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AFFONSO PASTORE: AN ONGOING DEBATE BASED ON EMPIRICAL EVIDENCE[1]

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This article honors Affonso Celso Pastore, highlighting his empirical contributions to Brazilian economic thought, especially on inflation, monetary policy, and external shocks. He challenged structuralist views through data, anticipated concepts like the Taylor rule, and stood out for his ethical conduct and analytical rigor. His work shaped generations of economists and remains central to macroeconomic debate in Brazil.

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Pastore belongs to an economic tradition that began with Eugênio Gudin and continued through Mário Henrique Simonsen and Delfim Netto. These are professionals who studied and developed their careers in Brazil and who have trained many generations of economists.

All three stand out for their desire to keep abreast of the latest developments in economic research in the main centers of the rest of the world, but seeking to use this tool to understand the challenges of the Brazilian economy.

In their long careers, all three balanced life in academia, the private sector and public service, and worked regularly with the press for years.

Pastore completed his academic training at USP and received his Ph.D. in 1968. He was Secretary of Finance of the State of São Paulo from 1979 to 1983 and President of the Central Bank of Brazil from 1983 to 1985 under the Figueiredo government.

It is no easy task to summarize the intellectual contribution of such a long and prolific researcher. Based on our biases and emphases, we will provide a more detailed systematization of his contributions to economics, both in academia and in public management.

One theme that stands out in Pastore's long professional life is the care with which he always separated his work as a public servant from his private interests.

Having been president of the Central Bank under the Figueiredo government in the first half of the 1980s, a period when our institutions were much less solid than they are today, he always moved between public service and private activities in a clean, transparent and clear manner. In this, as in other matters, there are no gray areas for Pastore.

One curious aspect is that his time at the Central Bank is little remembered. Three texts that deal with this period – Dionísio Dias Carneiro's chapter in the now classic volume *A Ordem do Progresso* (*The Order of Progress*), whose second expanded edition is from 2014, José Júlio Senna's book *Política Monetária* (*Monetary Policy*) from 2010, and Gustavo Franco's more recent A Moeda e a Lei, uma *História Monetária Brasileira de 1933-2013* (*The Currency and the Law, a Brazilian Monetary History from 1933-2013*) from 2017 – do not cover Pastore's time as president of the Central Bank.

There are two reasons for this omission. Those were times of balance of payments crisis. Our problems were external and related to the fiscal deficit. Despite the high levels of inflation observed at the time, although serious, inflation was not our biggest problem, as Pastore points out in the introduction to *Inflação e Crises* (*Inflation and Crises*), a book published in 2015.

The second reason is that the Central Bank's monetary policy at the time was prudent. Faced with the many constraints imposed by a government that was losing

political support in a dying regime, Pastore conducted monetary policy in the most effective way possible, without causing additional shocks to the economy.

Pastore acted like a soccer referee who barely appeared. He conducted monetary policy in the best way possible under the circumstances. It is not for nothing that the theories of inertial inflation, in which all prices rise at the same rate, were born during this period.

The memory of his time as president of the Central Bank is well described in the introduction to his version of Brazil's monetary history, *Inflação e crises: O Papel da Moeda* (*Inflation and Crises: The Role of Money*), a volume published by Campus in 2015[2]:

> My success in overcoming the balance of payments crisis went hand in hand with my frustration in the field of monetary policy. I came in and left the Central Bank with inflation hovering around 200% a year! You can't control inflation without a nominal anchor to hold down the price level, and neither of the two anchors tried so far – the nominal exchange rate and the money supply – could be used in those circumstances.

As Pastore explains, the exchange rate was at the service of the balance of payments adjustment, and it would not have been possible to rely exclusively on monetary policy to stabilize inflation above 100% per year, as the experience of Latin American economies and the Israeli case in that period, as well as the European hyperinflations of the early 20th century, showed.[3]

> Here's something very interesting. The managing director of the IMF was Jacques De Larosière, and his deputy was Ted Beza. The year was 1983 or 1984 (I don't remember exactly). The IMF wanted Brazil to control the monetary base, but at the same time we were obliged to keep the real exchange rate depreciated (we had to accumulate reserves, which were zero when I took over the Central Bank). A year before the conversation with Ted Beza, an article had been published in the *Staff Papers* (Adams and Gros) showing that if the real exchange rate is fixed, inflation has a unit root because there is no way to control the monetary base. It's a variant of Mundell's impossible trinity. Beza challenged us (and De Larosière) by arguing that this performance criterion should be excluded from the agreement. In other words, there was no way to control inflation. I took up this point later in several other articles, such as "Monetary Passivity and Inertia," preceded by "Monetary Policy in an Interest Rate Rule," which I'll comment on later.

