

DIPARTIMENTO DI IMPRESA E MANAGEMENT
CATTEDRA DI MACROECONOMIA E POLITICA ECONOMICA

AN ANALYSIS OF INFLATION'S EFFECT ON UNEMPLOYMENT RATE DURING FINANCIAL CRISES

BASED ON "JOBLESS RECOVERIES DURING FINANCIAL CRISES: IS INFLATION THE WAY OUT?" BY
CALVO, CORICELLI AND OTTONELLO (2013)

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INTRODUCTION

Since the last economic crisis started, many politicians in Europe have been asking for the end of the EURO, claiming that a steep devaluation of the reborn national currency would restore unemployment to pre-crisis levels. Their positions are supported by several empirical studies: in fact, *jobless recoveries* are not likely to happen when the inflation is high but controlled (therefore excluding hyperinflation episodes).

The phenomenon of the jobless recovery is defined as the situation in which, after an economic crisis, the total output of a country grows faster than the employment rate, therefore causing poor life quality for the population and increasing social injustice. It is easily observable when, after the output reaches its pre-crisis level, the unemployment rate is still above its natural value (non-crisis periods' one).

To understand if this, together with other issues, could be true, I will analyse and describe the paper "Jobless Recoveries During Financial Crises: Is Inflation the Way Out?" by Guillermo Calvo, Fabrizio Coricelli and Pablo Ottonello (2013)

GOALS

Our goals are mainly two: -to discuss case studies we can find in the paper, -to analyse the three policy tools suggested by the paper in order to limit the jobless recoveries during financial crises. The focus on *financial* crises rather than the generic “economic” depends on the fact that evidence clearly shows financial crises having the most severe jobless recoveries. We can define a crisis as “financial” when it experiences a *domestic credit sudden stop*.

First case study is Sweden (1990-93 and 2008-09). While during both recessions the inflation rate was relatively low, the difference between them is their nature: older one can be classified as a financial crisis, while the other depended on a fall in export demand, and it did not affect the financial markets. Concerning Argentina, the episodes selected are the 1995 and the 1998-2002 ones. In this case, both show the aspects of a financial crisis, but the inflation was low during the first and high during the second. I will eventually analyse three more economic crisis using the guidelines given by the paper, in order to confirm its thesis.

Furthermore, I will describe the two tools displayed in the paper: inflation (with specifics on real currency depreciation) and credit-recovery policies. The econometric study about 55 financial crises in emerging markets will help the discussion.

In the appendix, I will show analytical results of econometric analyses on these seven cases.

CASE STUDIES

DEFINITIONS

First, we need to define certain terms we will use not to generate misunderstandings.

HIGH INFLATION means an annual inflation rate between 30 and 200 percent.

EMERGING COUNTRY is a country where physical financial infrastructures (banks, unified currency, stock exchange) exist, but market efficiency, accounting standards and security regulations are at a significantly lower level compared to advanced economies such as USA, Europe and Japan).

DOMESTIC CREDIT SUDDEN STOP “Sudden and large contraction in domestic bank credit flows”.

SWEDEN

Through the Swedish example, it is possible to check if and how the financial nature of an economic crisis actually affects the labour market.

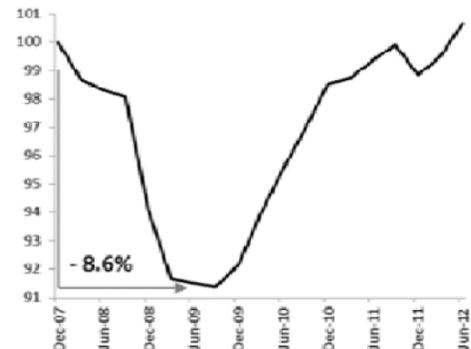
We start the analysis by defining the endogenous variable that is the unemployment rate, and three exogenous ones: Output, Bank Credit to the Private Sector and Inflation.

Crisis of 1991-1993

Crisis of 2008-2009

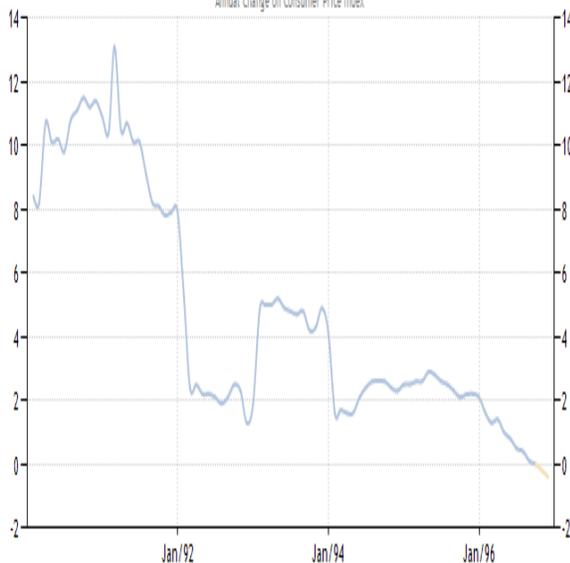
a) Output

(GDP per capita, in real terms)



SWEDEN INFLATION RATE

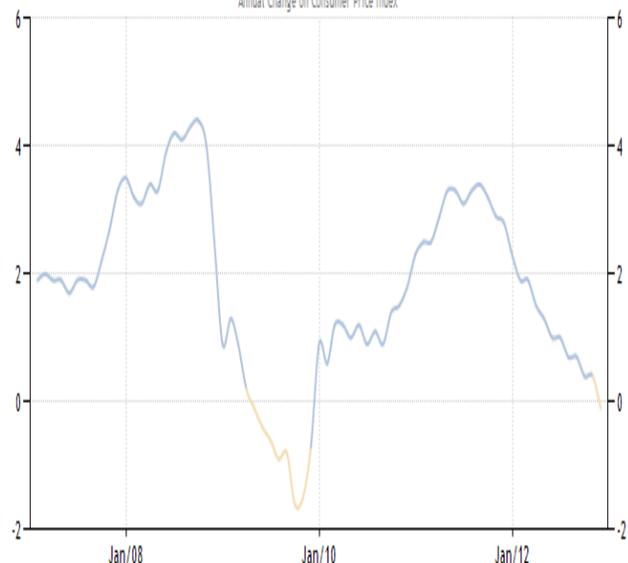
Annual Change on Consumer Price Index



SOURCE: WWW.TRADINGECONOMICS.COM | STATISTICS SWEDEN

SWEDEN INFLATION RATE

Annual Change on Consumer Price Index



SOURCE: WWW.TRADINGECONOMICS.COM | STATISTICS SWEDEN

First, it is possible to define both cases as economic crisis: the GDP per capita, in fact, shows large contractions (-7.7% and -8.6%) in two similar periods of time (about 6 and 5 years)

Second, we do not consider differences about inflation, because it was low in both cases.

b) Bank Credit

(Bank Credit to the private sector, per capita stock, in real terms)

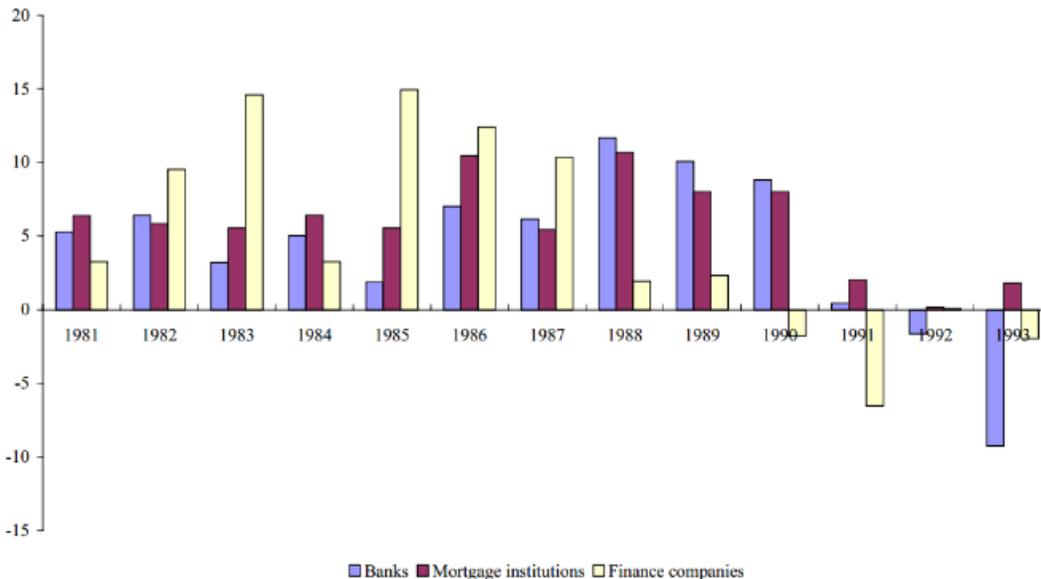


Lastly, we notice that only the first case can be defined as a financial crisis: during the 08-09 crisis in fact, the bank credit flows had been constantly increasing along the entire period. This is due to the different causes of the crisis.

CAUSES

Until 1985, Swedish regulations concerning banks was very strict while the real estate's prices were constantly increasing. Investment in real estate was heavy but profitable when the government decided for a deregulation. This led to a financial boom, implying the growth of a bubble that burst in 1990, causing a systemic banking crisis, situation that is, sadly, very similar to the USA's crisis nowadays.

Lending from Banks, Mortgage Institutions, and Finance Companies (percentage changes)



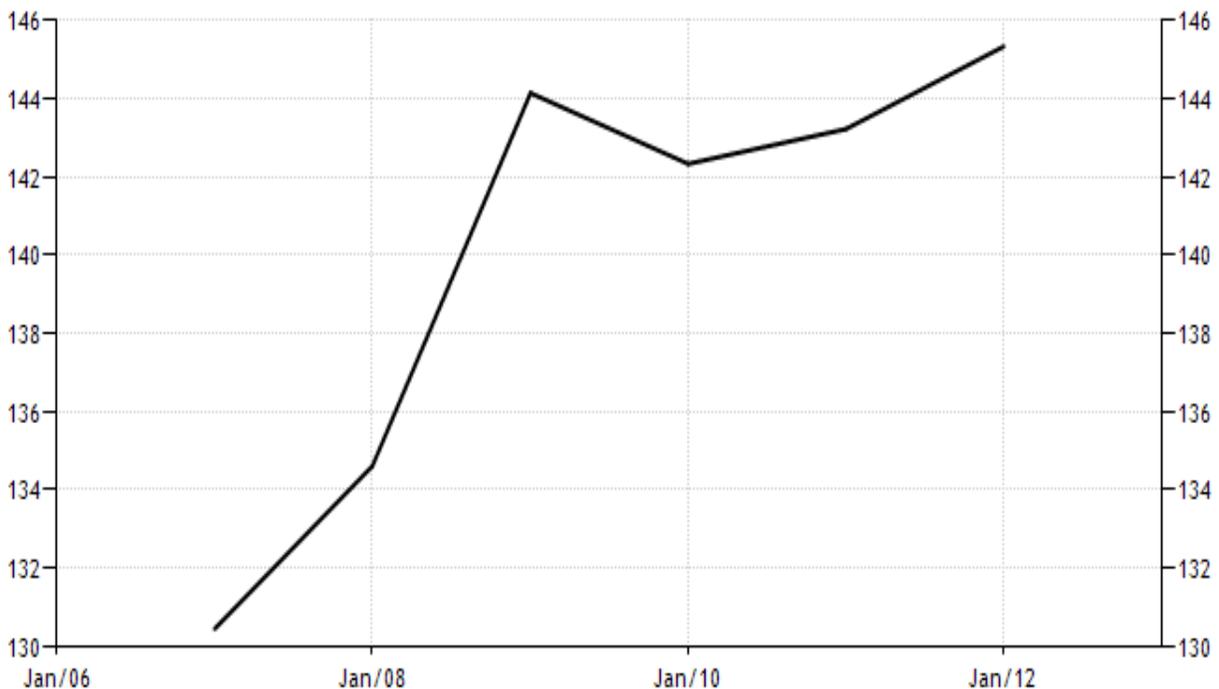
<http://www.contrahour.com/>

“Newly deregulated credit markets after 1985 stimulated a competitive process between financial institutions where expansion was given priority. Combined with an expansive macro policy, this contributed to an asset price boom. The subsequent crisis resulted from a highly leveraged private sector being simultaneously hit by three major exogenous events: a shift in monetary policy with an increase in pre-tax interest rates, a tax reform that increased after tax interest rates, and the ERM crisis. Combined with some overinvestment in commercial property, high real interest rates contributed to breaking the boom in real estate prices and triggering a downward price spiral resulting in bankruptcies and massive credit losses.”

