

**FUNDAÇÃO GETULIO VARGAS**  
**ESCOLA BRASILEIRA DE ADMINISTRAÇÃO PÚBLICA E DE EMPRESAS**  
**CURSO DE MESTRADO EXECUTIVO EM GESTÃO EMPRESARIAL**



**MARCH 4<sup>th</sup>, 1999: THE RECOGNITION-  
PRIMED DECISION HYPOTHESIS**

DISSERTAÇÃO APRESENTADA À ESCOLA BRASILEIRA DE ADMINISTRAÇÃO  
PÚBLICA E DE EMPRESAS PARA OBTENÇÃO DO GRAU DE MESTRE

**TAÍSA DE ARAÚJO AVELINO**  
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**TÍTULO**

MARCH 4<sup>TH</sup>, 1999: THE RECOGNITION-PRIMED DECISION HYPOTHESIS


**DISSERTAÇÃO DE MESTRADO APRESENTADA POR:**  
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## Abstract

On March 4, 1999, the newly appointed President of the Brazilian Central Bank, Mr Armínio Fraga, raised interest rates to a staggering 45% per annum. The objective of that decision was to keep foreign investors assets in Brazil, and prevent the country from default. At the time, Brazil suffered from an enormously intense crisis of confidence, and fears of such default were widespread. Mr Fraga was walking a very fine line when making that decision, for it could bring forth unintended effects: the market, already concerned about Brazil's sustainability, could perceive the increased rate as an irreversible step towards the abyss inevitable default. Economic theory postulates the rational actor model as the driving force behind economic decision-making. The objective of this thesis is to present and discuss the hypothesis that this particular decision, and by extension many others, are better explained through the recognition-primed decision model.

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To understand what a real essay is, we have to reach back into history again, [...] to Michel de Montaigne, who in 1580 published a book of what he called "essais." He was doing something quite different from what lawyers do, and the difference is embodied in the name. Essayer is the French verb meaning "to try" and an essay is an attempt. An essay is something you write to try to figure something out.

Figure out what? You don't know yet. And so you can't begin with a thesis, because you don't have one, and may never have one. An essay doesn't begin with a statement, but with a question. In a real essay, you don't take a position and defend it. You notice a door that's ajar, and you open it and walk in to see what's inside.

**Paul Graham, 2004**

## **Chapter 1. Introduction**

There were only a few hours for a decision to be made. And the world -- literally, the entire world -- would be watching. March 4<sup>th</sup>, 1999 marks a turning point in the economic history of Brazil.

On March 4<sup>th</sup>, 1999, the newly appointed President of the Brazilian Central Bank, Mr Armínio Fraga, raised interest rates to a staggering 45% per annum. The objective of that decision was to keep foreign investors assets in Brazil, and prevent the country from default. At the time, Brazil suffered from an enormously intense crisis of confidence, and fears of such default were widespread. Mr Fraga was walking a very fine line when making that decision, for it could bring forth unintended effects: the market, already concerned about Brazil's sustainability, could perceive the increased rate as an irreversible step towards the inevitable abyss of default.

Economic theory postulates the rational actor model as the driving force behind economic decision-making. The objective of this thesis is to question that assumption. We present and discuss the hypothesis that this particular decision, and

by extension countless others of similar nature, are better explained through the *recognition-primed decision model*.

Before we proceed into this essay, three questions are worth asking:

- 1.1) Is this (or should it be) of any scientific interest?
- 1.2) Why is this thesis worth if it only presents a hypothesis?
- 1.3) What is the structure of the thesis?

Let us deal with these questions in turn:

*1.1) Is this (or should it be) of scientific interest?*

Science is not about a particular phenomenon, neither a particular event. Science is concerned with patterns of phenomena, patterns of events (Hofstadter 1985). So is this single historical decision of scientific interest? Should it be? These are reasonable questions a skeptical reader might ask.

This decision to raise rates is of significant scientific interest, because it is representative of a pattern of decisions. This is only one of a set of decisions in which the decision-maker may face the law of unintended consequences, and have immediate adverse effects -- it is, thus, a pattern of decisions which include most high-stakes economic decision-making. And the hypothesis discussed here goes to the heart of economic theory, which brings us to the next question.

