not create a systematic bias downwards in the level of the GDP, as opposed to the bias generated by the discretional intervention on the official series. Hence, the gap between the two series is mainly due to the withdrawal of the traditional methodology followed in constructing National Accounts in Argentina since the last quarter of 2007.

We compile the same series and apply the traditional methodology as historical national accounts (Table A4 in the Appendix) by industry at the 4–5 ISIC level classification. This procedure reveals the existence of a 'Pandora's Box' effect of accumulation of positive gaps between official GDP series by industry with respect to our indicator. This bias occurs in most individual series (with very few exceptions). This is discussed in the following paragraphs, where we review each sector separately.

Agriculture and livestock

We reproduced this sector at a highly detailed level. We detected that some regional crops and minor livestock activities are no longer included in the official series, but this does not cause any important difference

with our ARKLEMS estimation (except for a higher variance related to 'weather effects' and changes in supply decisions).

Mining

In Argentina, this industry is mostly based on oil and gas extraction (which represents nearly 98% of the Argentine mining sector). We also included metallic production and other mining activities but, taking into account the crisis in oil and gas production that has been ongoing in Argentina since 2000 up to the present, we captured a negative downward trend in the series, which is not reflected by its official counterpart. There is also some evidence that official series include metallic mineral extraction activities at 2004 prices instead of the 1993 base year. This is an incorrect discretionary criterion probably driven by the intention to show a positive growth trend to avoid any reflection of the crisis in oil and gas production.

Electricity, gas and water supply

The official series since the end of 2007 do not reflect the underlying trends that appear in the basic series of the main utility supply indicators.

Manufacturing sector

This sector is a core element in the construction of estimates of GDP of the National Accounts. This is due not only to its direct impact on aggregate GDP (more than 20% of the total at constant prices) but also to the indirect impact on the estimation of other sectors' value added. This is, for example, the case for trade and transport, whose GDP estimation is directly linked to the manufacturing sector (also it represents another 10% of total GDP).

For the manufacturing sector we compiled original indicators for more than 100 different industries at 4–5 ISIC digits (representative branch), detecting any important gaps since the last quarter of 2007. Our guess is that the official series now takes into account the original INDEC Manufacturing Quarterly Survey, which collects value-of-production data at current prices, and deflates it using the wholesale index prices. As described above, the wholesale price index has been distorted since 2008. This survey has never been taken globally into account in the estimation of value added and gross output of the manufacturing sector in national accounts (ECLAC 1991; SNA Argentina 1999). Using a methodology that takes into account the basic volume series of traditional Argentina national accounts, and not a manufacturing survey

that deflates values at current prices, we find very different figures in our manufacturing sector estimations.

Construction

The traditional methodology measures value added and output as a weighted compounded indicator that takes into account a volume index of construction materials[12] and employment. Several years ago (before the political intervention), the materials' indicators methodology was modified: the weights were changed from 1993 to 1997. The basic series have several methodological problems (e.g. cement changed from an output volume indicator to an indicator that captures sales to the domestic market). Since 2008, the materials' indicator was changed and the indicator for the employment in the construction sector was included in national accounts without a clear and systematic methodology. We think that the INDEC should capture total employment from a household survey, but this survey is available only with a lag of several months, so there is no reported evidence about what kind of employment indicator is in fact used in the measurement of national accounts. The GDP series elaborated by us takes into account registered employment and an indicator of materials from the main materials producers (which correlates well with the original INDEC indicator up to 2007). Important differences in the performance of the sector were also detected in 2008 and 2009.

Wholesale and retail trade

There has been a systematic gap between reproducible GDP and official GDP since 2007–08, due to the impact of the application of an adjusted series from agricultural and livestock sector and also from manufacturing.

Hotels and restaurants

There has also been a systematic gap between the two series since 2007–08 in this sector. The case of hotels and restaurants is impressive, especially during 2009: the official INDEC GDP series does not take into account the impact of the H1N1 flu and the negative shock of the international crisis on tourism activity, reflected in the basic series elaborated by the Argentine Department of Tourism. For example, room nights dropped more than 30% at a national level (50% in Buenos Aires city), and most restaurants and

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[12] It is called ISAC and is a Laspeyres index of cement, iron rods, paintwork, bricks and asphalt.

cafeterias had to close for several months due to H1N1 restrictions during that year. Nevertheless, the official GDP indicator for tourism grew by 1% (in comparison to a reduction of 4% in our alternative indicator).

Transport and communications

In this sector, there is also a systematic gap due to the impact of the application of commodity flows on adjusted series from agricultural and livestock sector and manufacturing. Our series grew more than the official series during 2010 and 2011, but since 2012 have grown less. The official GDP sector indicator does not take into account the important negative impact of labour union riots on bus and metro transport, and the accident that occurred on the main railroad passenger service on February 2012, which provoked a huge fall in passenger transport activity.

Financial intermediation

There has been a systematic gap since 2007 and this is the only case investigated where the gap has to do with the deflation of nominal figures by a biased CPI: FSIM,[13] bank fees and other activities related to financial intermediation such as insurance, credit cards, private pension fund fees, etc. Besides, the official GDP measurement did not take into account the drop in 2008 in the activity of private pension funds due to nationalisation.

Business and real estate activities

Once again, there has been a systematic gap between the two series since 2007–08. Some evidence of non-systematic approaches on real estate activities with own or leased property prior to intervention also exists, but this does not impact considerably on the sector's output at 1 ISIC digit. The gap is generated because of inconsistent official measurement through commodity flows of minor sectors such as renting equipment, and inconsistencies with the original labour input series of professional services.