(THE SWEDISH BANKING CRISIS: ROOTS AND CONSEQUENCES. PETER ENGLUND)

Differently, during the global crisis starting in USA, Sweden did not experience any credit crunch, keeping the losses out of financial markets. Economists and banks explain this positive but weird fact with the considerable caution that financial intermediaries have been using since the '90s crisis.

Domestic credit provided by banking sector (% of GDP) in Sweden.
<http://www.tradingeconomics.com>



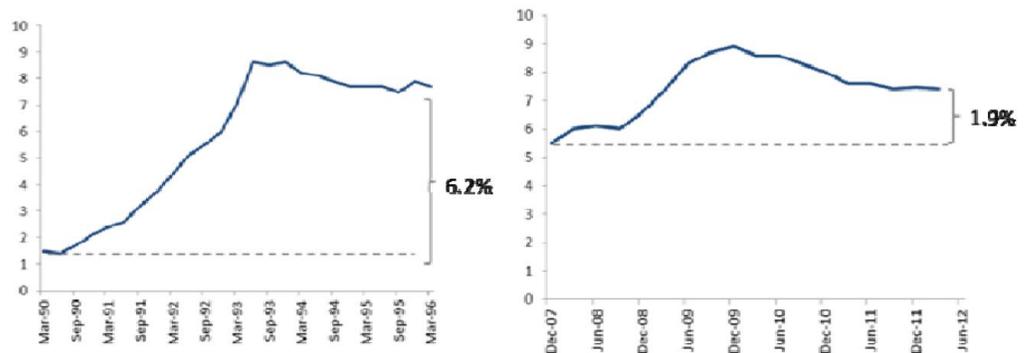
"The lesson from the crisis in the 1990s that the fiscal house must be kept in order is certainly one of the reasons why Sweden has been less badly hit this time round, but there are other factors,"

"We haven't had a crisis like those in Ireland, Spain or the UK, partly because the banks here acted more cautiously after the early 1990s crash. Swedish banks did lend recklessly in the Baltic economies, but they just managed to avoid a disaster, mainly because of the small size of those economies. Nobody really understood the risks the banks were taking there at the time and in hindsight there could have been much worse consequences for Swedish banks and thus for the Swedish economy,"

Lars Calmfors, professor of economics at Stockholm University

Once defined that the main difference between the two crises was the financial nature of the first one, it is possible to analyse the behaviour of the unemployment rate.

c) Unemployment
(Rate, in %)



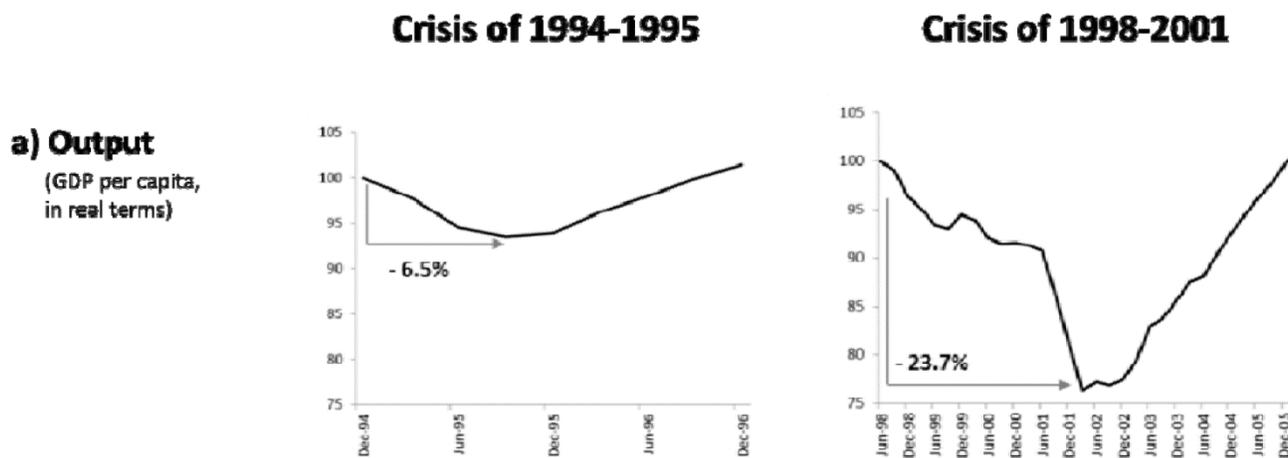
This example confirm our hypothesis (given in the introduction) that financial crises have a remarkably higher jobless recoveries (6.2 against 1.9 percent).

ARGENTINA

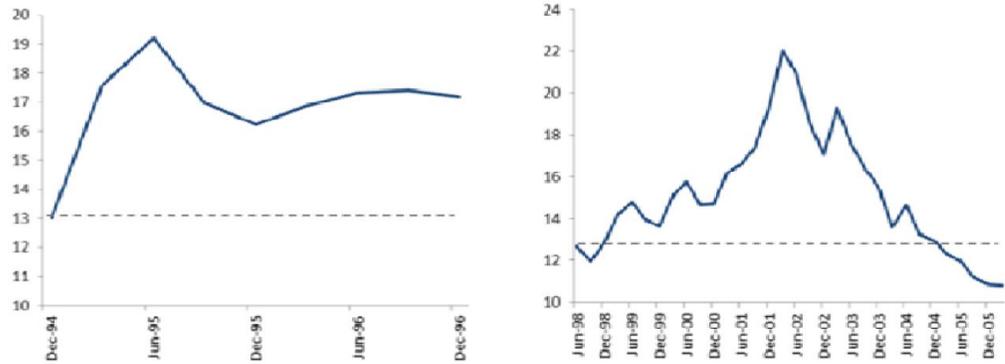
The purpose of the Argentinean case study is to verify that a high inflation positively affects the jobless recovery, causing on the other hand a negative impact on the *wageless recovery*.

The phenomenon of the wageless recovery is defined as the situation in which, after an economic crisis, the total output of a country grows as fast as the employment rate, therefore causing no gap between the natural unemployment rate and the post-crisis one; on the other hand, eventually real wages appear to be significantly lower than the pre-crisis period, typically because of the purchase power's losing. It is easily observable when, after the output and the unemployment rate reach their pre-crisis level, while real wages are way below.

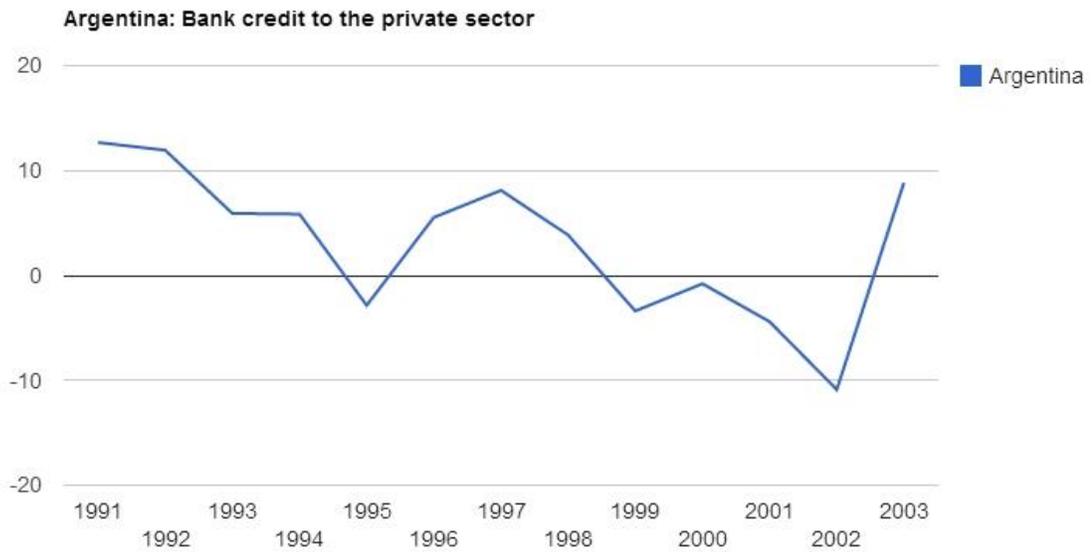
In this example, the exogenous variables are: Output, Unemployment Rate, Inflation and Bank Credit to the Private Sector. The endogenous variable is the Real Wage. The variable Output shows as the '98-'01 crisis was notably more severe, making the unemployment rate's behaviour apparently inexplicable: in fact, the crisis of '94-'95 was way minor compared to the one of '98-'01, but it presented a significant jobless recovery while the second did not.



b) Unemployment
(Rate, in %)



The Bank Credit indicator tells us that both crisis had a financial nature, even if with different proportions, giving *de facto* no influence on the model.

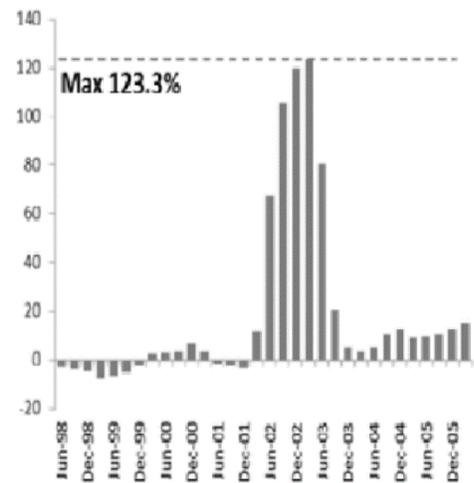
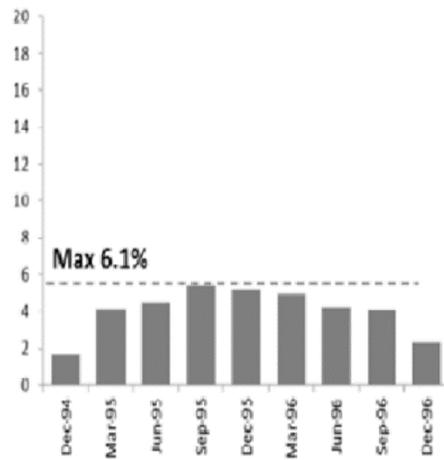


Source: TheGlobalEconomy.com, The World Bank

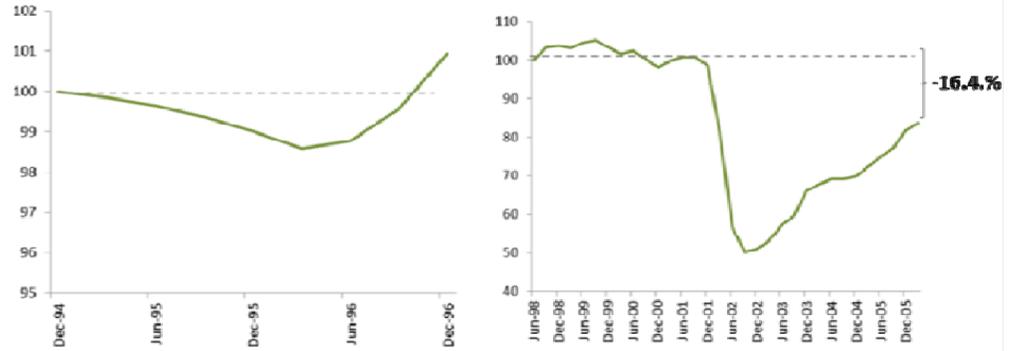
The last indicator manifests large differences between the two episodes: the first crisis was affected by a low-inflation, unlike the second that presented a maximum rate of 123%.