### 1.2) Why is this thesis worth if it only presents a hypothesis?

This thesis is an essay. The objective here is not to present new data for, or against, a hypothesis, or to model some phenomena. The objective is, instead, to present, and discuss, the hypothesis that the rate-rise decision is better explained through the framework of the recognition-primed decision model than the framework of the rational actor of traditional economic theory.

Many important scientific publications have been presented in the form of a hypothesis, for example: the original work of Hofstadter in *Scientific American* (later compiled in Hofstadter 1985), Francis Crick work on consciousness (Crick, 1995), and even studies conducted by our own research group in FGV (Linhares, 2005, Silva and Linhares, 2007). It is only natural, since this group has been working to advance hypothesis concerning human intuition and decision, that this particular thesis would continue this tradition.

### 1.3) What is the structure of the thesis?

Since we want to comprehend how a particular decision has been achieved in a particular moment in time, in chapter 2 we will study the circumstances encapsulating the decision-maker, with a historical outline starting with the introduction of the *Real Plan* in Brazil and following with the Russian default in 1998, which, in a rapidly cascading sequence of events, led to a crisis of confidence of the Brazilian economy. This, however, is not a work of history, and we thus present an admittedly brief outline of events. Economic historians will not be satisfied with our account, but the point here is to provide the necessary background information of the crisis. As a side note, our major source for these materials will be *The Economist* and

*Veja*, respectively British and Brazilian periodicals generally considered to be authoritative sources for economic and politics news analysis in their respective circulation. Of course, each publication has its own biases, and is subject to controversy from time to time, but this should not affect the major points involved in this study. Very few, if any, of our assertions might originate from disputed evidence or controversial editorial and opinion pieces from these publications.

Chapter 3 presents the recognition-primed decision model, proposed by cognitive psychologist Gary Klein (1998). On Chapter 4, we will focus on why the decision to raise interest rate is better explained by the recognition-primed decision model as opposed to the rational actor model.

This is the most serious financial crisis since World War Two.

Bill McDonough, President of the NY Federal Reserve, October 1998

## **Chapter 2. March 4<sup>th</sup>, 1999: A Retrospective of One of Brazil's Turning Points**

### **2.1 Background of the Crisis: Russia (1998)**

Russia went through a stabilization process that started in 1995 based on the idea of maintaining the exchange rate within a band; however, this policy was not successful due to, among other causes, the relevant increase in Russia's debt burden mainly during the years of 1996 and 1997; the failure to solve fiscal imbalances which resulted in large losses of external reserves; the impact of the Asian economic crisis as investors withdrew their funds from emerging markets (which influenced Russia's capital account), and a significant drop in international prices for Russian main exports. The crisis erupted in August 1998, with the announcement of the devaluation of the ruble by the Russian government. In the first day of the Russian default there was a buy effect in that country's stock and fixed income markets because investors had the idea that the country was on sale, as exposed by Eurípedes Alcântara in the article "O Brasil piscou" (1999). In addition, a 90-day moratorium on international debt payments was imposed.

The world's markets also felt the consequences: the London stock exchange had the largest one-day drop since 1987, Latin America experienced a collapse of share prices, and Wall Street had a deep decline on its markets with a rush into US Treasury bonds, cutting their yield rate to just 5.43 percent--below the 5.5 percent

rate fixed by the Federal Reserve. This flight into T-Bonds was an indication of the risk-aversion investors face mainly during economic crisis.

In that same year, the reserves of Russia fell from US\$ 13 to US\$ 8 Billion and GDP fell 10%.

Faced with this situation, Russian authorities announced a restructuring of the ruble-denominated government debt and a wider exchange rate band, which helped to devalue the ruble even further.

The impact of all these decisions was adverse in the domestic and foreign financial markets. Investors who bet in emerging countries, as they suffered great losses with the Russian crisis, panicked that the same could happen with other emerging markets, such as Brazil.

## **2.2 The Meltdown Reaches Brazil**

The timing of the series of events of the Russian crisis leads to the belief that this country contaminated Brazil in the beginning of 1999. A number of factors may have helped the Russian crisis precipitate the Brazilian one, such as: the panic of foreign and Brazilian investors to suffer major losses from investments in other emerging markets, the loss of investor confidence on the Brazilian currency as evidenced by the substantial loss of reserves during these months, and the vulnerability of the Brazilian economy due to its internal and external inconsistencies.