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[2] The book was released in December 2014 at the now-closed Cultura bookstore in Shopping Iguatemi, but the date on the book is 2015.

[3] Pastore's comments were made in an earlier version of the text. We retrieved the comments from the version of this text published in the second chapter of Goldfajn and Dantas (2020).

In the introduction to his book, Pastore describes the difficult renegotiation of the foreign debt at that time.

Pastore was a professor for decades, generally of monetary theory and econometrics. In fact, it was as a professor of econometrics that Pastore seemed to like to be recognized.

His doctoral thesis, defended in 1968, *The Response of Agricultural Production to Prices*, was, according to the original document, "presented to the Congregation of the Faculty of Economic and Administrative Sciences of the University of São Paulo, for the Doctoral Competition of Chair III – Statistics I (Economic Statistics and Econometrics)."

A long-lived author – five decades of intellectual production (his doctoral thesis was defended in 1968) – his output is not extensive. Pastore is more like Brahms or Caymmi. His work is characterized by quality. When he sits down to write a piece, Pastore respects his readers. He writes only when there is something relevant to say.

His career is surprising. Pastore began by studying microeconomic issues, such as the impact of prices on agricultural production. In the following decades, he devoted himself to macroeconomic issues such as exchange rate policy and inflation, an evil that afflicted us for five decades – from 1945 to 1994 – and from which we are not free of a recurrence.

Pastore's academic work includes numerous papers published in the best academic journals in Brazil, such as the *Revista Brasileira de Economia, Planejamento e Política Econômica and the Revista de Econometria*.

In addition to his doctoral thesis on agricultural economics in 1968, in 1974 Pastore published his associate professorship thesis on monetary issues – money supply, factors conditioning the expansion of the monetary base, inflation, money demand and monetary policy.

In addition, in 2015 he published "Inflation and Crises: The Role of Money," on Brazilian monetary history since the PAEG, with numerous empirical tests, in which he presents his version of the Brazilian saga of that period.

In the last ten years he published two books, both by Companhia das Letras.

In 2021, he published *Erros do Passado, Soluções para o Futuro: A Herança das Políticas Econômicas Brasileiras para o Século XX* (*Errors of the Past, Solutions for the Future: The Legacy of Brazilian Economic Policies for the 20th Century*). In it, Pastore reassesses his main academic works, reevaluating them based on new econometric techniques and available data.

The first chapter of the book makes an interesting attempt to evaluate the policy of stimulating manufactured exports during Delfim's first term in the Ministry of Finance.

Pastore's analysis includes the negative effects of distortions resulting from microeconomic intervention policies, which have been evaluated in more recent academic research on the effects of the misallocation of factors of production.

He comments on the surprise at the good performance of productivity in the period of the economic miracle, which was partially reduced recently with the original contribution by Bacha, Tombolo and Versiani (2023) on the evolution of productivity data in the 20th century in Brazil.

Posthumously, the volume *Caminhos e Descaminhos da Estabilização* (*Paths and Detours of Stabilization*) was published. In it, he revisits some old themes – such as the post-war experience with fixed exchange rates – and focuses on the construction of our macro-stability and its disorganization.

As Pastore notes, this cycle of organization and disorganization of our macroeconomy is accompanied by the evolution of fiscal policy. We will return to this topic at the end of this text.

Pastore is extremely concerned with empirical evidence and does not hide his impatience with hypotheses, intuitions or arguments that prove refractory to empirical testing; he has even less patience with authors who write a lot and test little.

The seemingly grumpy big Italian man, however, trained generations of economists with his memorable, impeccably organized lectures, which often ended with students clapping.

Few realized it, but for Pastore, the only thing that counts is the strength of the arguments. Well-founded, any new idea should be carefully analyzed, no matter how unexpected the conclusions. In a country that still discriminates a lot, Pastore doesn't know what prejudice is, except against light ideas.

Careful data analysis seems to have been the tradition at the USP School of Economics in the 1950s, where the figure of statistics professor Luiz de Freitas loomed large.

He was also the assistant of Alice Canabrava, who always practiced a historiography that gave much more importance to archives and data than to essayism.