Public administration

This is the only case where our GDP indicator shows a small positive gap in levels and a moderate growth against the official series, especially since 2007. The official estimation includes a non-public non-reported series

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[13] Financial intermediation services indirectly measured.

of public administration employment, which supposedly includes labour in public offices at the national, provincial and local levels, together with military employment. Our estimate takes into account registered employment in public administration from fiscal records. This series has the disadvantage of excluding some provinces, but reflects a higher trend of public employment that is not reflected in the national accounts official non-public series. There is strong evidence of a boom in public employment since 2007, and mainly during national election years (2009 and 2011), which is not totally reflected in the official national accounts.

Other services

This sector includes education, health and other services whose original methodology in the annual official series is based on the school enrolment, and hospital and other health centres utilisation indicators. But these indicators are not used at the required frequency; quarterly official series follows the employment series[14] until 2007. We detected that the original traditional employment basic series included in our GDP estimations didn't match the official series from 2008 producing a systematic positive bias.

Stylised facts and myths

Political interference in the production of statistics and a general recognition of this problem by academia, the media and public opinion has created a number of stylised facts about economic growth in Argentina that, on closer inspection, turn out to be myths. These myths can be dispelled using our GDP estimations. Three myths are evaluated below, which we call the methodology myth, Argentina's resurrection myth and the myth that Argentina is a Latin American growth champion.

The methodology myth: official Argentine GDP data have a positive bias upwards because official INDEC estimation deflates value added at current prices with a manipulated consumer price index

As shown above, official GDP shows a positive bias of 12.2% for 2012 compared to reproducible GDP. Since 94% of the value of GDP before

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[14] It is worth mentioning that the National Accounts Bureau has not published any annual revision since 1999.

considering the impact of political intervention is based on volume indicators by industry, this means that positive biases in official GDP are not due to a consistent application of a new methodology with distorted price indices, but, worse, to the act of withdrawing the traditional methodology of National Accounts and applying discretionary non-reported criteria. The reproducible GDP revision shows that, using traditional methodology and data sources, only financial intermediation (5% of GDP) is affected by deflation.[15]

Furthermore analysing the contribution of each sector's value added finds that financial intermediation explains only 27.9% of the total GDP gap between official and reproducible GDP as is shown in Figure 3.

The largest sectors explaining the total gap, besides financial intermediation, are trade (28%) and manufacturing (22%), which explain 50% of the total gap. The rest of services and goods production explains a smaller share compensated by minor negative gaps from public administration and agriculture.

> **The GDP gap depends not on inflation data manipulation but on changing the original national accounts methodology.**

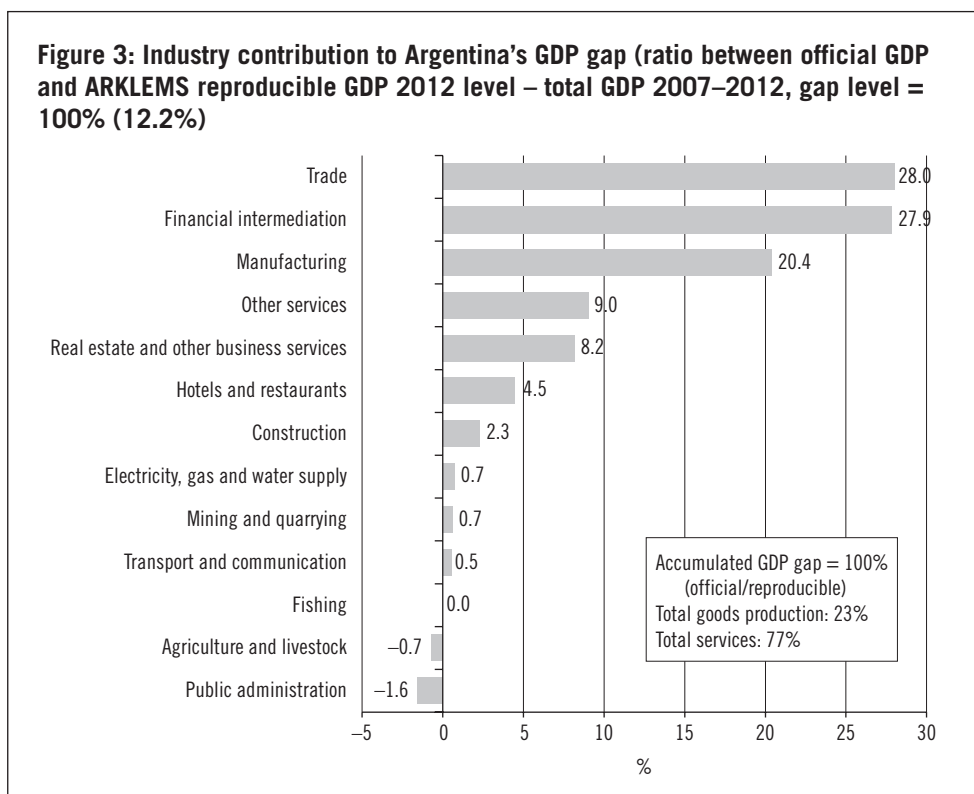To summarise, our GDP estimations show that the resulting GDP gap does not depend on official CPI index manipulation, but is mainly due to discretionary intervention in individual industries that imply changing the original national accounts methodology.

The resurrection myth: the recent Argentine GDP growth episode was the highest growth acceleration for many decades

It is important to analyse the GDP cycle to study whether an economy is recovering from a recession or a previous crisis, and whether it restarts a process of growth acceleration. It is also useful to assess whether an economy is growing in the long term beyond a cyclical recovery (Hausmann *et al.* 2005). This is an old and basic approach, sometimes known as the 'NBER approach'.[16] Its origins date back to a book by Burns and Mitchell (1946) written more than 60 years ago.