### 2.2.1 Steps to March: a crisis intensifies

The crisis in Brazil started forming long before it erupted. Many believe that the *Real Plan*, its strict control of the currency and the long period the government waited to devalue the *Real* were among the main reasons; however, even though the currency control helped to develop the crisis, many other events and facts played crucial roles to transform it in one of the worst economic scenarios of Brazil's history.

Let us thus briefly sketch out a timeline of events leading to the crisis point. It is under this intense cascade of global events that we intend to study Fraga's decision.

#### **Early 1994**

- Mr Cardoso introduces the *Real Plan*, with the objective of controlling the Brazilian currency, the *Real*, of lowering inflation and bringing economic stability to the country.

#### **December 1994**

- Under Ernesto Zedillo's first days of presidency, an economic crisis starts in Mexico prompted by a sudden devaluation of the *Mexican Peso*.
- The effect of this crisis in Brazil and in the Southern Cone of South America becomes known as the *Tequila Effect*. This event would be a landmark in the sense of international crisis spreading throughout the globe afterwards.

**July 1997**

- Three years later, a financial crisis erupts in most of Asia and scares worldwide economies that fear to be negatively affected.

**April 1998 to January 1999**

- Market confidence in Brazil tumbles. In an effort to protect its currency, Brazil's Federal Government spends more than USD 42 billion from its reserves, going from USD 74.6 billion in April 1998 to USD 32 billion in January 1999.

**August 1998**

- Provoked by the Asian crisis, economic turmoil reaches Russia. The abrupt decline in commodity prices is considered one of the main ignitions to the crisis. This is due to the fact that raw materials account for approximately 80% of the country's exports, making Russia susceptible to commodity prices volatility. The world's economy is affected as well. The most affected are the other emerging market economies, since foreign investors perceive greater possibility of default in them.

**October 1998**

- On October 4<sup>th</sup>, Fernando Henrique Cardoso wins the second term as President, with the same percentage of votes as its first election.
- Right after the Presidential reelection, Mr Cardoso asks Francisco Lopes, who would later become the President of the Brazilian Central Bank, to study an alternative to the current exchange policy, a task that he accepts easily since

he is a critic of the policy, maintained by Gustavo Franco, the then President of the Central Bank.

### **November 1998**

- Brazil and the IMF sign a new agreement that includes a package of USD 41.5 billion of international loans to the country.

### **End of 1998**

- Congress denies the approval of social security collections for public workers. That places increased disbelief over the sustainability of Brazil's Federal government policies.
- Default in domestic debt sanctioned by Itamar Franco (in the state of Minas Gerais), and the approval and support of other states' governors, increase the market's conviction that the country will not be able to pay its debts. Not even the IMF agreement signed in November eases investors' opinion of the likely country's currency devaluation and debt default.

### **January 1<sup>st</sup> to 15<sup>th</sup>, 1999**

- USD 5 billion of international reserves flies from Brazil. That represents more than half of the first payment of Brazil's debt with IMF.

### **January 13<sup>th</sup>, 1999**

- Under pressure, the Central Bank allows the dollar to fluctuate but still under its control. There is the creation of a system that works within bands, using the TBAN, 'Rate of Bank Assistance' (the rate that fixed the upper limit of the

exchange rate) as well as the TBC, 'Rate of the Central Bank' (the rate that fixed the lower limit of the exchange rate).

- The system is neutralized by the market within a few hours.

### **January 14<sup>th</sup>, 1999**

- The government sells USD 1 billion to alleviate the speculators.
- The credibility of Brazil starts to plummet rapidly.
- Large foreign financial institutions with considerable amounts of credit in Brazil are downgraded by Standard & Poor's, signaling to other financial institutions that they should also be punished by keeping investments in Brazil, which deeply intensifies the crisis. This triggers fears of a self-fulfilling prophecy.
- Foreign exchanges from other countries feel the consequences of the Brazilian crisis; the countries that are impacted the most are Portugal and Spain, as they had invested in the purchase of Brazilian telecommunication companies and banks in 1998.
- The C-Bond, the Brazilian security most traded in the foreign exchanges, reaches 47% of its face value. This is one of the lowest prices of this asset since the Mexican Crisis, in December of 1994.
- Fernando Henrique Cardoso speaks to Stanley Fischer, one of the main economists of the International Monetary Fund, who advises him to let the exchange rate to fluctuate freely.
- During this one day, USD 1.8 billion flights from Brazil, a sign of the lack of credibility that the country has created to investors in general.