This happened because Argentina first was in a currency peg, which was then abandoned in 2001.

c) Inflation
(PPI, % change)



d) Real Wage
(Peak =100)



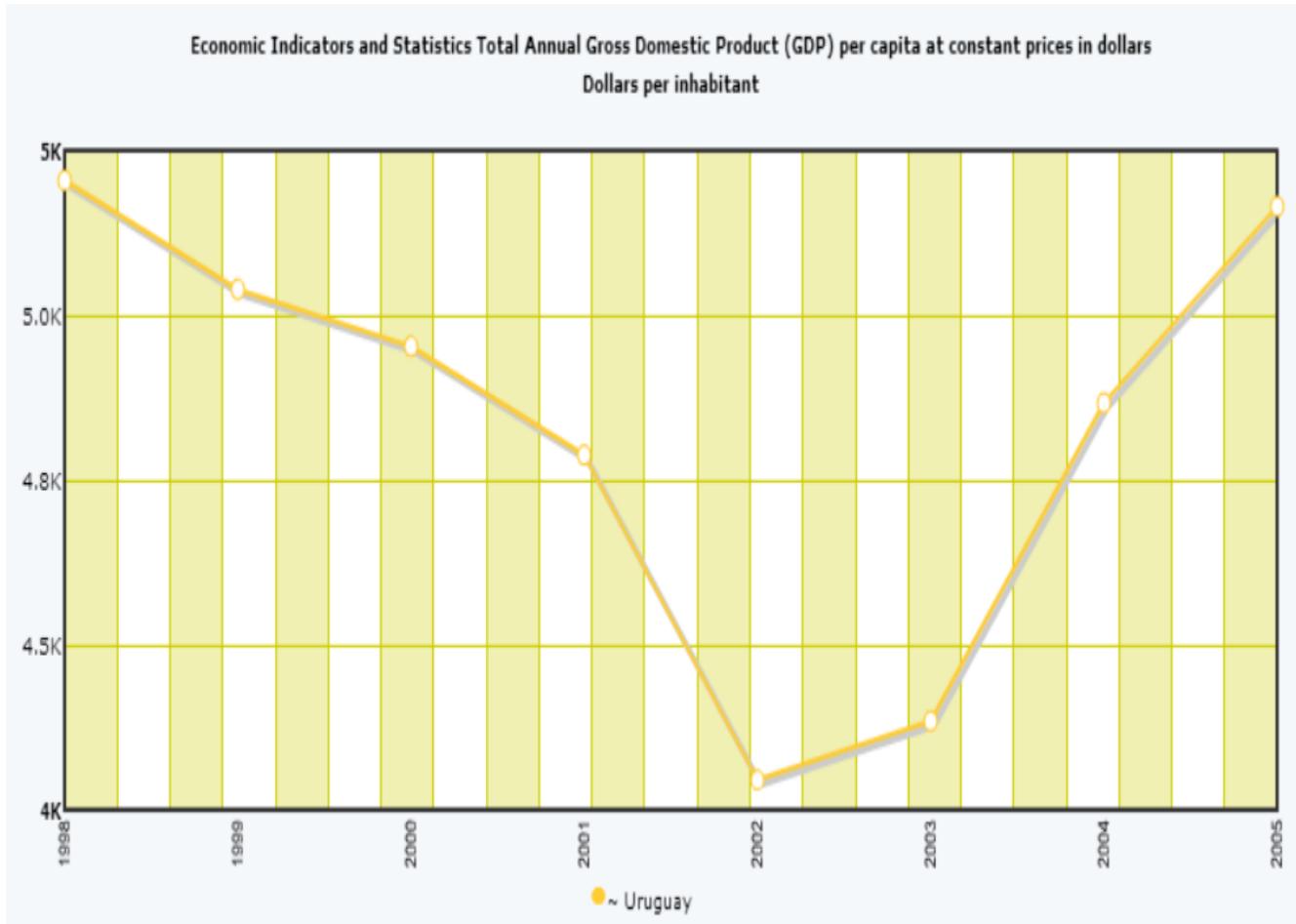
Once clarified the effect of inflation upon jobless recovery, it is easy to explain the endogenous variable “Real Wage”: since no job were lost while the output was decreasing, money power had to fall, therefore inflation rose. This because nominal wages are rigid.

Thanks to this two examples, we can state that high inflation is effective against unemployment, but this is to the detriment of real wages. Therefore, before implementing any inflationary policy, it is needed to study carefully about the trade-off between having less workers with relatively high salaries and lots of them with a very low one.

THREE NEW CASES

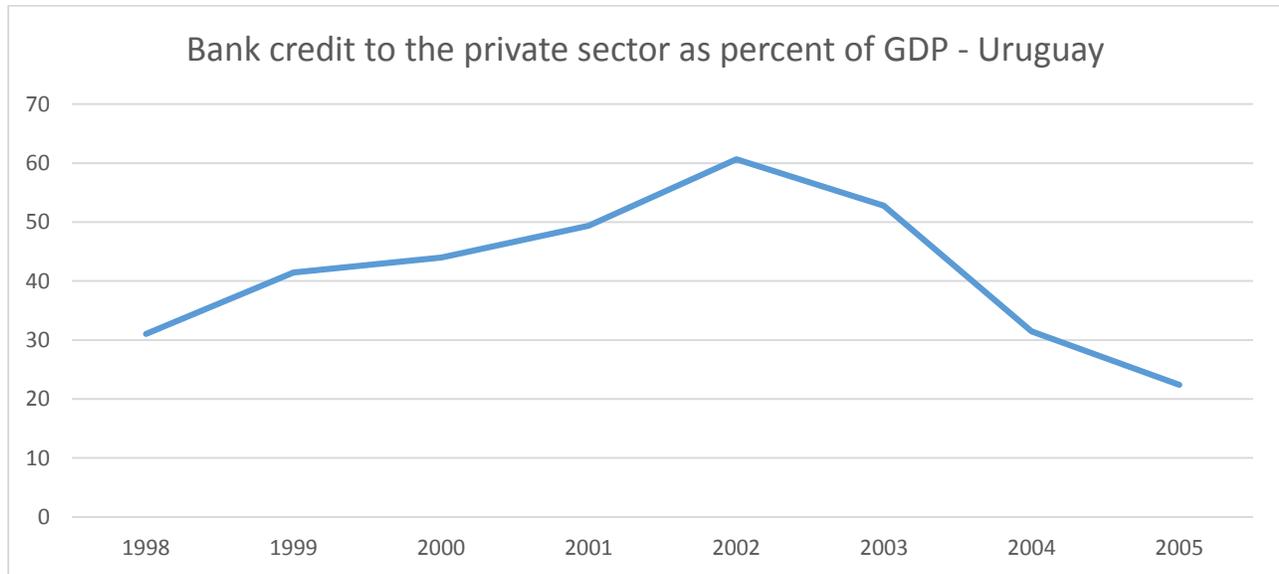
First I will describe crises' causes and data, to eventually make comparison and discuss on them. I will proceed two by two.

URUGUAY



<http://www.eclac.cl/>

Uruguay's crisis of 1998 is uncommon: it started as a non-financial crisis, due to the fall in demand from Argentina and Brazil, but it turned to be more severe than expected, causing the financial collapse in 2002.