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[15] In the case of restaurants and non-regular passenger transportation, the traditional methodology uses a demand function approach (because there are no direct surveys on those industries), so index prices do not enter directly in the estimation unless through the relative prices of those categories in the CPI. But this methodology was abandoned in 2003, before the beginning of the intervention, based on a unitary income elasticity.

[16] National Bureau of Economic Research.

Figure 3: Industry contribution to Argentina's GDP gap (ratio between official GDP and ARKLEMS reproducible GDP 2012 level – total GDP 2007–2012, gap level = 100% (12.2%)

Industry	Value
Trade	28.0
Financial intermediation	27.9
Manufacturing	20.4
Other services	9.0
Real estate and other business services	8.2
Hotels and restaurants	4.5
Construction	2.3
Electricity, gas and water supply	0.7
Mining and quarrying	0.7
Transport and communication	0.5
Fishing	0.0
Agriculture and livestock	−0.7
Public administration	−1.6

Accumulated GDP gap = 100% (official/reproducible)
Total goods production: 23%
Total services: 77%

%

According to Hausmann *et al*. (2005) the output recovery after a crisis ('the recovery effect') could be sustainable in the long term as long as the post-growth output exceeds its pre-episode peak. Generally, GDP peaks coincide with an output level near the potential output, where all production factors are fully utilised. In general, GDP between cyclical peaks grows at a lower rate than during a recovery phase, because it is more difficult to grow when there is full capacity utilisation. Furthermore, GDP growth rates in the long term (between peaks) are usually lower than GDP growth rates during recoveries, because the former are based on productivity rises and not on changes in the production factors' utilisation rates, as explained by Coremberg (2012a) and Jorgenson (2011).

One of the stylised facts of the commodity price boom that took place between 2002 and 2011 is that the economic growth of Latin America and Argentina occurred after a deep economic depression during the period 1998–2001. How much of the economic growth was really due to the boom and how much was due to a 'recovery effect'? By how much did GDP

accelerate, in comparison to the previous positive phase that occurred during the so-called 'Washington Consensus period' in the 1990s? We believe that the answers to these questions depend on the consistency of the GDP series used.

The periods of analysis have been chosen in order to compare the actual boom to that which took place during 1990–98. This period corresponds to the initial positive phase of the reforms put into force after the lost decade of the 1980s. It lasted until the negative shock of 1998 followed by the economic depression period of 1998–2002. Moreover, comparing the crisis phase of 1998–2002 to the following decade, 2002–12, allows an analysis of the impact of the present boom of commodity prices on the recovery after the crisis. We also report data for the periods 2002–07 and for 2007–12, taking into account that 2007 is not technically a cyclical peak, but rather is the year when the political manipulation of official statistics began (especially in the final quarter of that year.

Table 1 shows the GDP performance in the periods previously defined above according to the official INDEC statistics and to our alternative GDP ARKLEMS reproducible estimations.

Measured at annual average growth rates, the most recent growth episode from 2002 to 2012 measured by reproducible GDP is similar to the previous positive phase in Argentine history from 1990 to 1998. However, the official figures show that average annual growth in the recent growth episode is stronger by 1.0% than in the previous one. Therefore, the figures in Table 1 show that there was no GDP acceleration for the period 2002–12 in comparison with the previous positive cycle, 1990–98.

The official and the reproducible GDP estimates show 'Chinese rates' of approximately 8% annual growth, only during the period 2002–07 (or 48.3% and 47.6% accumulated, respectively). However, between 2007 and 2012, the reproducible GDP series shows that Argentina suffered a significant GDP slowdown: 15.9% in accumulated growth (or 3.0% at an annual average rate). The official GDP performance, however, is almost double at an accumulated 29.4% (or a 5.3% annual average rate).

A more formal approach to see if a growth episode qualifies as sustainable acceleration is that proposed by Hausmann *et al*. (2005). This approach classifies growth acceleration episodes and long-term growth in the long term, taking into account GDP per capita instead of GDP, using the following method:

Table 1: Argentina GDP growth (1993 prices)

		ARKLEMS (%)	Official (%)
1990–1998	Accumulated growth	56.3	56.3
	Annual growth	5.7	5.7
2002–2012	Accumulated growth	71.1	91.9
	Annual growth	5.6	6.7
2002–2007	Accumulated growth	47.6	48.3
	Annual growth	8.1	8.2
2007–2012	Accumulated growth	15.9	29.4
	Annual growth	3.0	5.3
1998–2012	Accumulated growth	42.2	59.4
	Annual growth	2.5	3.4

Source: ARKLEMS; GDP growth at producer prices

1. $g_{t,t+n} > 3.5\%$ per annum $\rightarrow$ Growth is rapid
2. $\Delta g_{t,n} > 2.0\%$ per annum $\rightarrow$ Growth accelerates
3. $y_{t+n} > \max(y_i)$, $i \leq t \rightarrow$ Post-growth output exceeds pre-episode peak
4. Relevant time horizon is eight years (i.e. $n = 7$)

where $g_{t,t+n}$ is the growth rate of GDP per capita (y) from t to $t + n$; $\Delta gt,n = g_{t,t+n} - g_{t-n,t}$ or the change in the growth rate at time t is simply the change in the growth over horizon n and y_{t+n} is GDP per capita after the growth horizon.

Table 2 shows the corresponding values for g and Δg according to the official and alternative GDP estimations.

By comparing the figures that appear in Table 2, it is evident from the reproducible data series that there was no GDP per capita acceleration for the period 2002–12 in comparison with the previous positive cycle of 1990–98. The acceleration occurs only during a period of five years (2002–07), but it does not fulfil all of Hausmann *et al.*'s (2005) rules for qualifying as a sustainable growth episode. Moreover, after 2007, the so-called 'Chinese rates' could not be sustained, since both GDP and GDP per capita growth showed a strong slowdown. There is no structural change on the GDP trend either, especially when we compare the trend of GDP per capita between 2002 and 2012, and the one that corresponds to the period 1990–98.