### **January 15<sup>th</sup>, 1999**

- The system of bands, which was put in place two days prior, to control the currency devaluation, is brought to an end.
- With the decrease in external reserves due to investors' aversion to exposure to emerging markets, the Brazilian government decides to abandon the control to the local currency. The exchange value of the *Real* will now be dictated by the markets. The Government ends a cycle of the *Real Plan* and lets the market be responsible for Brazil's new image, according to *The Economist* (1999). This decision is made by Fernando Henrique based on information from outside of his economic team.
- In two days, the dollar rises 19.7% in relation to the *Real*.
- The public deficit becomes the main concern of the Brazilian economy and Congress is responsible for approving a new fiscal plan which "will provide the means for the government to reduce internal debt, lower the interest rates, and depend less on foreign capital." (NETO, 1999).

### **February, 1999**

- Signs of inflation start to appear as the price of the standard basket of goods rises by almost 5%.
- Since January, the interest rate rises from 29% to 39% and may have to go up further in the coming months as a mechanism to control inflation. (ECONOMIST, Brazil's Lenten Diet, 1999).
- IMF team and Brazilian officials revise the agreement of November 1998 to renegotiate terms, organizing a new accord.

- According to the article "Armínio entra no jogo" (1999), on February 27<sup>th</sup>, a team of Central Bank officials are sent to banks in São Paulo and Rio de Janeiro in order to avoid currency speculation.

### **March 1<sup>st</sup>, 1999**

- The economist Armínio Fraga becomes the new President of the Central Bank.
- Still according to the same article mentioned above, Fraga's main challenge is to stop the valuation of the dollar against the *real* because: 1) this may make it harder for the Brazilian government and private companies to pay their dollar-denominated debts; and 2) because the higher cost of production may bring inflation back.

### **March 4<sup>th</sup>, 1999**

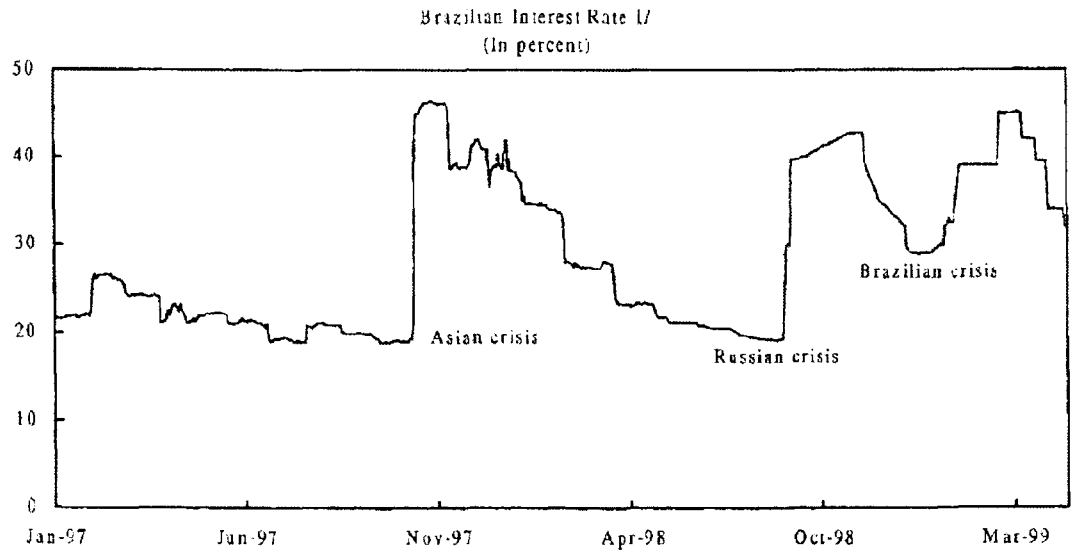
- In the hopes to stop the Brazilian currency collapse, the government's monetary policy committee, led by Mr Fraga, increases the interest rate to 45% per annum, from 39%.