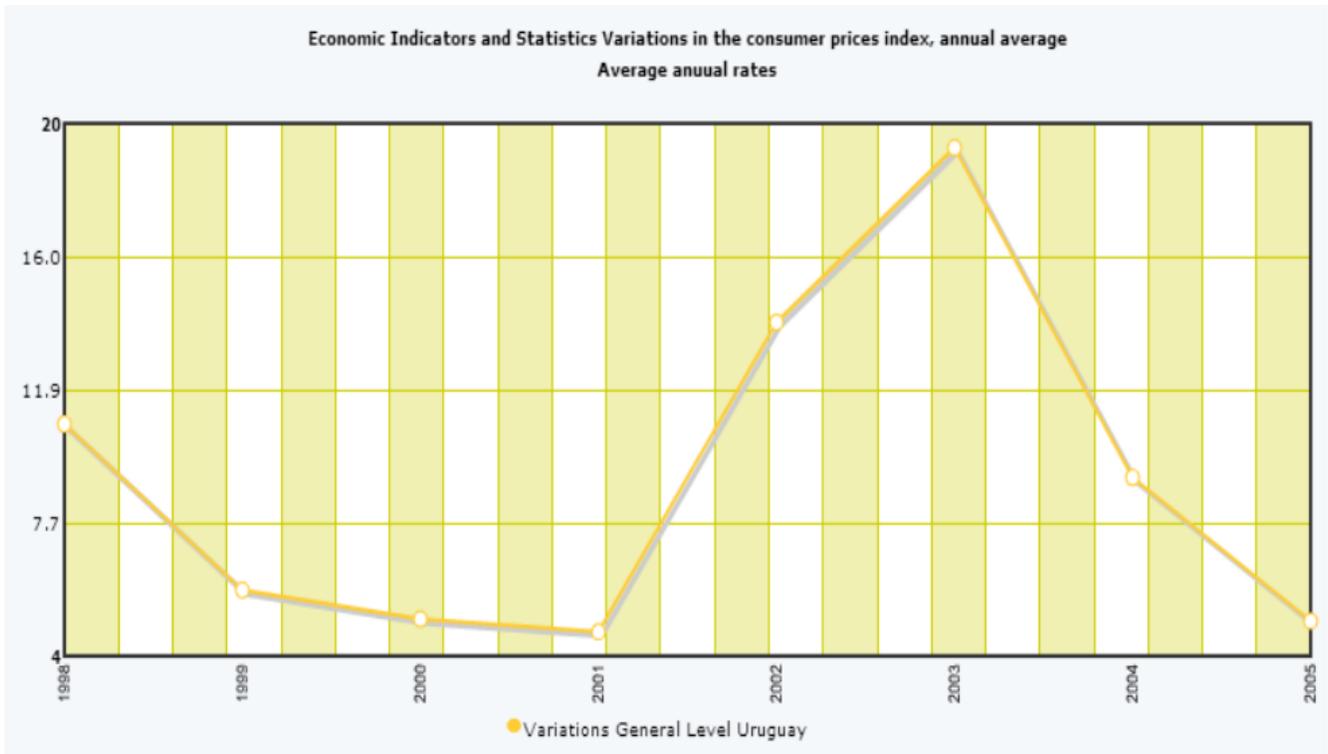


Data from: <http://www.theglobaleconomy.com/>

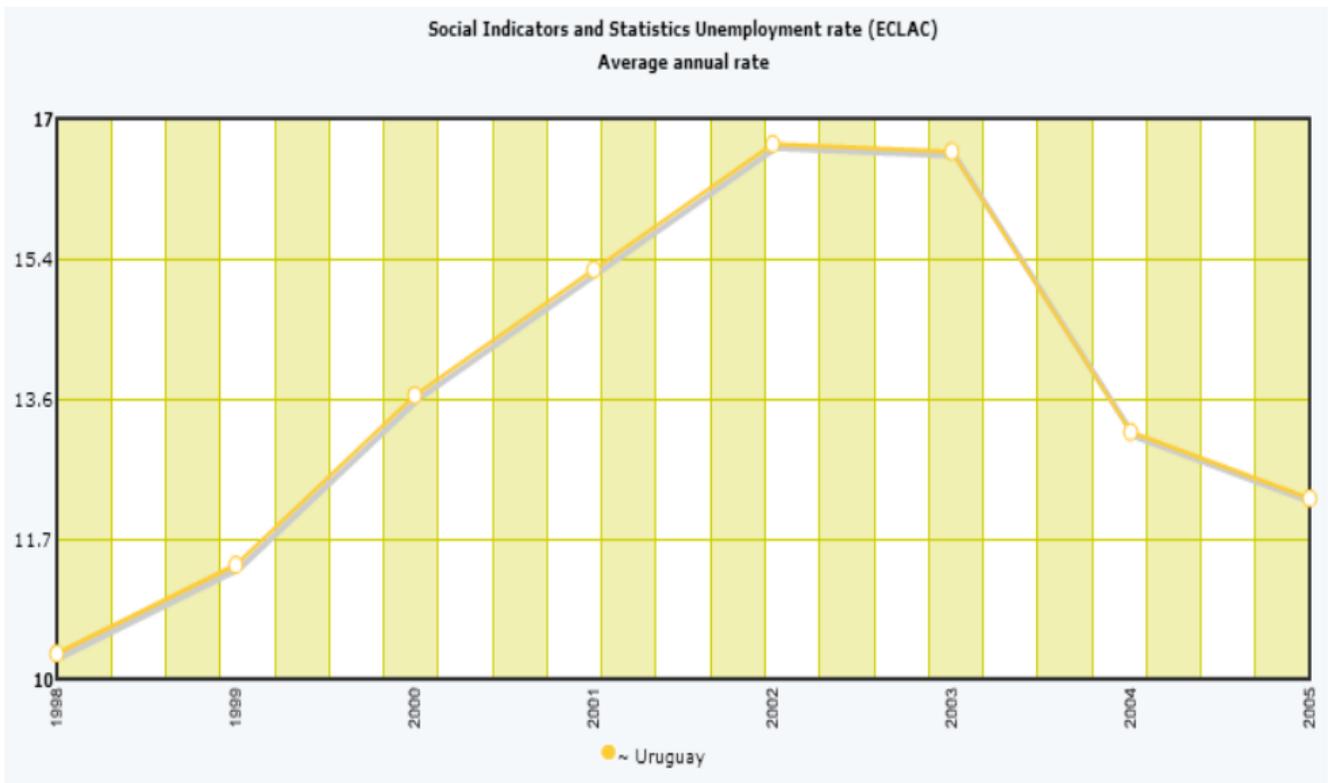
“After averaging growth of 5% annually in 1996-98, in 1999 the economy suffered from lower demand in Argentina and Brazil, which together account for about half of Uruguay's exports. Despite the severity of the trade shocks and ensuing recession, Uruguay's financial indicators remained more stable than those of its neighbours, a reflection of its solid reputation among investors and its investment-grade sovereign bond rating - one of only two in Latin America.”

Copyright © Bonnie Hamre 1998 – 2001

This passage is ironically explicative of how nobody was expecting the financial breakdown. In 2002 the government was forced to renegotiate its debt. Anyway, despite of the double nature of the crisis, it is easier to treat it as a non-financial one.

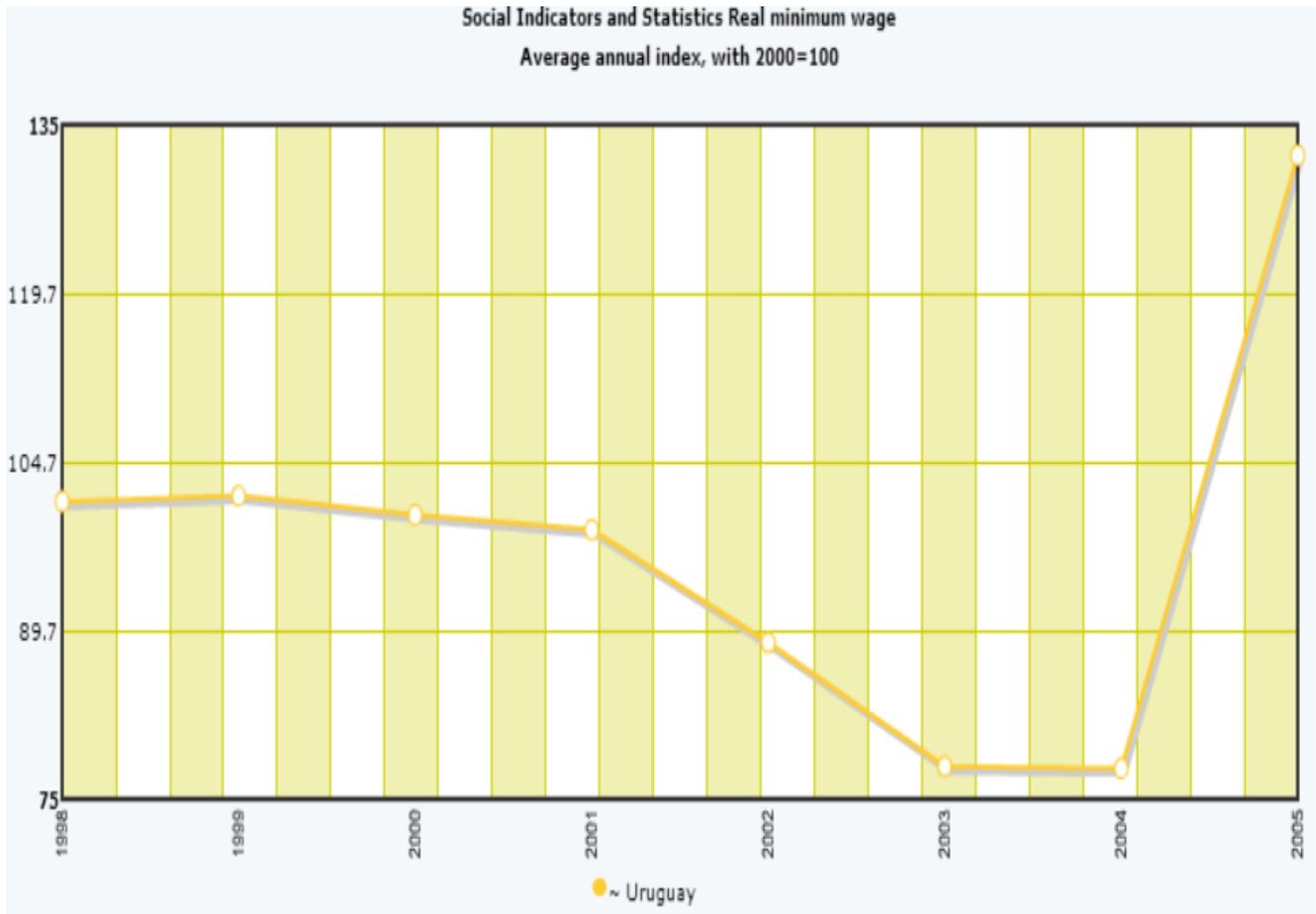


Inflation was always low, even if inconstant, while the Jobless recovery left behind 2.1% of unemployment.



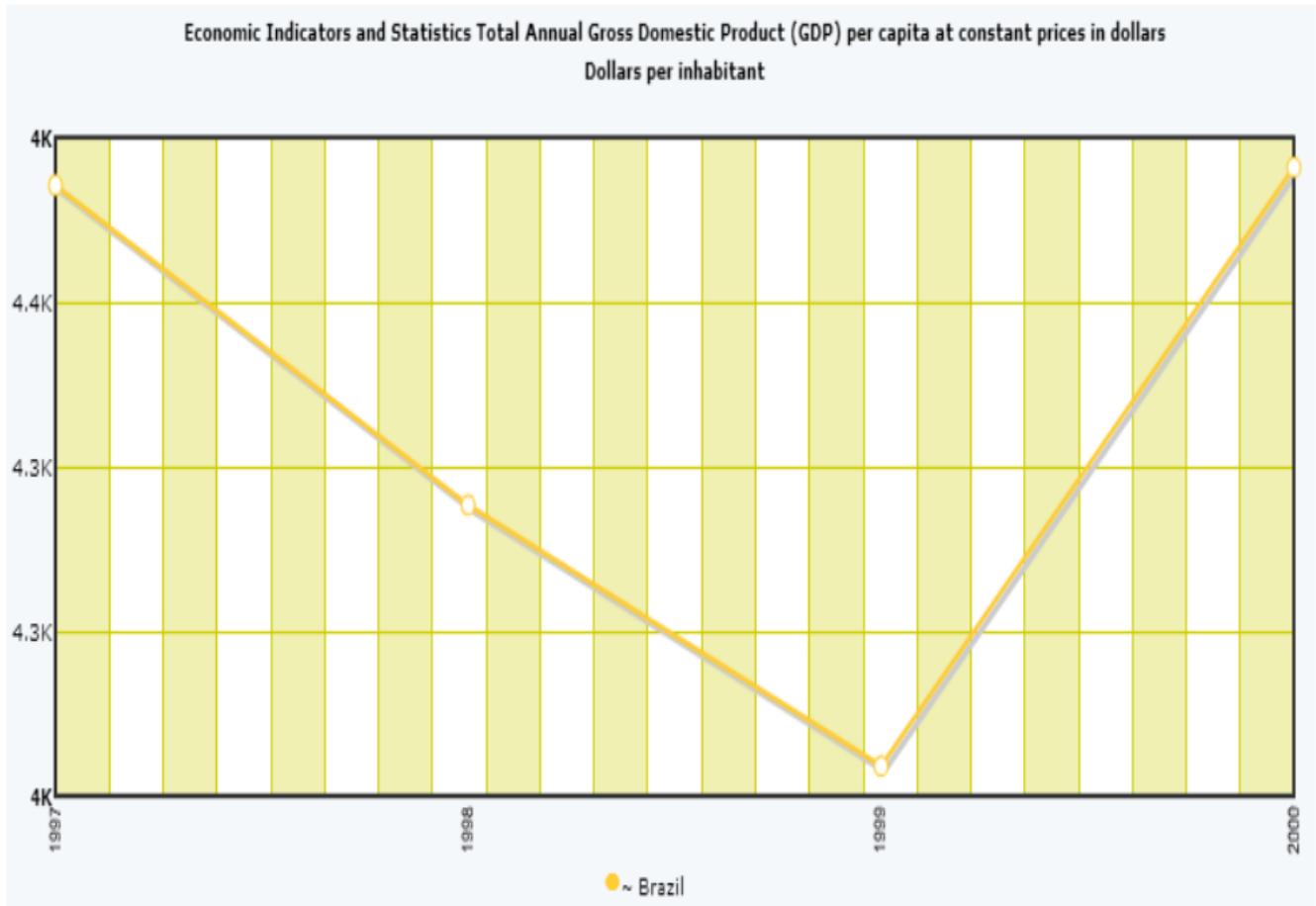
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Lastly, the real wage was not affected.