However, this technical classification of macroeconomic data does not deal with the important 'quality' differences of the present decade in

Table 2: Argentina GDP per capita growth (1993 prices)

		g		Δg	
		ARKLEMS (%)	Official (%)	ARKLEMS (%)	Official (%)
1990–1998	Accumulated growth		43.7		
	Annual growth		4.2		
2002–2012	Accumulated growth	48.3	38.3	−0.2	1.0
	Annual growth	4.0	5.2		
2002–2007	Accumulated growth	37.7	38.3		
	Annual growth	6.6	6.7	2.4	2.5
2007–2012	Accumulated growth	7.7	20.4		
	Annual growth	1.5	3.8	−2.7	−0.5
1998–2012	Accumulated growth	15.6	29.9		
	Annual growth	1.0	1.8		

Source: ARKLEMS; GDP growth at producer prices

comparison with 1990–98: more job creation, a real wages recovery and the scope of the 'social safety nets' in the Argentine economy. The sustainability of these changes in the long term, however, has been put into question. As demonstrated by Coremberg (2011, 2012a), Argentina's growth profile showed an unsustainable growth from the point of view of source of growth: the growth profile was extensively based on factor utilisation and accumulation, while total factor productivity slowed down during the recent growth episode. As shown previously, the reason is not only unsustainable use and the inefficiency of the use of productive factors, but also lower growth performance that it is not recognised in official statistics.

Argentine GDP grew only 2.5% between cyclical peaks according to ARKLEMS estimation (instead of the official figure of 3.4%). One of the main lemmas of the canonical economic growth theory as pointed out by Barro and Sala-i-Martin (2004), Aghion and Howitt (1998) and Acemoglu (2009) is that 'small numbers matter': one point of difference of GDP growth can explain a great part of the accumulated differences in GDP per capita level between poor and rich countries in the long term. Argentina can be taken as an example of this lemma: the PPP GDP per capita of 1998 was US$8,273,[17] so if the country could grow at a rate of 3.4% for the next 100 years its GDP per capita would reach US$53,559 (6.5 times its initial

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[17] Measured in 2000 constant price dollars.

GDP per capita level). However, if the growth rate were equal to 2.5%, as our ARKLEMS estimation suggests, then GDP per capita will reach only US$23,115, just 2.8 times the initial level. Of course, the exercise of measuring future GDP per capita according to official GDP growth computes 'freaky numbers': GDP per capita level could be 53 times higher (official figures of 2002–12) or 600 times using Chinese unsustainable rates (official figures for 2002–07). It is worth pointing out that 2.5% GDP growth and 1.0% GDP per capita growth is nearly what the Argentine growth profile was during the period 1900–2012, according to our estimates.[18]
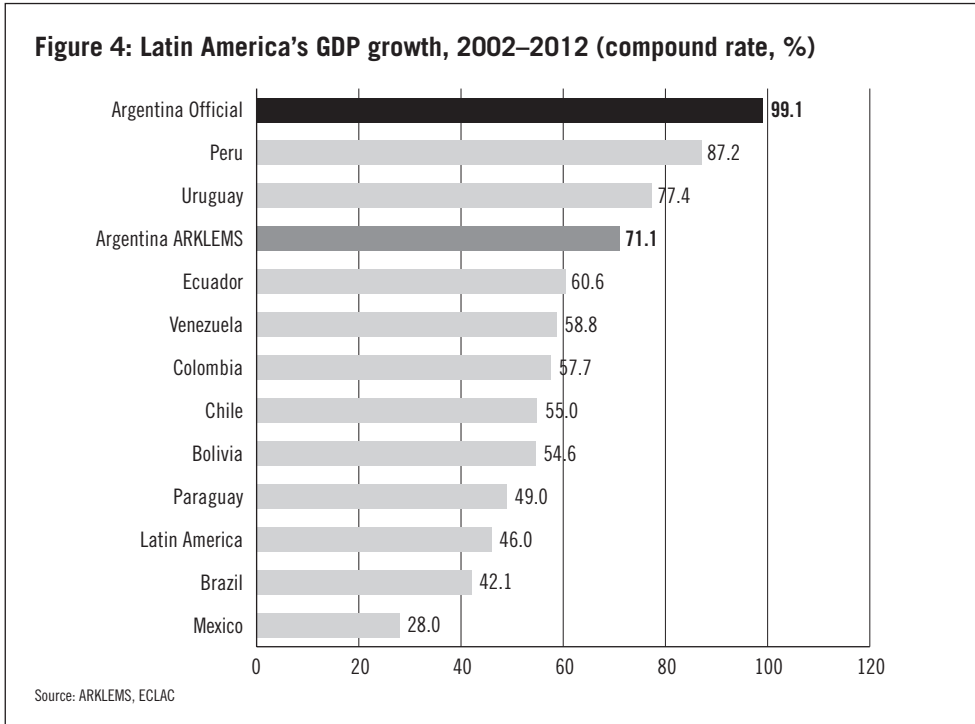
The growth championship myth: Argentina is the Latin American country that has had the highest growth acceleration in the region during the last decade

We have already seen that reproducible Argentine GDP growth during the boom from 2002 to 2012 was 71% in accumulated growth, or 5.6% at an average annual rate. This performance can be compared with that registered by other Latin American countries, as shown in Figure 4.

Argentina, Peru and Uruguay are the countries that lead the ranking of accumulated growth, far beyond the regional average for Latin America. The largest countries in the continent (Brazil and Mexico) grew below the region's trend. According to official figures, Argentina is the 'growth champion' in the whole region: its growth accumulated an impressive 99%, which is more than double the region's average. However, if we use our ARKLEMS GDP estimation instead, the growth performance of Argentina is substantially lower (71%, nearly 30 points less than the official figures), and lies behind those of Peru and Uruguay.