The various crises around the world, such as the Mexican in 1994, the Asian in December 1997 and the Russian in August 1998, helped to create the setting for the Brazilian crisis (figures 1 and 2). The first attack to the Brazilian *Real* was in March 1995, during the Mexican *Peso* devaluation:

Brazil responded by adopting a pegged exchange rate, under which the *real* devalued by 7.5% a year against the dollar. This succeeded in bringing inflation down, eventually, to just 2.5% in 1998, its lowest level in half a century. It seemed painless - as long as the foreign capital poured in. But for the scheme to be sustainable, it was vital for government as well as firms to cut costs.

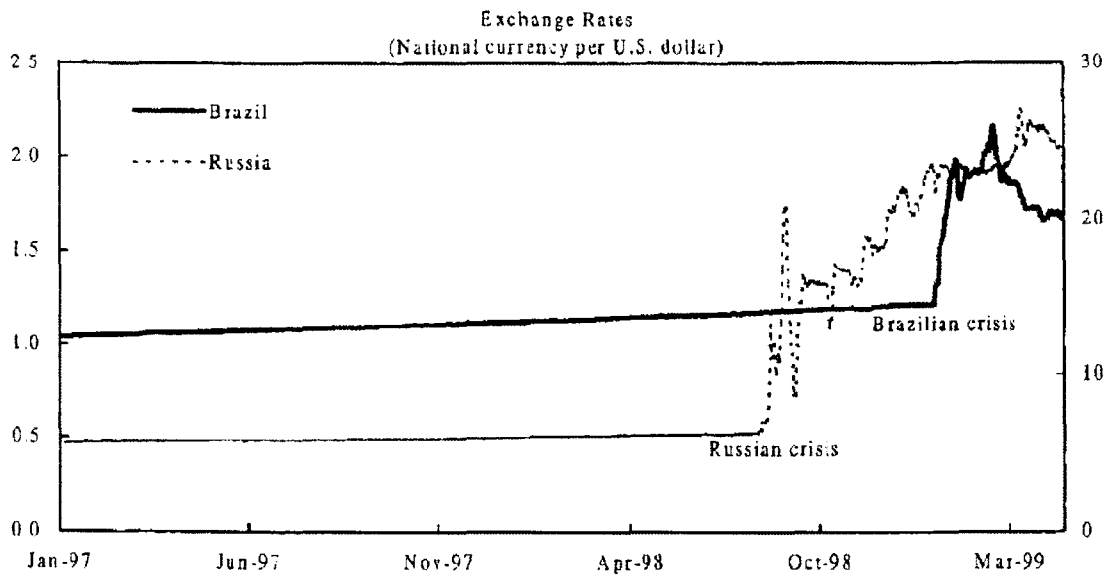
THE ECONOMIST, The Devaluing of a Presidency, 1999.

This was definitely a flaw of the Brazilian policies, as they did not reform public finances accordingly.



Source: Central Banks of Russia and Brazil – IMF Working Paper, The Russian Default and the Contagion to Brazil

Figure 1. Brazilian Interest Rate (in %)



Source: Central Banks of Russia and Brazil – IMF Working Paper, The Russian Default and the Contagion to Brazil

Figure 2. Exchange Rates (National Currency per U.S. dollar)

Prompted by the Mexican crisis, the Asian financial crisis first affected Thailand in July 1997, when this country cut the peg of its currency, the Baht, to the US dollar. Being the Asian country most impacted by the crisis, the dollar increased 50% in value over the baht, and Thailand's reserves, fell from USD 33.3 billion to USD 26.2 billion. From there, the crisis spread all throughout the Asian countries, which were forced to deal with cheaper currency values, undervalued stock markets, greater private debt, and declining overall asset prices.

By the end of 1997, Brazil was already feeling the consequences of maintaining the peg of the Brazilian currency to the dollar, and at the same time, putting aside the reform on public finances:

By the end of 1997 Brazil's combination of an overvalued currency [that was not compatible with the country's economy], a loose fiscal policy and tight money had resulted in a large and growing public-sector deficit and a big hole in its current account. The government's first response was to sacrifice growth for currency stability. Twice in less than a year it pushed interest rates to stratospheric levels and announced big fiscal squeezes.

THE ECONOMIST, The Devaluing of a Presidency, 1999, p. 4.