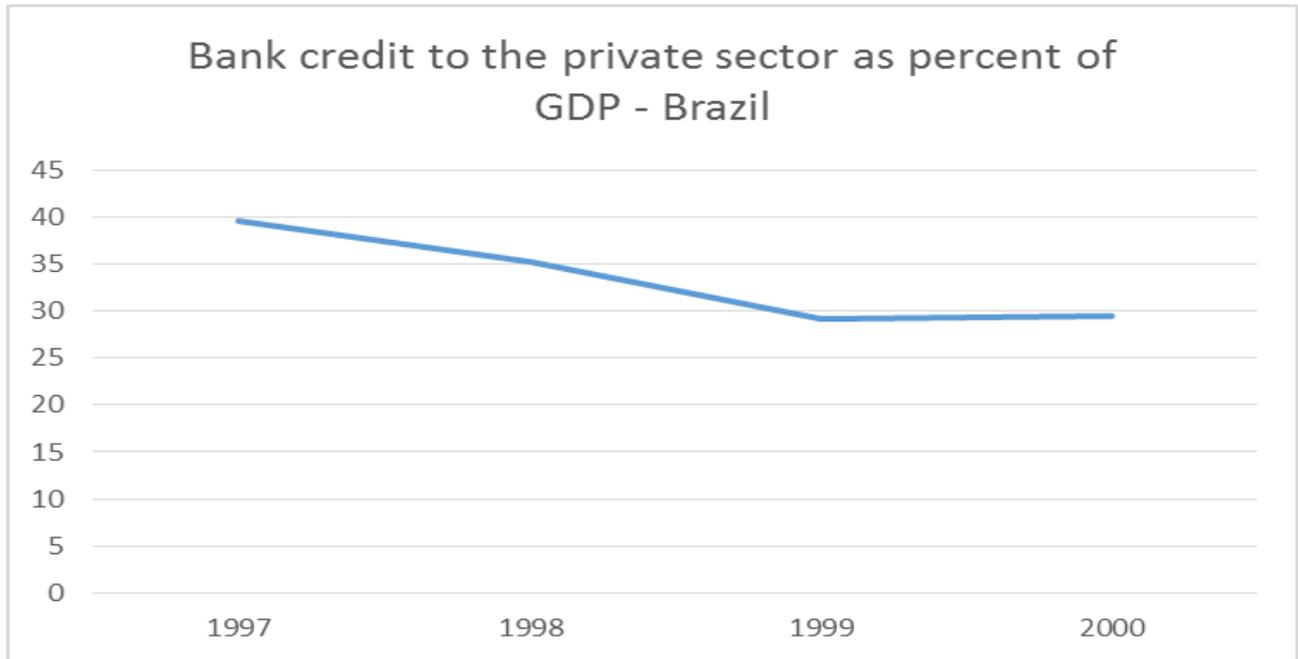
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BRASIL



<http://www.eclac.cl/>

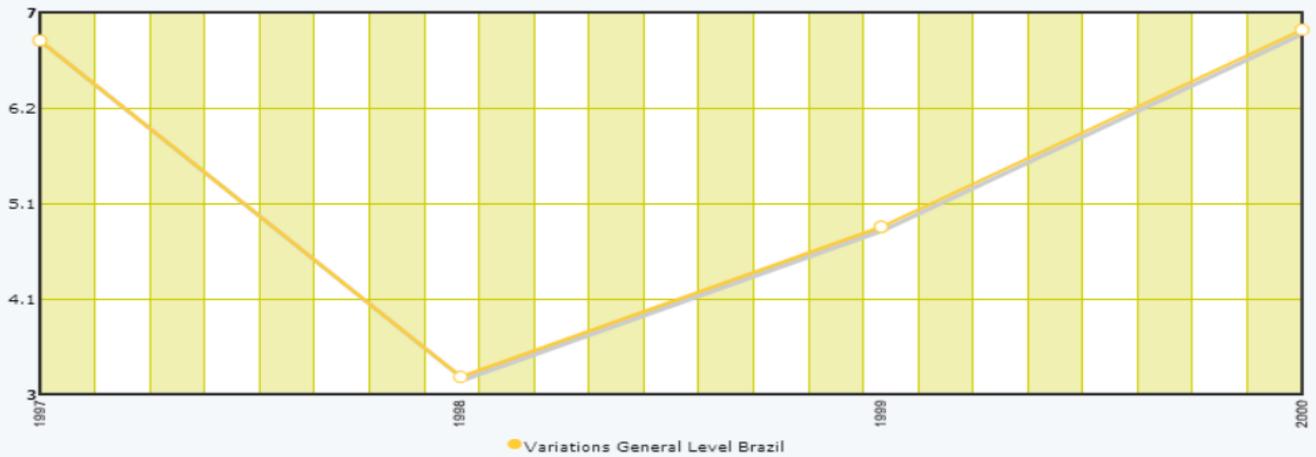
Brazilian crisis originated from the lack of foreign currency reserves: after an export demand's negative shock, the government was not able to maintain the currency peg and had to devaluate the Real, causing the failure of many national banks. Therefore, this crisis is surely financial. As we can easily see from the graph below.



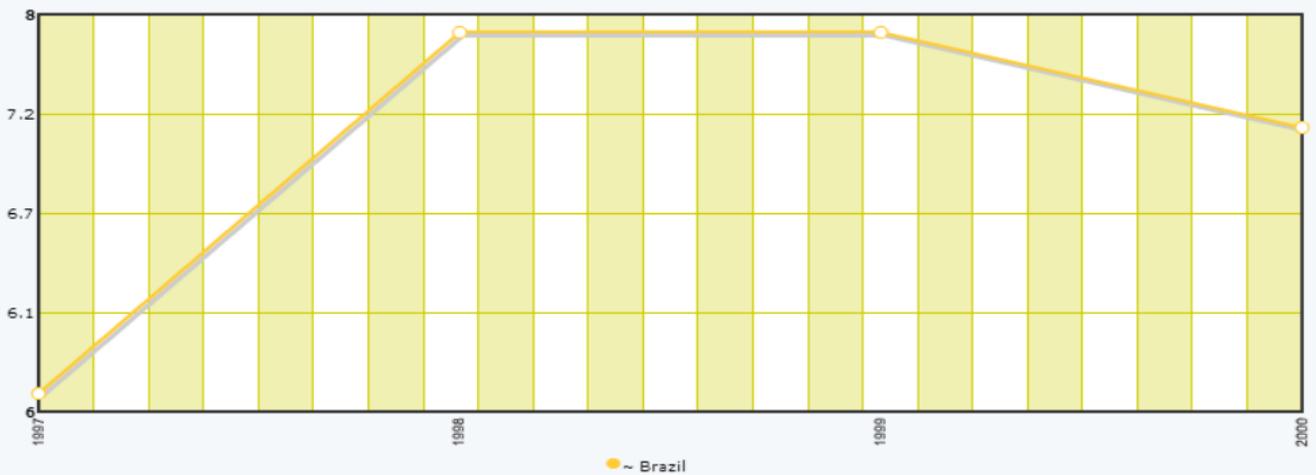
Data from: <http://www.theglobaleconomy.com/>

Concerning the other indicators: inflation was low within the entire period while unemployment was affected by jobless recovery for 1.4% -real wages were not affected.

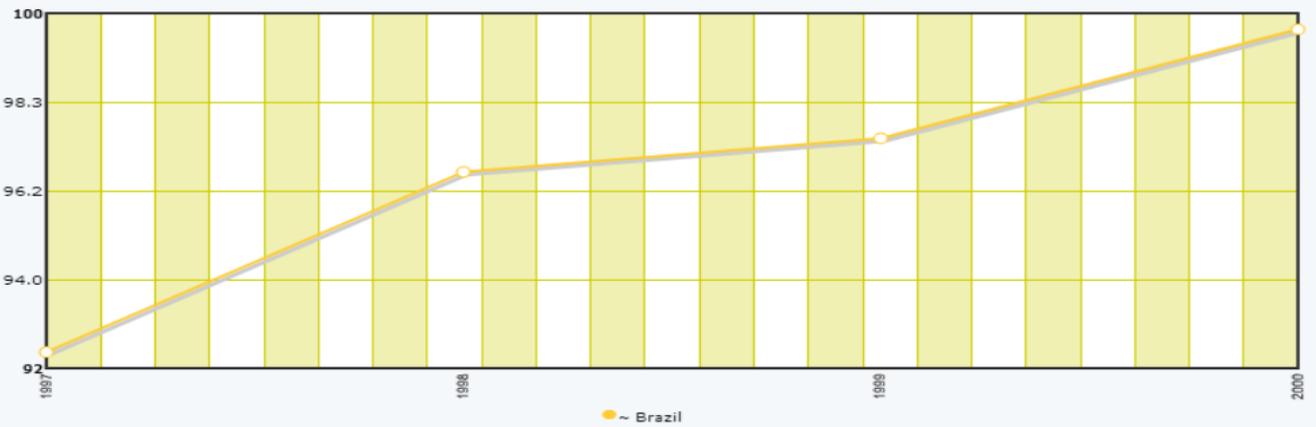
Economic Indicators and Statistics Variations in the consumer prices index, annual average
Average annual rates



Social Indicators and Statistics Unemployment rate (ECLAC)
Average annual rate

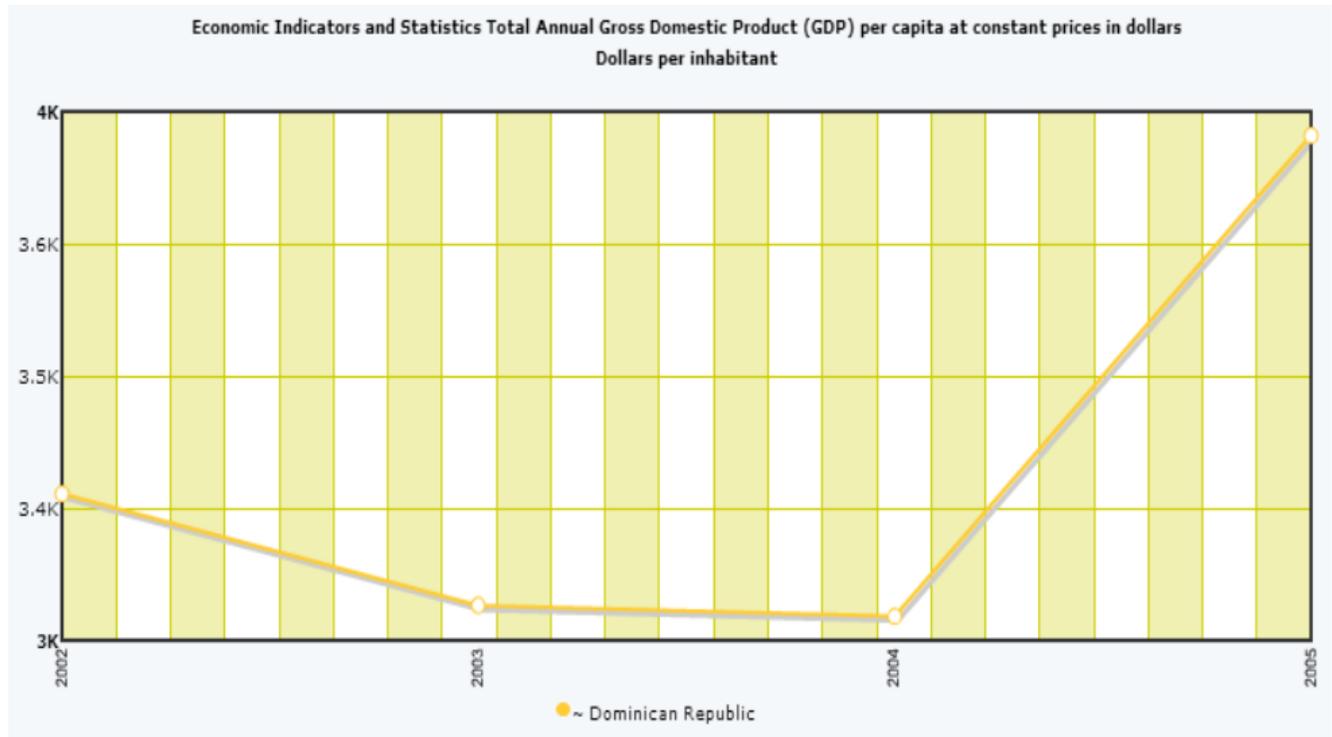


Social Indicators and Statistics Real minimum wage
Average annual index, with 2000=100