In terms of methodology, with a few exceptions, Pastore is a researcher who uses time series to analyze empirical evidence on the problems of our economy.

His doctoral thesis tests one of the basic hypotheses of the Cepaline model, which was very pessimistic about the development of the agricultural sector and agriculture in general, and considered that the only source of progress for the country was industrial development.

Cepaline or structuralist thinking held that the agricultural sector, being "traditional," did not behave according to the principles of basic microeconomics. Fluctuations in agricultural prices, it was argued, would not affect total production.

Pastore went into the field to test, with the best statistics available at the time, whether the thesis survived the data. The answer was no. Contrary to what the ECLAC claimed, agricultural production did react to prices.

Pastore's research touched on other important debates of the time, such as the role of economic policy in generating repeated negative shocks to the supply of agricultural goods.

Various analysts, such as Eugênio Gudin, argued that the high food inflation of the 1950s was the result of public policies that encouraged an early and dysfunctional process of urbanization. The countryside was depopulating and the food supplies were declining.

In contrast to Gudin, structuralist economists linked the backwardness of agriculture to the distribution of land in large estates, *latifundios*, which led to low productivity and the inability to increase production even with rising food prices.

In Brazil, in addition to Latin American structuralism, Arthur Lewis's model of an economy with hidden unemployment or underemployment played a key role.

This approach is an attempt to find a macroeconomic shortcut to overcome underdevelopment, or the hijacking of the theory of economic development by some followers of Keynes.

Traditional agriculture, for example, would have a surplus of underutilized workers with zero marginal productivity. Taking them out of the fields and into industrial production would increase the total productivity of the economy and generate economic growth.

Moreover, this sector would be insensitive to market conditions, such as changes in relative prices.

Pastore tests the hypothesis of agriculture's response to price incentives by analyzing the production of the main crops for the domestic market – cotton, sugarcane, rice, castor beans, onions, corn, peanuts, cassava, beans and tobacco – in the different regions of the country.

Pastore finds that the response of agricultural production – measured by the area planted – is relatively elastic, being most elastic in São Paulo and least elastic in the Northeast.

All the results obtained confirm the prediction of the conventional theory, which is quite different from the heterodoxy that prevails here. Moreover, the elasticities obtained are not different from those obtained in other studies for other economies of the world.

Pastore thoroughly analyzes the difficulties with the data and uses the best available techniques, reporting on the difficulties of working with time series before the studies that created the concept of cointegration and Granger causality and so many other tools that have long since become commonplace.

The core of the thesis was published in 1971 in the third issue of the first volume of the journal of the FEA-USP department, *Estudos Econômicos*.

Pastore's comment on his doctoral thesis is worth mentioning:

> The thesis, of course, had the ECLAC at its center. But there's much more to it. It marks my decision to return to academia, abandoning the MF's economic consultancy in Rio (I'd moved to Rio with my family, dropped everything and returned to USP). The thesis is a combination of studies: a) Samuelson's *Foundations* and Hicks' *Value and Capital* (chapter 1); b) Ted Schultz (*Transforming Traditional Agribusiness*), a view that either peasants were rational or they thought "as if"; c) Karl Popper – what distinguishes science from metaphysics is the ability to subject the hypothesis to negation; d) Merc Nerlove on the distributed lags model and Zvi Griliches on the creativity of testing. I studied all this during those months and wrote my thesis in my apartment in Alameda Itu, completely alone, while teaching morning and evening classes at USP.

In 1976, in the third issue of *RBE*, Pastore and José Roberto Mendonça de Barros published a rare entirely theoretical paper on a mechanism similar to the ECLAC hypothesis. The subject was the possibility that emerging countries were lagging behind due to the production of agricultural goods and the supposed downward trend in their prices, the famous "downward trend in the terms of trade."

The paper analyzes the conditions under which technological modernization in agriculture would be discouraged by its significant impact on the prices of produced goods and their profitability.

Pastore and Mendonça de Barros show that this phenomenon occurs only under very restrictive conditions, especially when the agricultural market is open to international markets.

In the same article, Pastore and Mendonça de Barros conclude that the imposition of import tariffs on manufactured goods, a standard strategy of import substitution, ends up appreciating the exchange rate and discouraging the production of goods that do not benefit from the tariff, particularly agricultural goods.

The problems and pessimism about Brazilian agriculture in the middle of the last century may have been more the result of the policies adopted than of the structural problems in the sector, as Pastore had already shown in his doctoral thesis.