Although Latin America seems to have experienced a significant economic growth process since 2002, it is important to remember that the region was recovering from a previous economic recession. If one compares Latin American growth during 2002–12 (3.8% at an annual average) to the previous growth cycle of 1990–98 (3.4%), the region does not seem to show a differentiated performance between both periods. Even more, if

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[18] ARKLEMS Tornquist estimations measuring output including composition effects according to a growth accounting and productivity approach show a slightly lower trend of 2.3% between peaks (1998–2012) so GDP per capita would have grown in a century to US$18,206 per capita, which is 2.2 times the initial GDP per capita level (see Coremberg (2012a) for ARKLEMS Source of Growth methodology). Coremberg *et al.* (2007), conversely, show a GDP growth annual rate of 2.5% between 1950 and 2006. This figure updated would reach nearly 3% if we consider the whole 1900–2012 period.

Figure 4: Latin America's GDP growth, 2002–2012 (compound rate, %)

Country	Value
Argentina Official	99.1
Peru	87.2
Uruguay	77.4
Argentina ARKLEMS	71.1
Ecuador	60.6
Venezuela	58.8
Colombia	57.7
Chile	55.0
Bolivia	54.6
Paraguay	49.0
Latin America	46.0
Brazil	42.1
Mexico	28.0

Source: ARKLEMS, ECLAC

one takes into account the period in which the regime of import substitution was in force (1950–80), then Latin America grew at an annual rate of 5.5%. This figure is close to the present growth rates of most Southeast Asian countries (Ocampo 2012).
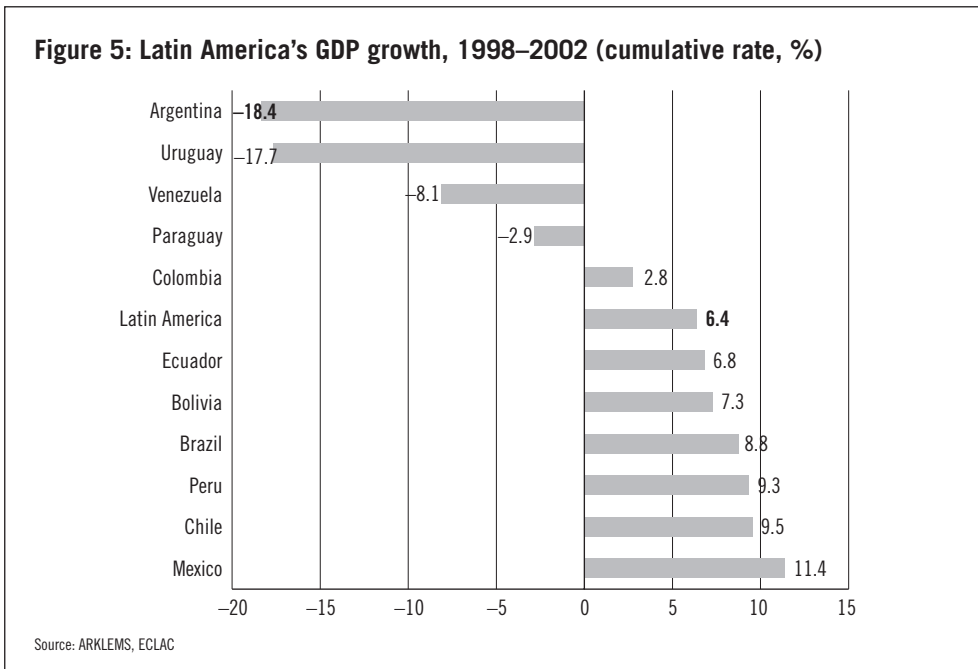
The beginning of the commodity price boom in 2002 coincided with the end of the great economic depression that had affected Latin America and began in 1998, with large currency devaluations in Brazil and Russia. The crisis was later magnified by so-called 'flight to quality' effect during the dotcom crises in the United States, when there was important capital flight outside Latin America. During this period of economic depression from 1998–2002, Latin America grew at an annual rate of only 1.3%, but it is worth pointing out that, while the rest of the region showed average positive but slower growth rates during that period, as shown in Figure 5, Argentina and Uruguay showed an impressive net drop in GDP, followed by Venezuela and Paraguay.

One of the reasons for the depth of the Argentine crisis was a lack of flexibility and the poor ability of its economy to face external shocks due

to the strong commitment to the currency exchange rate that the 'convertibility law' implied (the 1 to 1 parity between the Argentine peso and the US dollar). Similarly, Uruguay faced immediate negative consequences as a result of the crisis at the end of the convertibility law period in Argentina, because of the high interdependence between the two economies.

However, as shown above, Argentina displayed an important resurrection. The exit from the crisis and the recovery of the Argentine economy were due not only to the bailout and the strong devaluation of the domestic currency at the beginning of 2002, but also to the impact of an agricultural product prices increase (especially soybean and corn), which generated a significant increase in exports. In addition, there were also significant wealth effects based on urban real estate and farming land revaluation, which in addition to a bailout helped reduce the financial vulnerability of the private corporate sector (Coremberg 2012b).