<http://www.eclac.cl/>

DOMINICAN REPUBLIC

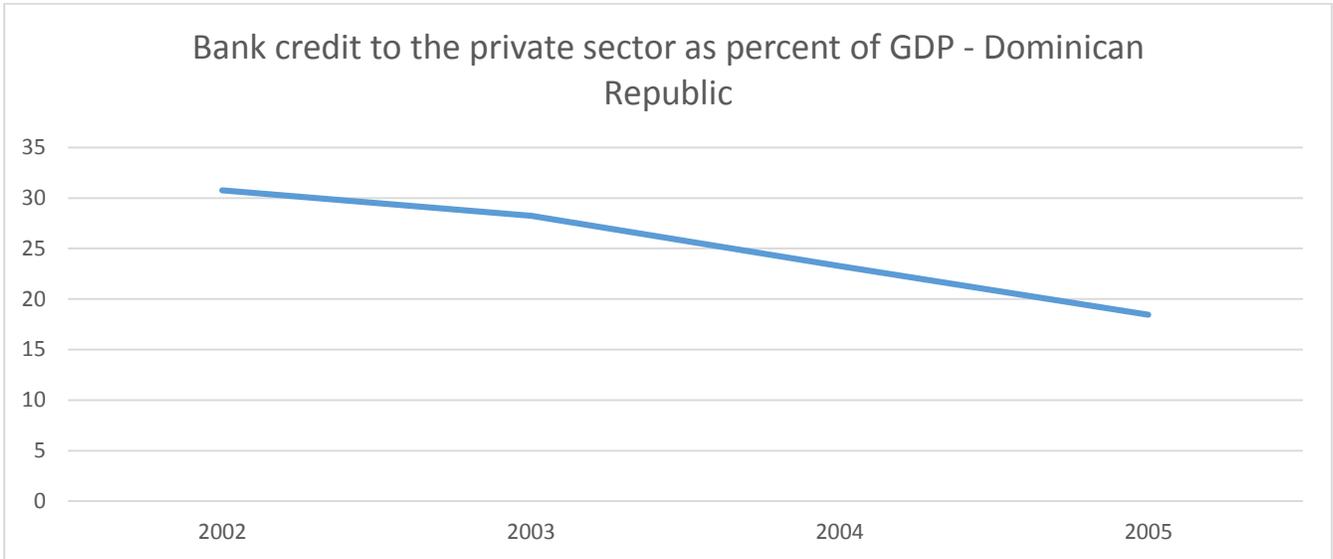


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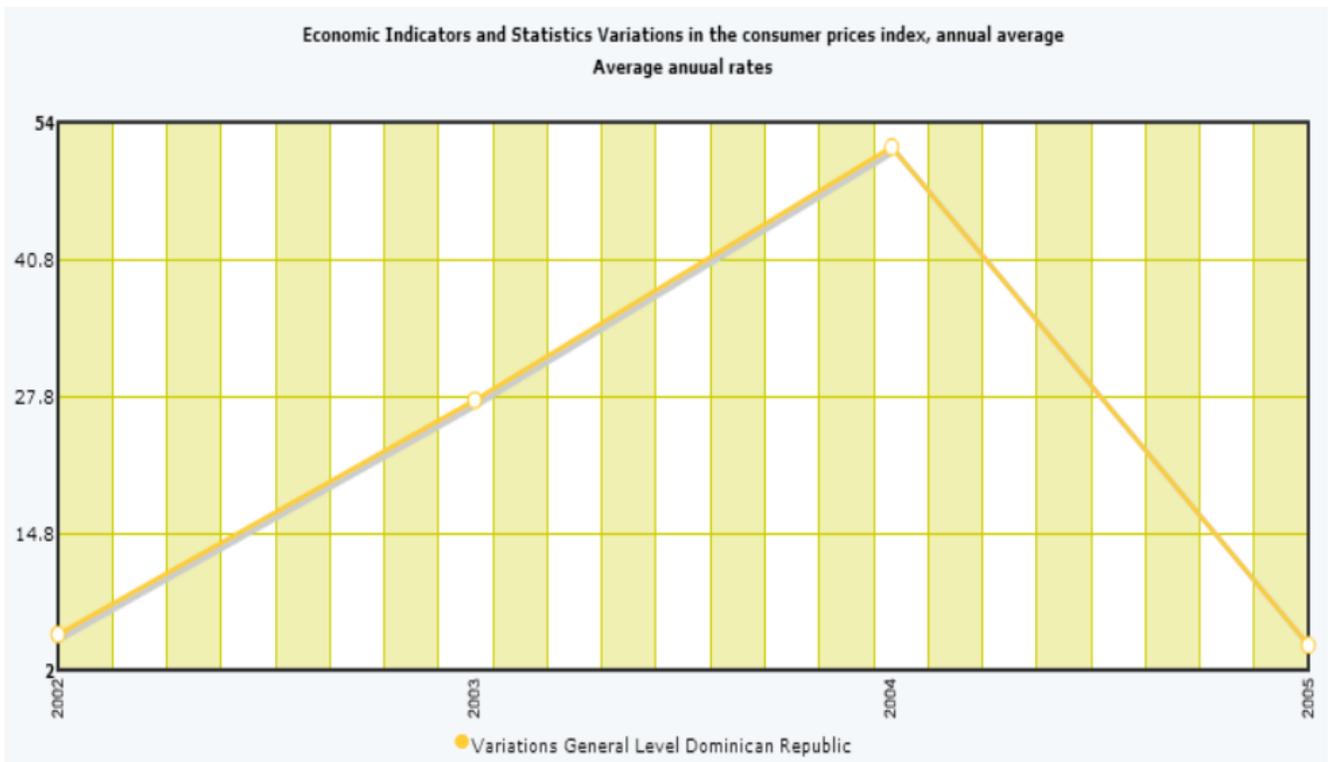
The recession in Dominican Republic originated from the lighter global one, who affected the island with the weak newborn euro and the lack of tourists. It then got worse after a big scandal caused by the failure of the third national bank.

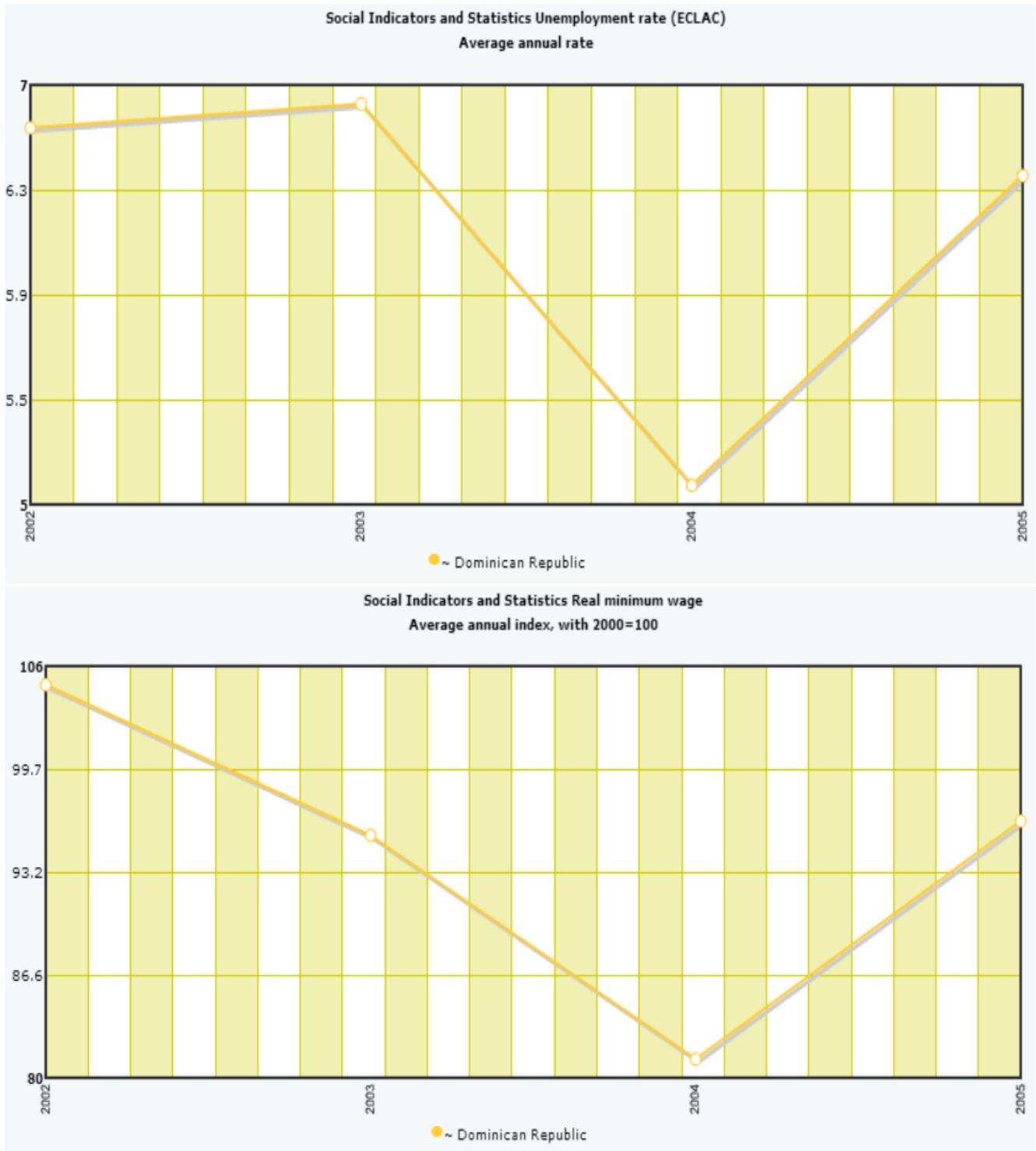
“In 2002, the Dominican economy, despite strong performance in the mining and telecommunications sectors, entered a recession. The country’s public finances were placed under strain after President Mejía elected to bail out the country’s third largest bank in violation of the monetary code, Banco Intercontinental (Baninter), which collapsed in May 2003 after a record fraud.”

Clare M. Ribando. Analyst in Latin American Affairs, Foreign Affairs, Defense, and Trade Division



Data from: <http://www.theglobaleconomy.com/>





<http://www.eclac.cl/>

Registered inflation was high, with a peak of more than 50%. Even if unemployment rate fully recovered, real wages were heavily affected: the wageless recovery lost 8% of their value.

COMPARISON

First, we look at uruguayan and brazilian crises. Similarly to the swedish case, the difference is the financial nature of the second. Inflation is low in both cases.

Our goal here is to confirm that financial crisis can be associated with a larger jobless recovery.

Even if Uruguay had the larger and longer contraction, together with the weaker economical infrastructure, caused by the financial collapse in the meanwhile, it is curious to notice how Brazil suffered, in proportion, the most severe jobless recovery. This goes to confirm our thesis.

Then we examine the differences between Brazilian and Dominican episodes, comparable to the Argentinean case. Both recessions had a financial background, and the duration was the same as well. The GDP contraction was less severe in Dominican Republic 2002-2005. The main difference is the behaviour of inflation that reached a maximum of more than 50% in the insular country, while falling in Brazil.

Our goal here is to confirm that high inflation helps jobless recovery causing on the other hand a wageless recovery.