Pastore, José Roberto Mendonça de Barros and Décio Kadota, in an article published in the second issue of *PPE* in 1976, analyzed the need for a devaluation of the exchange rate to ensure the balance of the external accounts as a result of the oil shock and the higher rate of inflation compared to other countries.

The authors use world income, domestic income, the domestic currency price of imported products corrected for trade policy and the domestic currency price of exported products corrected for trade policy as controls.

The result is that a currency devaluation of just over 80% would be necessary to keep the external accounts in balance. The exchange rate would have to fall from Cr$7 per US dollar to just under Cr$13. The income elasticity of our exports would be very close to 1, much higher than the structuralist school thought.

Edmar Bacha, in an article in the same *PPE* the following year, pointed out inaccuracies in the analysis and concluded that there had been no problems with the exchange rate policy in 1973.

In their reply to Bacha in the August 1978 *PPE*, Pastore, Mendonça de Barros and Kadota show that, accepting all of Bacha's parameters, the devaluation to balance the external accounts would in fact be much smaller.

However, the very low price elasticity of oil would require a much greater devaluation than that achieved, around 38% and not the 11% observed. A middle ground was reached between the 80% in the original article and the 11% observed and correctly sustained in Edmar's analysis.

The response of economic policy to external shocks, such as the price of oil, and their impact on the exchange rate and inflation became the subject of Pastore's research in the following decades.

How should Brazil respond to a negative supply shock? Failure to adjust economic policy can lead to imbalances that build up in advance and end up costing more when they take their toll.

On the other hand, adjustment can be very costly in the short term; just imagine the consequences of a 38% real exchange rate devaluation, as was necessary after the 1973 oil shock.

Not surprisingly, the option at the time was to finance the oil account with loans and launch an ambitious investment program to change the composition of domestic supply through the II PND.

The result was the country's growing foreign debt, which took its toll a few years later.

> I was confused at the time. Today I know: a) in the short term, there was no substitute for oil; b) the price increase led to an increase in imports and a current account deficit, and the country had two alternatives. It could reduce absorption – which would be recessive; it could go into foreign debt, which is what happened. The error was even greater than this statement suggests. In those years (see the introduction to *Inflation and Crises*), Arthur Burns had thrown monetary control in the US to the winds by keeping interest rates low. We (and all the oil importers) thought that it was the recycling of petrodollars that would make it possible to finance the (huge current account) deficits, so we didn't make any adjustments. On the contrary, just like Dilma, we thought that expanding supply could narrow the gap between absorption and GDP. A sad mistake.

Supply shocks also have an impact on inflation, and absorbing them means opting for a passive monetary policy, accepting a temporarily higher inflation rate in the hope that the phenomenon will reverse once the supply shock has passed.

Pastore's first paper on inflation was published in RBE in the first quarter of 1969. He estimated the demand for money and the response of the velocity of circulation of money to changes in the cost of carrying money, using techniques similar to those used in his doctoral thesis.

> The reason for this article was a disagreement with Delfim. He despised money, and at the time I was still (*mea culpa*) a monetarist. I had to show that the income velocity of money would grow with monetary expansion, and I made my point.

In this work, the same difficulties that arise from estimating time series at a time when the concepts of cointegration and all of modern econometrics had not been developed are present.

Pastore is aware that high R2s mean nothing and that care must be taken with the autocorrelation of the residuals, and he uses the best tools of the time, including the use of a lagged dependent variable.

The paper concludes with a diagnosis of cost-push inflation for the economic slowdown in 1966, and suggests that credit or even fiscal measures could make it possible to maintain the recovery of the economy while fighting inflation.

Typically, central banks today fight only the secondary effects of supply shocks on inflation, i.e. their pass-through to other prices.

This point was already made by Pastore at the time; a conclusion that will be taken up in his thesis: in the case of "cost-push inflation", monetary policy should seek only to combat its secondary effects on other prices, without raising interest rates or controlling monetary aggregates to compensate for the change in relative prices.

This, we believe, would be the modern interpretation of the "cost inflation" result.

As usual, Pastore very carefully analyzes the difficulties of estimating the effects of monetary policy and their implications. What is the nominal growth rate of money that stabilizes inflation? How should monetary policy be conducted?

Currently, after decades of research and the varied experiences of central banks, the answer is to operate with the interest rate rather than controlling the money supply, calibrating policy based on an estimate of the neutral real interest rate and inflation expectations. Still complicated, but much better than before.