However, according to the ARKLEMS measurement, the Argentine GDP recovery was important, but its rate was similar to the one registered in the previous recovery from hyperinflation during the 1980s. According to economic growth theory, we should be able to identify the sustainability of the present growth phase if we can analyse how much of this growth

Figure 5: Latin America's GDP growth, 1998–2002 (cumulative rate, %)
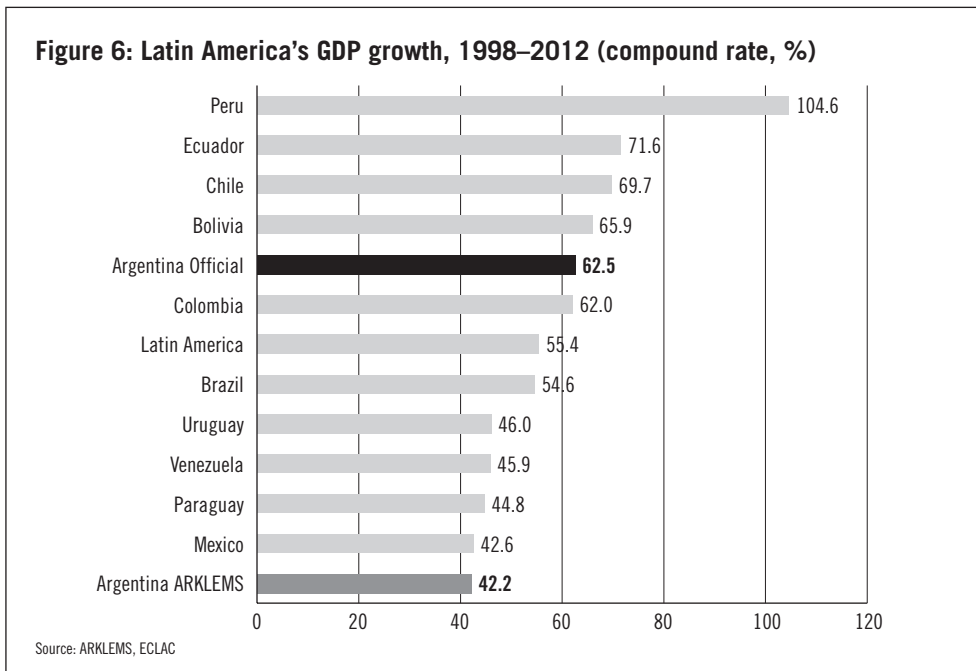
Source: ARKLEMS, ECLAC

is due to a recovery effect and how much has been based on sustainable growth above the maximum GDP level attained by the region before the crisis of 1998. When we look at that, we see that the countries' growth ranking substantially changes. Latin America as a whole grew 55% between 1998 and 2012 (which implies a 3.2% annual rate). However, Peru, Ecuador, Chile, Bolivia, Colombia and Brazil experienced a growth rate that was above the regional average.

> **Argentina grew 42% between 1998 and 2012 (20% less than the official figures), a rate slower than Brazil, Uruguay, Paraguay and Venezuela.**

Argentina's official GDP also shows a performance above the average of the region, but if we take into account the ARKLEMS reproducible GDP measurement, then Argentina belongs to the group of countries whose growth performance is below the region's average.

According to our figures, Argentina grew 42% between 1998 and 2012 (20% less than the official figures), and this figure is smaller than those that correspond to Brazil, Uruguay, Paraguay and Venezuela. So Argentina is the lowest growth country of Latin America in the long run.

Figure 6: Latin America's GDP growth, 1998–2012 (compound rate, %)

Country	Value
Peru	104.6
Ecuador	71.6
Chile	69.7
Bolivia	65.9
Argentina Official	62.5
Colombia	62.0
Latin America	55.4
Brazil	54.6
Uruguay	46.0
Venezuela	45.9
Paraguay	44.8
Mexico	42.6
Argentina ARKLEMS	42.2

Source: ARKLEMS, ECLAC

These comparative performances allow us to look at another concept that is generally forgotten about in the theory of economic growth: continuous growth. Not only are recovery and growth acceleration important, but also rates of growth must be continuous and sustained. This consideration reinforces the need to analyse continuous long-term growth periods without cyclical effects. In conclusion, the impact of the commodity price boom on Argentina allowed a recovery of aggregate demand with respect to that of the crisis period, but this has not been translated into any change in long-term growth trends. Argentina's recent growth episode, therefore, is a case of normal recovery in terms of the country's economic history of volatility and irregular growth, which does not seem to have generated a structural change in its long-term growth pattern.

Conclusions

This paper reports on an exhaustive revision of the Argentina National Accounts methodology in order to reproduce GDP series since 1993, and check economic growth after political interventions in the production of official statistics. GDP is estimated using the same traditional series and methodology that had been employed for 25 years up to the intervention of the official statistics in 2007. Our series reproduces Argentina's GDP growth closely from 1993 up to 2006. Since then, the difference between the official series and ARKLEMS reproducible series accumulates a large positive bias upwards due to intervention.

The divergence between our results and official figures is due to the withdrawal of the traditional GDP measurement methodology in almost every sector of GDP. This paper shows that these distortions are not based on deflating value added by industry at current prices levels with manipulated price indices but mainly on discretional intervention in every industry component of the GDP, not only in the financial sector but also trade and manufacturing, and the rest of services and goods production sectors, with the objective to be to show a higher GDP growth.

The official series present a picture of GDP growing at higher rates during the recent recovery period (2003–12) than in the previous one (1990–98), and they make Argentina lead the GDP performance of the region. But our research demonstrates that the ARKLEMS reproducible GDP for the recent growth episode had a similar performance to that in

the previous positive cycle, 1990–98. Technical analyses based on typical National Bureau for Economic Research (NBER) cycle decomposition, updated by Hausmann *et al.* (2005), shows that Argentina does not have a sustainable growth acceleration.

This paper has shown that Argentina's recent growth episode 2002–2012 was similar to the previous positive growth cycle period 1990–1998. Argentina was not the growth champion of the Latin America region during the recent growth episode. Argentina also has some of the highest GDP volatility in the whole region, showing the lowest GDP growth of the region in the long run, less than Brazil and Mexico, when the comparison is realised between the peaks of the economic cycle (1998–2012). Argentine official GDP could not evade the so-called 'Pandora's Box' effects, caused by the political intervention in official statistics.