During 2002-2005 episode, the unemployment rate was inversely proportional to inflation: in fact, while the second was increasing, jobs were being created. The highest peak of inflation in 2004 also experienced the lowest unemployment rate of the period. Indeed, when the GDP reached its pre-crisis level, jobless recovery was slightly negative (lower unemployment rate). Anyway, real wage increased among all the Brazilian crisis, while suffered a drastic contraction after the other one. Even here, the thesis is confirmed, leaving us free to discuss the more appropriate policies in the light of what we just claimed.

CONCLUSIONS BASED ON EVIDENCE

Once analysed these seven cases, we can state that:

- A financial crisis has much more impact on unemployment compared to a real-economy one.
- High inflation actually helps restoring the unemployment rate to its pre-crisis level.
- If unemployment rate recovers because of the high inflation, real wage tends to be negatively affected.

POLICY TOOLS

CLASSICAL THEORY RECALLING

The main classical economic theory about relationship between inflation and unemployment is the Phillips curve. This can be easily summarized in this way:

- We start from the aggregated supply curve in the short run $P = P^e + \left(\frac{1}{\alpha}\right)(Y - \bar{Y})$
- Level price, actual and expected, can be easily obtained by subtracting P_{-1} to both terms. A random exogenous supply shock is also added $\pi = \pi^e + \left(\frac{1}{\alpha}\right)(Y - \bar{Y}) + v$
- Eventually, we assume that output is inversely related to unemployment rate (common empirical evidence, also clear from the study in the appendix) and we write the final form of the Phillips curve $\pi = \pi^e - \beta(u - u^e) + v$

Even if the relationship between those variables is already well known, it is important to remember that Phillips curve shows a short-run equilibrium and that, obviously, shocks can heavily affect previsions. Evidences of its validity and implications on political economy are mostly concentrated on how decreasing inflation incurs in a rise of unemployment\decline of GDP. This is the case, for example, of United Kingdom in the '80s. Furthermore, the research has defined a sacrifice ratio between decrease in inflation and decrease in GDP\employment rate that, however, appears to be over computed, since the empirical observation gave a way lower one.

Anyway, Phillips curve's theory does not fit well with ours. In fact, sacrifice ratio does not seem to properly work in the opposite direction, especially in the cases we considered: emerging countries and high inflation rates.

INFLATION ANALYSIS

Despite the fact that high inflation helped reducing unemployment, it is not possible to define a linear relationship similar to the Phillips curve: mid-ranged increasing of inflation level do not seem to help jobless recovery (not even if considering a lower impact); on the other hand, hyperinflation is counterproductive, since unemployment has a natural rate. Another finding is that having high inflation rates at the beginning or at the end of a crisis does not affect jobless recovery.

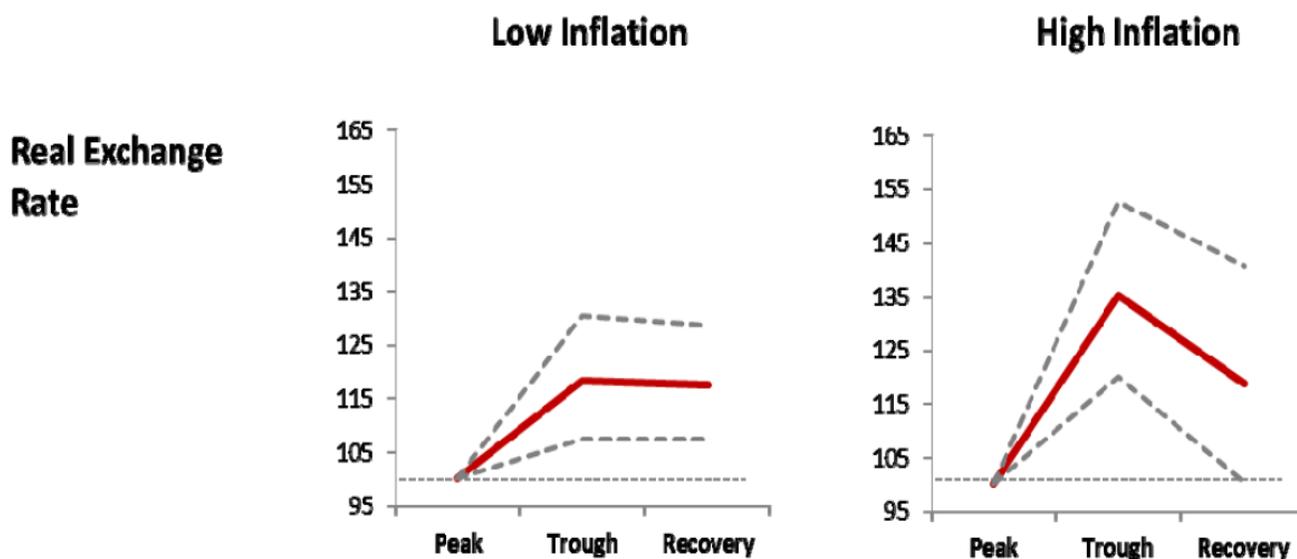
From the econometric study of Calvo, Coricelli and Ottonelli (2013), we can state two conclusions that represent the two sides of the coin of high inflation during a financial crisis, seen by the eyes of a central bank.

1. A positive evidence about high inflation cases is that, once the output is recovered, inflation tend to return to its pre-crisis level. Thus, there seems to be no permanent increase of inflation rate.
2. The negative aspect of high inflation is that, since only a more than 30% rate would help unemployment, this is not a measure that can be accepted by everyone.

REAL CURRENCY DEPRECIATION

One easy way, for emerging countries, to heavily increase inflation is to depreciate the nominal currency. But to understand if this is the appropriate monetary policy channel between inflation and unemployment, two theses have to be demonstrated:

1. Is real exchange rate truly related to inflation?
2. Has the real exchange rate an actual impact on unemployment rate, apart from the inflation's effect?



To check the first thesis, we obviously look at the relationship between inflation and real exchange rate: considering the first halves of the crises, high inflation has a clearly higher impact on real exchange rate than low inflation. This would seem to confirm our thesis but things change considering the whole crises: in fact, if the real exchange rate were related to jobless recoveries, impact should have been constant during the entire period; instead, we can observe that the difference between the post and pre-crisis real exchange rates does not depend on the inflation. It is easy to explain the initial behaviour of real exchange rate then: with high inflation, nominal exchange rate is more likely to adjust faster but the final impact is actually the same.

We can eventually state that, during financial crises, high inflation is not related to changes in the real exchange rate.

Anyway it is still possible to hypothesize a relationship between real exchange rate and jobless recovery, independently from inflation. The study reported in appendix shows that there is no statistically significant association between those two variables.

The conclusion is that there is no possibility to achieve a negative jobless recovery without experiencing a positive wageless recovery. Therefore, real currency depreciation is not a suitable monetary policy channel during financial crises. According to Calvo, Coricelli and Ottonello (2013), the reason could be the presence of credit constraints in both tradable and non-tradable sectors: in this case, a real currency depreciation, through sector reallocation, would not necessarily mitigate the jobless recovery, because crisis affects both sectors.

Cases were also registered in which jobless recovery was avoided without any change in the real exchange rate: it is then very clear that only a decrease in real wage can help to recover from high unemployment.

It is then possible to make two statements about policies concerning countries with fixed exchange rates, such as countries in the Eurozone:

1. The best option for countries experiencing financial crises is to support the labour market by reducing the labour costs, rather than increasing sectorial reallocation by subsidies to imports or exports.
2. Increasing inflation in the whole Eurozone would result in an adjustment of real wages of countries experiencing the crisis (therefore helping employment recovery) without provoking a currency depreciation against the healthiest ones.

CREDIT RECOVERY POLICIES

In this section I will analyse the innovative policy tools to be implemented in order to mitigate both jobless and wageless recoveries, shown in Calvo, Coricelli and Ottonello (2013).

THEORY ASSUMPTIONS

The idea from which it is possible to start is that, during financial crises, a major problem is the credit availability for the firms; this happens because collateral values decrease (for example because of a negative shock in real estate market). Since solvency requirements are now higher, capital-intensive firms are favoured: tangible assets are more recognizable and increase the possibility to have the debt paid in case of firm's default. This situation inevitably results in firings or in a real wage fall.

In Calvo, Coricelli and Ottonello (2012) we find an analytical description of the phenomenon, shown below:

Considering a "firm that produces homogeneous output" with a linear production's function $F(K,L)$ not affected by technical progress, it is possible to define a profit expression:

$$F(K,L) - (K + WL)$$

Where W is the wage bill and L is the cost's sum related to labour. Making the assumption that all the costs must be borrowed, we define a credit constraint as the situation in which credit needs are higher than the collaterals' total value:

$$K + WL > Z + (1 - \theta)K$$

Where Z is the value of the intangible assets, while θ is the measure of how much of the capital value, in percentage, is not qualifying as a collateral. For simplicity, capital costs are fully covered by capital collateral ($\theta = 0$), resulting in a simpler expression:

$$WL > Z$$

As we said, this happens because intangible assets have lost part of their value. What matters, though, is the fact that labour is the only factor affected by credit constraint: since the labour costs are supposed to remain stable, either the real wage or the number of workers have to decrease, in order to less the wage bill and reach the equilibrium. This simple framework shows how financial crises necessarily cause either jobless or wageless recoveries.

PRACTICAL IMPLICATIONS

The empirical evidence resulting from Calvo, Coricelli and Ottonello (2013) indicates that “there is a positive association between credit recovery and wage bill recovery”. This result implies that credit recovery policies can help in reducing both wageless and jobless recoveries.

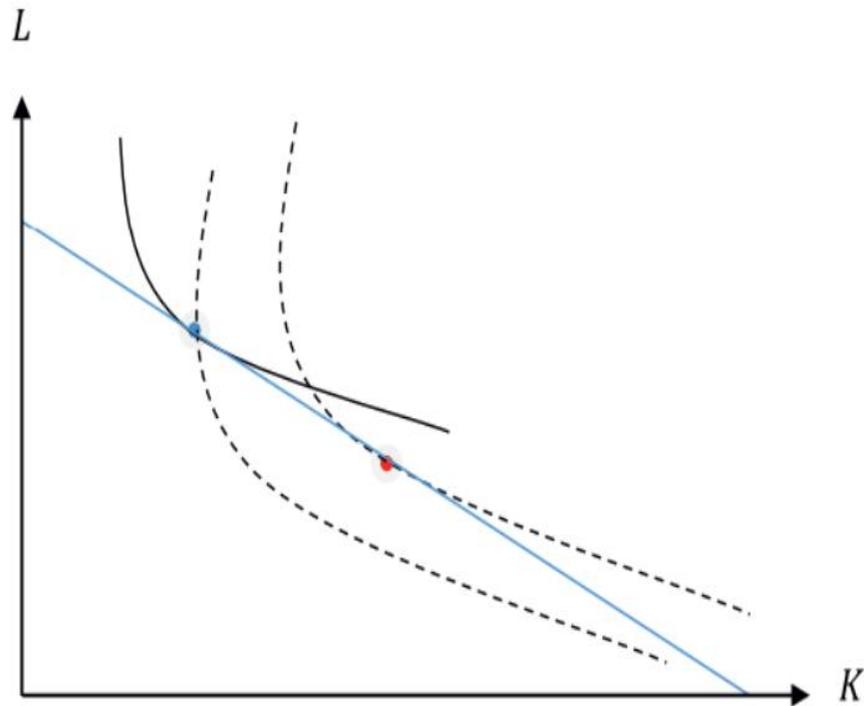


FIGURE 5: Optimal Input Vector under Credit Constraint

Notes: Blue line depicts the credit constraint (4), black curves are isoprofit lines. Solid and dashed lines correspond to two different families of isoprofit lines; an increase in A is equivalent to a shift from the solid to the dashed isoprofit lines.