In 1973, Pastore defended his associate professorship thesis, a monumental work on Brazilian inflation dynamics, and in the same year published part of his findings in *Estudos Econômicos* in the third issue of the third volume.

> In fact, chapter 2 of my thesis was preceded by Andrea Calabi's master's thesis (I was his advisor), and the motivation for the work was my lack of understanding of the mechanics of the CMN and the formulation of monetary policy in Brazil. At that stage I was in direct conflict with Delfim and the economists on his team, and one of the purposes of Andrea's thesis and my chapter was to arm myself with arguments to show how not to do monetary policy and how it would backfire.
>
> I like chapters 1 and 2, but there's something in chapter 3 that I pursued later and solved better, which is the quantification of seigniorage. It was enormous in those years (it peaked at 4% of GDP). There's a curious thing, which in the field of political economy explains why the BB was so opposed to Campos and Bulhões when the Central Bank was created. In the article on the monetary base, I show that the BB's deposits were part of the expanded base, which (doing the math with the parameters) shows that more than 1/3 of the seigniorage was appropriated by the BB. Well, popcorn, they didn't want to lose their "*boquinha*" and had to go against the Central Bank.

The introduction to the thesis clarifies the motivation behind the work. Once again, Pastore dialogues with the structuralist or Cepaline school.

At the time, the hypothesis was that inflation in Latin America was the result of a productive structure that was not very sensitive to prices or monetary policy.

This would be the case, for example, with the low responsiveness of agricultural supply to prices, a theory that was rejected by the analysis of the data in his doctoral thesis.

A similar phenomenon would occur in other relevant productive activities, sometimes due to oligopolistic structures.

Fighting inflation through "recession" would be ineffective and would have high social costs. Instead, according to Cepal's thesis, it would be better to adopt measures that increased supply and loosened the ties that made productive activities rigid. Something like the II PND or the new economic matrix.

The greatest contribution of the article, and one of the greatest contributions of the thesis, was the careful analysis of the money supply and its determinants. A detailed work based on the consolidation of the balance sheets of the Bank of Brazil and the Central Bank, as well as the various programs implemented by the monetary authorities.

Pastore documents that the fiscal deficit was the most important factor in the expansion of the monetary base in the 1950s to 1963. In the post-PAEG period, base expansion was determined by the accumulation of international reserves, partially offset by the issuance of government bonds.

Another important factor in the expansion of the base during this period was the Central Bank's loans to the Bank of Brazil, through the famous "*conta movimento*."

The paper highlights the complex structure of lags between the expansion of the money stock and inflation. In other words, the fall in inflation under the PAEG was accompanied by a profound change in the nature of monetary policy.

In addition, in his thesis and subsequent articles, Pastore documents the existence of a strong relationship and time lag between the expansion of the monetary base and inflation, which is well explained by a model with lags.

In December 1975, Pastore published in *Pesquisa e Planejamento Econômico* a second rare case of a theoretical article, "Gradualism or shock treatment," written with Ruben Almonacid, a brilliant Argentine economist and student of Friedman in Chicago, whom Pastore had met during his visit to the neighboring country in 1972 and brought to FEA-USP.

The article breaks new ground by proposing that expectations can lead to inflationary inertia, a problem that becomes more severe the higher and longer we have inflation. The paper anticipates many of the aspects of heterodox anti-inflation plans.

In the following years, Pastore interrupted his academic work. He joined the Central Bank, then returned to private life and began to build up his consultancy firm, always keeping abreast of advances in macroeconomics and econometrics.

There is nothing better to evaluate Pastore's contribution than to systematize how monetary policy was treated at the time by academics and public managers, especially central bankers, the practitioners of monetary policy.

The First World War ended the long 19th century, which, in the words of Eric Hobsbawm, began with the French Revolution in 1789 and ended in 1914. The end of the long period known as the Pax Britannica led to the destruction of the fixed exchange rate system based on the gold standard.

The gold standard established a simple mechanism, albeit a very limited and rigid one. The management of the quantity of currency was determined by the capacity of the mines to produce gold and by the demand for gold for purposes other than serving as a monetary standard.

It took 70 years to build the rules for today's monetary policy, which is not dependent on the supply of gold and in which the exchange rate regime allows external shocks to be cushioned[4]. The current inflation targeting regime has reduced the cost of ensuring the lowest rate of inflation and economic stability.