Appendix

Table A1: Main background of National Accounts in Argentina

Date of publication	Title	Institution	Base year	Period
1946	National income of Argentina	NAB-Central Bank	1935	1935–1945
1955	GDP and income of Argentina	Secretariat of Economic Issues	1950	1935–1954
1958	The economic development of Argentina	ECLAC	1950	1900–1955
1964	GDP of Argentina	NAB-Central Bank	1960	1950–1962
1964–1968	Income distribution and national accounts of Argentina	CONADE-CEPAL (ECLAC)	1960	1950–1963
1966	GDP origin and national expenditure composition	NAB-Central Bank	1960	1950–1966
1971	GDP origin and national expenditure composition	NAB-Central Bank	1960	1950–1969
1975	System of national accounts and income of Argentina	NAB-Central Bank	1960	1950–1973
1979–1980	Quarterly estimations of supply and demand	NAB-Central Bank	1970	1970–1980
1996	Revision of quarterly estimations of supply and demand	NAB-Ministry of Economy	1986	1980–1996
1999	System of national accounts, base year 1993	NAB-Ministry of Economy	1993	1993–1997
2000	Update of supply and demand	NAB-Ministry of Economy	1993	1998–1999
2001	Input–output matrix 1997	NAB-Ministry of Economy-INDEC	1993	1997

Notes: NAB = National Accounts Bureau; all titles have been translated from Spanish

Table A2: Author's estimation of Argentina ARKLEMS reproducible GDP by sector, 2006–2012 (GDP in million pesos at 1993 prices)

	2006	2007	2008	2009	2010	2011	2012
Agriculture and livestock	17,265	18,515	18,823	14,819	19,392	20,031	17,618
Fishing	497	465	484	427	472	511	502
Mining and quarrying	5,219	5,162	5,090	4,911	4,932	4,737	4,636
Manufacturing	54,975	59,153	60,997	58,081	63,983	66,888	65,522
Electricity, gas and water supply	9,023	9,468	9,796	9,698	10,100	10,604	11,067
Construction	20,751	23,118	23,402	21,355	22,596	24,828	24,372
Trade	41,587	46,222	48,457	45,037	50,677	54,603	52,462
Hotels and restaurants	8,079	8,650	8,802	8,404	8,973	9,364	9,216
Transport and communication	33,049	37,561	40,991	42,858	49,233	55,388	56,571
Financial intermediation	14,573	16,794	16,855	15,302	16,184	17,994	18,745
Real estate and other business services	43,959	45,992	48,336	48,062	49,608	51,436	52,190
Public administration	15,561	15,957	16,758	17,917	18,762	19,781	20,799
Other services	44,603	46,541	48,459	49,556	50,727	52,173	53,025
Total	309,140	333,599	347,251	336,426	365,639	388,337	386,725

Source: Author's estimation of ARKLEMS reproducible GDP by sector based on data source cited in Table A4

Table A3: Official estimation of Argentina GDP by sector, 2006–2012 (GDP in million pesos at 1993 prices)

	2006	2007	2008	2009	2010	2011	2012
Agriculture and livestock	17,265	19,037	18,523	15,601	20,046	19,557	17,342
Fishing	497	465	484	427	472	511	502
Mining and quarrying	5,219	5,195	5,250	5,193	5,113	4,933	4,980
Manufacturing	54,975	59,153	61,842	61,503	67,547	74,962	74,660
Electricity, gas and water supply	9,023	9,541	9,863	9,954	10,567	11,049	11,583
Construction	20,751	22,806	23,641	22,744	23,915	26,085	25,396
Trade	41,587	46,219	49,870	49,751	56,245	64,486	65,739
Hotels and restaurants	8,079	8,745	9,417	9,486	10,180	10,964	11,137
Transport and communication	33,049	37,568	42,129	44,860	49,605	54,231	56,918
Financial intermediation	14,573	17,280	20,279	20,436	22,225	26,944	32,211
Real estate and other business services	43,959	46,018	48,902	50,878	52,982	55,661	55,860
Public administration	15,561	16,134	16,758	17,609	18,486	19,220	20,008
Other services	44,603	47,050	49,519	51,540	53,513	55,776	57,404
Total	309,140	335,211	356,478	359,983	390,896	424,380	433,740

Source: National Statistics and Census Institute (INDEC)

Table A4: Survey of GDP data sources by industry (SNA Argentina 1999)

Industry	Denomination	Volume index	Data source
A: Agriculture and livestock activities			
011	Growing of main crops	Crop area and tons	Buenos Aires Grain Exchange
	Other crops, horticulture and fruits	Crop area and tons	Ministry of Agriculture, USDA and Private Fruits Chamber
012	Farming of animals	Tons	Ministry of Agriculture
B: Fishing			
05	Fishing	Tons shipments of registered fishing	Ministry of Agriculture and other sources based on statistics on main fishing ports like Mar del Plata city
C: Mining and quarrying			
10 + 12	Mining of coal and lignite; extraction of peat, uranium and others	Tons	Production data from Mining Secretary
11	Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction, excluding surveying	Tons + metres drilled	Production data from Mining Secretary, cross checked from Institute Argentinean of Petroleum and Gas (IAPG)
13 + 14	Mining of metal ores + 14 – Other mining and quarrying	Tons	Consumer function based on IO97
D: Manufacturing			
15	Manufacture of food products and beverages	Cattle slaughter of different species in tons + tons milk production + milling and flour wheat production + sugar cane + production of beverage by type + grape for wine	Ministry of Agriculture + FAIM (Argentinean federation of milling industry) + Chamber of Spiritual Beverage + Institute of Viniculture + Beer Chamber + Beverage without Alcohol Chamber
16	Manufacture of tobacco products	Cigarette tobacco production	Ministry of Agriculture and data from main producers
17	Manufacture of textiles	Gross cotton fibre in tons	Ministry of Agriculture + series from Cotton Bureau of Chaco Province
18	Manufacture of wearing apparel; dressing	Tons	Own survey based on specialists and main producers
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	Tons	CICA (Argentinean Chamber of leather)
20	Manufacture of wood and cork	Tons	Own survey based on specialists and main producers