“An increase in the neutral technical progress parameter, A , implies that the isoprofit line becomes steeper, and thus an increase in A is equivalent to a shift from the solid to the dashed isoprofit lines.”

From “Labor Market, Financial Crises and Inflation: Jobless and Wageless Recoveries” by Calvo, Coricelli and Ottonello (2014)

CONCLUSION

The initial question was the actual impact of inflation on unemployment rate, to understand if devaluating the national currency (therefore leaving EURO, in case of European countries) would help to avoid a jobless recovery. Obviously the answer is not easy and we can say that only further studies on the specific situation could help more. The only way to take this decision would be deeply analysing the forecasted trade-off between unemployment and real wage. Probably, assuming that the difference could exist, this would not be enough to justify the huge risk undertaken by running a high inflation. In order to avoid unnecessary speculations, since the analyses were concentrated on emerging market economies, it is better not to go into the discussion concerning the Eurozone. Anyway, we demonstrated that devaluating the national currency will not help the unemployment rate.

The conclusion I think is the most important concerns the credit recovery policies: during these last years, interest rates from BCE were constantly decreasing, until they reached 0% in 2012. Unfortunately, the threat of deflation brought Europe in a classic liquidity trap, in which banks prefer to hold money instead of lending. Many economist have begun to ask for innovative measures to fight deflation while Denmark, in 2012-2014, set a negative interest rate on banks' deposits: currency remained weak even if exports were increasing.

The discussion on interest rates is not included in this work, but can be related to the credit recovery policies: negative interest rates are an extraordinary measure that

“charges banks ... for holding money at the central bank. It might extend even to depositors, households and companies, having to pay to hold money at their own banks”

Chris Giles – Financial Times

The purpose of negative interest rates is exactly what we stated being the best solution:

“to stimulate the economy, to encourage banks to lend more and households and companies to spend more”

Chris Giles – Financial Times

This scenario can maybe frighten, but seems to be the only left solution to this crisis. In fact, while I was writing this paper, it happened: from 11th of June 2014, interest rate on deposit facilities at the BCE officially is -0.1%. Within next years, we will have empirical results on the effects of negative interest rates. The ideal limit of 0% interest rate is finally broken, will it fail?

APPENDIX – ECONOMETRIC RESULTS

The objective of this section is to support by myself the conclusions given in chapter 2 and 3, since so far they were based exclusively either on an analysis of graphs or from the data of Carlo, Coricelli and Ottonelli (2013).

The database is constructed by data taken from LUISS LIBRARY DATASTREAM and the ECLAC website. Variables spread from 1990 to 2011, and include:

- GDP per capita, real, US\$
- Inflation, consumer prices (annual %)
- Unemployment rate
- Domestic credit to private sector (% of GDP)
- Annual real average wages indexed (concerning Dominican Republic only, real minimum wage indexed is considered)
- Real exchange rate against US\$ indexed

All data are not seasonally adjusted and are considered at constant prices. Values used for estimations are the annual percentage changes of the variables.

Values were considered during the crisis periods only (since the GDP started decreasing to when it had recovered its pre-crisis level). Crises are:

- Argentina '94-'96
- Argentina '98-'05
- Brazil '97-'00
- Dominican Republic '02-'05
- Sweden '90-'94
- Sweden '07-'11
- Uruguay '98-'06

Two dummy variables were added:

- “hin” - Equal to 1 when high inflation is registered.
- “fin” - Equal to 1 when the crisis has a financial nature.

.sum

Variable	Obs	Mean	Std. Dev.	Min	Max
dune	31	.1177065	.2589197	-.2316	.7773
dgdg	31	.0031258	.0505942	-.1174	.0821
fin	38	.5	.5067117	0	1
hin	38	.2631579	.4462583	0	1
deltar	4	-.075	.0635085	-.16	-.01
deltau	4	.21	.248998	-.1	.44
drfx	31	-.0360968	.1621834	-.5816	.3126

CASE STUDIES

First, I remember the three conclusions we made.

1. A financial crisis has much more impact on unemployment compared to a real-economy one.
2. High inflation actually helps restoring the unemployment rate to its pre-crisis level.
3. If unemployment rate recovers because of the high inflation, real wage tends to be negatively affected.

To check the first statement, we run a regression with “dune” as endogenous, “dgdp” as exogenous and “fin” as dummy variable; we only consider data corresponding to the crises in Sweden, Uruguay and Brazil. We expect “fin” to have a positive value, because during the financial crisis, unemployment should be more severely affected. We also expect “dgdp” to be negative, because unemployment should raise while GDP is decreasing.

```
. reg dune dgdp fin if casefin==1
```

Source	SS	df	MS			
Model	.719174688	2	.359587344	Number of obs =	19	
Residual	.756075003	16	.047254688	F(2, 16) =	7.61	
Total	1.47524969	18	.081958316	Prob > F =	0.0048	
				R-squared =	0.4875	
				Adj R-squared =	0.4234	
				Root MSE =	.21738	

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dune						
dgdp	-2.901598	1.276113	-2.27	0.037	-5.606838	-.1963585
fin	.3358383	.1034469	3.25	0.005	.1165406	.5551359
_cons	.0419042	.0627565	0.67	0.514	-.0911337	.1749421

Even if the number of observations is low, we observe, with a significance way over 95%, unemployment rate being strongly affected by GDP: decreasing the GDP by 1% would result in an increase of unemployment by 2.9%. The financial nature of a crisis also worsens the labour market, with an about 33% higher rise in unemployment rate. We confirm our first thesis.

It is important to remember that the percentage are referred to the deltas: doing a numerical examples, this means that if during a non-financial crisis the unemployment rate goes from 10% to 15% (delta = 5%), it is likely that a financial one would show it going from 10% to 16.65% (delta = 6.65%); in fact, 0.0665 is 33% higher than 0.05. This is also valid for the next regressions.

The second goal is to verify the positive influence of a high inflation over the unemployment rate. The regression is run with “dune” as endogenous, “dgdp” as exogenous and “hin” as dummy variable. Cases considered are Argentina, Brazil and Dominican Republic. Our expectations about dgdp are the same than the previous regression, while hin must have a negative value: a high inflation should reduce the unemployment better than a low one.

```
. reg dune dgdp hin if casehin==1
```

Source	SS	df	MS	Number of obs =	15
Model	.392625435	2	.196312717	F(2, 12) =	17.31
Residual	.136128891	12	.011344074	Prob > F =	0.0003
Total	.528754325	14	.037768166	R-squared =	0.7425
				Adj R-squared =	0.6996
				Root MSE =	.10651

dune	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
dgdp	-2.562381	.4824463	-5.31	0.000	-3.613541 -1.511221
hin	-.1328663	.0584031	-2.27	0.042	-.2601157 -.005617
_cons	.1644162	.0476334	3.45	0.005	.0606319 .2682005

Again, the small amount of observations does not affect the significance, still over 95%. Dgdp's behaviour follows the pattern of the previous regression. Furthermore, as we predicted, the presence of a high inflation during an economic crisis help to reduce the unemployment rate by about 13.28%.

The analysis supporting the third statement will be different: since we want to demonstrate that lower jobless recovery implies a higher wageless recovery, data will only be the percentage differences between the beginning and the end of the crises. Observations will be four: Brazil, Dominican Republic and two for Argentina; variables will be the jobless recovery rate (deltau) and the wageless recovery rate (deltar). The regression will be between "deltar" and "deltau" only. We expect deltau to be positive, because when there is no jobless recovery (negative deltau) there should be wageless recovery (negative deltar).

```
. reg deltar deltau if caserew==1
```

Source	SS	df	MS	Number of obs =	4
Model	.011376343	1	.011376343	F(1, 2) =	31.44
Residual	.000723656	2	.000361828	Prob > F =	0.0304
Total	.012099999	3	.004033333	R-squared =	0.9402
				Adj R-squared =	0.9103
				Root MSE =	.01902

deltar	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
deltau	.2473118	.0441057	5.61	0.030	.0575404 .4370833
_cons	-.1269355	.0132757	-9.56	0.011	-.1840564 -.0698146

INFLATION – REAL CURRENCY DEPRECIATION

In this section, I will try to answer to these two questions:

1. Is real exchange rate truly related to inflation?
2. Has the real exchange rate an actual impact on unemployment rate, apart from the inflation's effect?

Concerning the first question, I run a regression between the total change of the real exchange rate during the first halves of the seven economic crises considered so far and the dummy variable "hin".

```
. reg deltaf hin2 if casehin2==1
```

Source	SS	df	MS			
Model	.084605838	1	.084605838	Number of obs =	7	
Residual	.257941539	5	.051588308	F(1, 5) =	1.64	
Total	.342547378	6	.05709123	Prob > F =	0.2565	
				R-squared =	0.2470	
				Adj R-squared =	0.0964	
				Root MSE =	.22713	

deltaf	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
hin2	-.24336	.1900311	-1.28	0.257	-.7318505	.2451305
_cons	-.16384	.1015759	-1.61	0.168	-.4249491	.0972691

The result is not significant, but this is probably due to two outliers (Brazil and Uruguay) that presented an anomalous behavior of the real exchange rate. I run the regression without considering them.

Source	SS	df	MS			
Model	.180497626	1	.180497626	Number of obs =	5	
Residual	.098740258	3	.032913419	F(1, 3) =	5.48	
Total	.279237884	4	.069809471	Prob > F =	0.1011	
				R-squared =	0.6464	
				Adj R-squared =	0.5285	
				Root MSE =	.18142	

deltaf	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
hin2	-.3878333	.1656136	-2.34	0.101	-.9148896	.1392229
_cons	-.0193667	.1047432	-0.18	0.865	-.3527063	.313973

The result is significant enough. It shows that during a high inflation episode, real currency tends to depreciate 39% faster.

Anyway, to exhaustingly answer to the question, it is needed to check the entire crisis periods.

```
. reg drfx hin dgdp
```

Source	SS	df	MS			
Model	.397869956	2	.198934978	Number of obs =	31	
Residual	.391234096	28	.013972646	F(2, 28) =	14.24	
Total	.789104052	30	.026303468	Prob > F =	0.0001	
				R-squared =	0.5042	
				Adj R-squared =	0.4688	
				Root MSE =	.11821	

drfx	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
hin	-.000016	.0454657	-0.00	1.000	-.0931481	.0931162
dgdp	2.276202	.427023	5.33	0.000	1.401485	3.150919
_cons	-.0432066	.0258029	-1.67	0.105	-.0960614	.0096482

Evidence suggests that no relationships between real exchange rate and inflation exists: the coefficient of hin is 100% equal to 0.

Once answered to the first question I can start to analyze the second. The regression is run between unemployment rate and real exchange rate. To check relationships apart from inflation's effects.

```
. reg dune drfx dgdp
```

Source	SS	df	MS			
Model	.601331472	2	.300665736	Number of obs =	31	
Residual	1.40985062	28	.050351808	F(2, 28) =	5.97	
Total	2.01118209	30	.067039403	Prob > F =	0.0069	
				R-squared =	0.2990	
				Adj R-squared =	0.2489	
				Root MSE =	.22439	

dune	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
drfx	.3494849	.3587477	0.97	0.338	-.3853765	1.084346
dgdp	-3.480321	1.149993	-3.03	0.005	-5.835975	-1.124666
_cons	.1412005	.0432548	3.26	0.003	.0525972	.2298039

Since Student's t is too high, no statistically significant evidence is found. There is no relationship between real exchange rate and unemployment rate.

RESOURCES

Apart from the paper of Calvo, Coricelli and Ottonello.

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