Between the outbreak of World War I in 1914 and the adoption of inflation targeting, there were European hyperinflations, the Great Depression, the attempt

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[4] This story is told in Part II of *Política Monetária: Ideias, Experiência e Evolução (Monetary Policy: ideas, experience and evolution)* by José Júlio Senna, published by the FGV in 2010.

to create a monetary standard tied to the dollar, the end of Bretton Woods in 1972, and high inflation in the developed world in the 1970s and early 1980s.

High inflation was a common theme in Brazil and many emerging markets in the 1970s. Academics and central banks did not know exactly how to manage the monetary system to achieve full employment with price stability.

Since the end of the gold standard, the fact is that we did not have a good monetary theory for a fiat currency regime. If money is colored paper, how can the quantity be regulated? How much colored paper can be put into circulation?

There were two answers to that question. The first was to use a fixed exchange rate. In the end, we have a bypass of the gold standard, as was the case with the Bretton Woods regime. The other was quantitative control of monetary aggregates.

In addition to the difficulty of determining which monetary aggregate to control, there is the even greater difficulty of quantitative control due to the enormous variability in the demand for money over time as a result of seasonality, the economic cycle, and structural changes brought about by technological revolutions.

The conventional monetary system of the last century proved to be very difficult to operate. It was very difficult to achieve monetary stability outside of the gold standard or the fixed exchange rate.

Monetary policymakers were left to peel the pineapple. Through much trial and error, amidst enormous pragmatism, they eventually developed the current model of monetary policy. Inflation targeting was developed by practitioners before theorists.[5]

Later, academic economists discovered and systematized the practical man's approach. The same thing happened with thermodynamics, which was developed after the first industrial revolution and the development of the steam engine.

In 19th-century Rio de Janeiro, Machado de Assis expressed the contradiction of a slave society amidst the liberal ideals of the Pax Britannica.[6]

Pastore saw no such contradiction. The ideas of his time were just as out of place in developed countries, though more so here than there, given our leniency toward the inflationary process.

In 1990, Pastore published the article "Inflation and Expectations with Monetary Policy in an Interest Rate Rule" in the *RBE*.

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[5] A recent text by Mervyn A. King, "Inflation Targets: Practice Ahead of Theory," Working Paper 32594, June 2024 argues along the same lines.

[6] See Roberto Schwarz's "To the Winner, the Potatoes" and "A Master on the Periphery of Capitalism", critical spirit collection, publisher 34.

In this text, Pastore picks up the thread of the 1975 article written with Ruben Almonacid and asks himself: what would be the optimal monetary policy when inflationary inertia is due to adaptive expectations that accelerate and when the central bank's reaction function is limited to the choice of the nominal interest rate?

According to Pastore, the central bank would have to react by counterbalancing the effect of inertia. Three years later, John Taylor notes that, in practice, central banks use a nominal interest rate rule. Stabilizing prices would require raising the interest rate more than proportionately to the increase in inflation. Pastore was asking the right question.

Returning to the article "Inflation and Expectations with Monetary Policy in an Interest Rate Rule," Pastore asks what the nominal interest rate path is that stabilizes inflation in a model with adaptive expectations. As he writes on page 508:

In addition to shocks to supply and the IS curve, and the autoregressive structure of π caused by adaptive expectations, the inflation rate will vary inversely with the real interest rate.

The real interest rate that stabilizes the system follows from equation (17) in the text:

$$r_t = \frac{b}{\beta}\left(\frac{1-\lambda}{1-\lambda L}\pi_{t-1} - \pi_t + \frac{u_t}{\beta} + \frac{z_t}{\beta}\right).$$

In this equation, r_t is the real interest rate; π_t is the inflation rate; b is the interest rate semi-elasticity of aggregate demand; β is the slope of aggregate supply; $1-\lambda$ is the speed at which the inflation forecast error is revised; L is the time-lag operator; and u_t and z_t are shocks to aggregate supply and aggregate demand (or the IS curve), respectivel y.v

The model is constructed so that the equilibrium real or neutral interest rate is 0.

Pastore stopped here. He considered the rule to be "complex and risky." Due to the complexity of implementing the rule, Pastore felt that quantitative control would be safer.[7] The following shows that Pastore came very close to a derivation of the Taylor rule.