(continued)

Table A4: Survey of GDP data sources by industry (continued)

Industry	Denomination	Volume index	Data source
D: Manufacturing (continued)			
21	Manufacture of paper and paper products	Tons	Pulp and paper manufacturing chamber
22	Publishing, printing and reproduction of recorded media	Tons	Own survey based on specialists and main producers
23	Manufacture of coke, refined petroleum products and nuclear fuel	Tons	Energy Secretariat
24	Manufacture of chemicals and chemical products	Tons	CIFIM, CILFA, Petrochemical Institute, Fertilizer and Agricultural Health Chamber,
25	Manufacture of rubber and plastics products	Tons	Rubber Chamber
26	Manufacture of other non-metallic mineral products	Tons	Own survey on main glass producers, Cement Association, Tyre Chamber
27 + 28	Manufacture of basic metals and metal products	Tons	Centre of Iron and Steel Manufacturers, Aluminium Main producer
29 + 30 + 32 + 33	Manufacture of machinery and equipment, computers, communication and medical, other	Tons	CAFMA, AFAT (private chambers on agricultural equipment) + Manufacturers Association of Tools Machines + own survey based on specialists and main producers
34	Manufacture of motor vehicles, trailers and semi-trailers	Tons	ADEFA (Chamber of Manufactures of Vehicles)
35 + 36 + 37	Manufacture of other transport equipment + furniture + recycling, others	Tons	Own survey based on specialists and main producers
E: Electricity, gas and water supply			
40 + 41	Electricity, gas, steam and hot water supply + water	M3 + kw + ton (water)	Secretary of Energy, Aysa (water supply), CAMMESA (electricity distribution), ENARGAS (gas regulator)
F: Construction			
45	Construction	Weighted average of labour input and materials indicator	Own indicator of main materials from main producers: weighted average of main materials as painting, bricks, cement, and others + labour input based on household survey and registered employment surveys

(continued)

Table A4: Survey of GDP data sources by industry (continued)

Industry	Denomination	Volume index	Data source
G: Trade			
50 + 51 + 52	Wholesale and retail trade; repair of motor vehicles, motorcycles, and personal and household goods	Commodity flow on domestic production net of exports + imports by good type based on coefficients of IO	Own estimation based on own estimation of domestic production net of exports + imports (international trade data from Custom House) at 4–5 digit ISIC industry level
H: Hotels and restaurants			
55	Hotels and restaurants	Room nights for hotels + demand function for restaurants	Room nights (Survey of Tourism Secretariat) + restaurants: consumer demand estimated on Household Consumer Survey and flows of goods and services by type based on own estimation of income at constant prices ARKLEMS reproducible GDP net of non-market sectors at 4–5 digit ISIC
I: Transport, storage and communications			
61	Land transport; transport via pipelines	Passengers by transport mode + tons for cargo transport by mode	CNRT (National Commission of Transport Regulation), National Bureau of Aero Transport
62 + 63	Air + water transport	Passengers by transport mode + tons for cargo transport by mode	National Bureau of Aero Transport
64	Supporting and auxiliary transport activities; activities of travel agencies	Commodity flow, coefficients of IO	Based on demand activities at disaggregated level of ARKLEMS reproducible GDP at 4–5 digit ISIC
65	Post and telecomunications	Call minutes by type + postal shipments	CNC (National Commission of Telecommunications)
J: Financial intermediation			
65	Financial intermediation, except insurance and pension funding	Deflation by CPI GB	Publish methodology based on deflation of credits and deposits by unweighted average of CPI and WPI until intervention of National Accounts Bureau in last quarter 2007. If WPI is also distorted, as well as CPI, we adopted CPI GB, which is similar to other alternative private CPI and, more important, CPI of other provinces
66	Insurance and pension funding, except compulsory social security	Deflation by CPI GB	Insurance premium according to Superintendence of Insurance activity

(continued)

Table A4: Survey of GDP data sources by industry (continued)

Industry	Denomination	Volume index	Data source
J: Financial intermediation (continued)			
67	Activities auxiliary to financial intermediation	Deflation by CPI GB	Stock exchange, main credit cards, Superintendence of Regulation of Pension Funds
K: Real estate activities			
70	Real estate activities		
71	Renting of machinery and equipment without operator and of personal and household goods	Commodity flow, coefficients based on IO	ARKLEMS reproducible GDP by sector at 4–5 digit level
72 + 73 + 74	Computer and related activities, research and development, other business activities	Labour input	Household survey and registered employment by sector at 4–5 digit level ISIC
L: Public administration and defence; compulsory social security			
75	Public administration and defence; compulsory social security	Labour input	Registered employment
M + N + O + P: Other services – education, health, other community, social and personal service activities, domestic staff, other services			
80 + 85 + 90 + 91 + 92 + 93 + 95 + 96 + 97 + 99	Other services: education, health, other community, social and personal service activities, domestic staff, other services	Labour input	Household survey and registered employment by sector at 4–5 digit level ISIC

Source: this is a survey of data sources at 2 digit of ISIC classification, as used in this estimation. The estimation was made at 4–5 digit of ISIC according to traditional data sources and methodology of national accounts (more detail is available in SNA Argentina 1999)

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