Suppose the monetary authority wants to reduce the inflation rate from π_t to $\bar{\pi}$ which is the inflation target. Given the process of expectation formation, it is natural for the monetary authority to implement the following disinflation path:

$$\pi_{t+T} = \bar{\pi} + \lambda^T(\pi_t - \bar{\pi}), \quad (*)$$

[7] See the discussion on page 502 in the last paragraph of the introduction to the article.

for all $T>0$. The initial inflation, π_t, slowly converges to the target at the speed given by the way people revise their expectations. The question remains: what interest rate rule produces this disinflation path in the absence of shocks?

According to Fisher's equation, nominal interest is real interest plus inflation expectations. Formally:

$$i_{t+T} = r_{t+T} + \pi^*_{t+T+1},$$

where i_t is the nominal interest rate and π^*_t is the inflation expectation. Substituting the real interest rate into this equation and incorporating the process of forming adaptive expectations, we have the following equation:

$$i_{t+T} = r_{t+T} + \pi^*_{t+T+1} = \frac{b}{\beta}\left(\frac{1-\lambda}{1-\lambda L}\pi_{t+T-1} - \pi_{t+T}\right) + \frac{1-\lambda}{1-\lambda L}\pi_{t+T}.$$

The second term of the second equality derives from the rule for the formation of expectations and the effect of the inflation path of previous periods. Assuming that π_{t+T} is constant for all $T \leq 0$ and substituting the disinflation path chosen by the monetary authority, we obtain:

$$i_{t+T} - \bar{\pi} = \left(1 + \frac{\beta}{b}\frac{1-\lambda}{\lambda}\right)(\pi_{t+T} - \bar{\pi}).$$

In each period, the difference between the nominal interest rate and the inflation target is proportional, with a ratio greater than one, to the distance between observed inflation and the target. The proportionality of the monetary policy response, with a coefficient greater than one, corresponds to the Taylor principle, formulated some time later.

Remembering that the neutral interest rate is zero, i.e. $\bar{r} = 0$, the path of the nominal interest rate can be written in a form that recovers Taylor's rule:

$$i_{t+T} = \bar{r} + \bar{\pi} + \left(1 + \frac{\beta}{b}\frac{1-\lambda}{\lambda}\right)(\pi_{t+T} - \bar{\pi}). \quad (**)$$

The nominal interest rate is the long-term nominal interest rate, i.e. the neutral interest rate plus the inflation target, plus a term that depends on the deviation of current inflation from the inflation target.

Note that Taylor's rule (**) does not depend on the expectation formation process, since disinflation takes into account the way expectations are generated, as indicated by (*) for the case of adaptive expectations, for example.

In the early 1990s, it was not clear to monetary policymakers that an economy could be stabilized by a nominal interest rate rule, much less by an inflation targeting regime. Thermodynamics had not yet been written.

At that time, Brazil was facing the disaster of uncontrolled inflation. We had made mistakes with the Cruzado Plan, Cruzado II, the Bresser Plan, the Summer Plan and the Collor Plan. Each heterodox attempt at stabilization failed, and the result was only higher inflation.

Society succumbed to the inflationary process. The monetary correction and the banks' offer of countless alternative liquidity instruments, which could easily be converted into money, numbed society and allowed the economy to stumble along with high inflation.

The apparent normality led to outlandish theories, such as the one behind the Collor Plan. Inflation would be produced by short-term public debt, which could be quickly converted into purchasing power.

The disastrous solution was the forced renegotiation of the public debt to prevent the expansion of consumption in the midst of yet another heterodox stabilization plan.

In his critique of the Collor Plan, in an article in the RBE of January 1991, Pastore rejects the thesis that inflation is the result of the existence of financial assets that can be quickly converted into currency.

Uncontrolled inflation, he proposes, was the result of fiscal imbalance in the midst of a monetary policy without a rule like Taylor's or the one derived by Pastore in his 1990 article.

Surprisingly, Pastore's 1991 article emphasizes the automatic zeroing mechanism of the Central Bank and the control of monetary aggregates, a monetarist relapse without remembering his rule derived in the previous article.

Pastore corrects this deviation in his chapter in the volume in honor of Edmar Bacha's 75th birthday. Thermodynamics had not yet been written.

It is worth noting that Taylor's classic article was published later, in 1993, and treats the Taylor rule as empirical evidence of how central banks operated at the time; that is, it is not derived from a macro model.

In the years that followed, Pastore devoted himself to studying the complex empirical relationships between real variables – employment, hours worked, industrial production – throughout the economic cycle. Hence his observation that employment is the last variable to react to the economic cycle in Brazil.

In his long article in the late 1994 issue of *Revista de Econometria*, Pastore documents the importance of the inflation tax, seigniorage, in balancing the intertemporal budget constraint of the public sector in Brazil. Without this source of revenue, there were no resources to stabilize the public debt.

As in the 1950s, 1980s and early 1990s, inflation was essentially a fiscal phenomenon. Inflationary inertia and supply shocks are relevant to the process of rising prices, but in the long run, the imbalance in the public accounts is the source of inflation.

Often the problem ceased to be fiscal and became purely inertial. However, the fight against inflation and the achievement of a low-inflation equilibrium brought the fiscal problem back to the fore. This was the case, for example, during the first term of the FHC government.

In the July and September 1996 RBE article, Pastore analyzes the reduced effectiveness of monetary policy due to the short duration of public debt. Ultimately, if all the debt is post-fixed, the wealth effect of monetary policy is nullified and interest rate rises result in gains for debt holders. In this case, a contractionary monetary policy requires an even greater increase in the interest rate.

In the article "Monetary Passivity and Inertia" published in the *RBE* in the first quarter of 1997, Pastore exercises his art by using econometrics to make the concepts of the theory more precise.

For example, inflationary inertia can be a property of inflation data over time. The available data may be a good predictor of expected inflation in the future.

Almost all macroeconomic time series data have this property. However, the monetary regime can present the problem known as a unit root: tomorrow's inflation is today's inflation, barring an unpredictable shock.

In this case, the best estimate of tomorrow's inflation is exactly today's inflation. This is true inertial inflation.

This result had already been obtained by economists at PUC Rio in the 1980s, who studied the inertia of inflation. Pastore's novelty was to show that in these cases inflation seems to precede the expansion of the monetary base. The inattentive observer might conclude that it is inflation that causes the expansion of money and not the other way around.

As in Lucas' famous critique of the careless use of econometrics, the statistical properties of economic series depend on the rules of the game and how economic agents respond to changes. Macroeconomics that ignores microeconomics produces a lot of cancer pills.

Pastore and Cristina Pinotti published the article "Inflation and Stabilization: Some Lessons from the Brazilian Experience" in the *RBE*, first quarter 1999.

The first part of the article systematizes the results of previous articles on the characteristics of the Brazilian inflationary process and the reasons for the success of the Real Plan.

The second part shows the limitations of the plan and the need for fiscal and exchange rate reform. The article was published at the time of the crisis of the fixed exchange rate regime of FHC's first term, which led to the inflation targeting regime with a floating exchange rate amidst a fiscal consolidation of 3% of GDP.

A decade ago, we went through a very difficult time. In 2014/2015, we entered a deep fiscal crisis. The solution to the crisis was the impeachment of President

Dilma and the construction of fiscal institutions that stabilized the dynamics of the public debt: the expenditure ceiling; the indexation of the minimum wage to the IPCA; and the indexation of the Union's minimum spending on health and education to the IPCA. The real neutral interest rate fell from 6% to 2-3%.

Society has apparently rejected the Temer government's solution. The expenditure ceiling has been scrapped, the minimum wage has once again been indexed to real GDP growth, and the constitutional minimum spending on health and education has once again been linked to net current revenue.

The mood of the Brazilian economy goes hand in hand with fiscal dynamics. The country will have a date with fiscal adjustment in 2027. No matter who wins the elections. Will we have to go through another inflationary surge?

There is nothing better than imagining that economic policymakers have learned from Pastore the importance of careful data analysis, and that they will not repeat the disastrous mistakes of narratives that pay little attention to the evidence that have driven macroeconomic policy for so long.

Pastore began his distinguished career studying microeconomics and productivity. The evidence from applied research over the past three decades suggests that well-designed public policies combined with private entrepreneurship, rather than the flow of new ideas stimulated by competition, is an essential source of long-term sustainable economic growth.[8]

However, the country, which has chosen to go backwards, has made fiscal and monetary policy the order of the day. We have once again opted for sectoral intervention policies that reward business groups for their access to government offices rather than for their entrepreneurship and ability to introduce effective new ideas.

The result is our regression, which will take its toll in the years to come.

With his meticulous data analysis and attention to technique, Pastore pointed out our many mistakes, offered possible solutions for conducting public policy in times of serious crisis, and carried out his immense work amidst an example of personal ethics and academic seriousness.

Our thanks to our friend and teacher, Affonso Celso Pastore.

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[8] For a review of applied research in this area, see Jones (2016).

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