To add to this scenario, the Russian crisis came into place in August 1998. From all the prior mentioned foreign crises, the Russian one influenced Brazil the most because its timing coincided with the period in which Brazil was already vulnerable to the world economy due to its domestic and international weaknesses. In addition, Russia, as an emerging market country, made foreign investors believe that the risk of default was inevitable in other emerging markets with similar fundamentals, such as Brazil. Another reason for the lack of confidence by foreign and local investors was the poor management of public debt, which was being postponed for the four and a half years of the *Real Plan*. The Brazilian government

did not view “the need [for payment of the public debt as] urgent because of the great amount of dollars that entered the country during [the Real Plan] years” (Veja, *A Ancora virou Anzol*, 1999). With all the facts pointing to an imminent crisis, investors started withdrawing their funds from Brazil. From August 1998 to January 1999, around USD 50 billion flew the country.

With the objective of assisting Brazil to meet its commitments, the International Monetary Fund agreed to give out a USD 41.5 billion rescue package in November 1998. This package would temporarily alleviate pressure on the *Real* and on the country’s obligations, even though it was to be released in portions. This initiative did not convince investors that a devaluation of the currency was unlikely.

In the end of 1998, when Itamar Franco, the Governor of Minas Gerais, announced a moratorium on the state’s domestic debt, the insecurity in the Brazilian economy strengthened. Investors were led to believe that other states could act the same way, which would eventually leave Brazil with no other option other than defaulting.

The elite of Brazil decided to stand up against the high interest rates, as observed: “Powerful groups, such as industrialists based in São Paulo state and leading politicians within Mr Cardoso’s coalition, rebelled against such high interest rates” (THE ECONOMIST, *The Devaluing of a Presidency*, 1999, p. 4). They believed that a controlled devaluation would be the solution to escape of the economic turmoil Brazil was in. This encouraged Mr Cardoso to bring forth the devaluation of the Brazilian currency. As part of his strategy, he eliminated Gustavo Franco as the

Central Bank president and empowered Francisco Lopes, who was against the strong *Real* and consequently against the economic policies maintained by Mr Franco.

It was under this global scenario, along with high interest rates, high internal debt, great dependence on foreign capital, high unemployment rate, low growth, and poor export performance that the Brazilian Government could wait no longer. On January 13<sup>th</sup>, a system was implemented that worked within barriers so that the devaluation of the *Real* could happen still under the control of the government. The TBAN, 'rate of bank assistance', the rate that fixed the ceiling of the exchange rate, as well as the TBC, 'rate of the Central Bank', the rate that fixed the bottom of the exchange rate, were soon neutralized by the market.

Finally, on January 15<sup>th</sup>, no other alternative was available at hand besides letting the *Real* fluctuate freely, without barriers, being controlled only by the market and its players. From that day on, Brazil was exposed to the same risks that Mexico, Thailand, South Korea, and Russia had been previously.

With the market dictating the behavior of the exchange rate, from January 13<sup>th</sup> to the first days of March 1999, the *Real* weakened rapidly, going from R\$ 1,31 to R\$ 2,10 on March 4<sup>th</sup> (Figure 3).

In February, inflation signs started to emerge as the price of the standard basket of goods increased by almost 5%. Under new economic conditions, talks between the IMF monetary committee and Brazilian officials were initiated in order to

renegotiate terms of the November 1998 IMF accord. The new IMF agreement included "a bigger fiscal squeeze", which meant more spending cuts (THE ECONOMIST, That sinking feeling, 1999). Besides controlling the valuation of the dollar against the real, among Brazil's priority were "the renegotiation of the IMF deal, and the end of the misunderstandings between the Brazilian states against the Federal Government" (FRIEDLANDER; NETO, 1999). The new agreement was important for Brazil's economic health since these inflows would assist the stabilization of the country's economy.

[The deal would] allow Brazil to draw a second \$9 billion slice of the \$41.5 billion bail-out package. It also frees the Central Bank to spend up to \$8 billion of reserves to help meet demand for dollars from private banks and firms that must pay foreign debts. Officials hope that this will put a floor under the exchange rate, and encourage banks and foreign investors to start increasing their exposure to Brazil again.

THE ECONOMIST, The battle for confidence, 1999, p.6.

However, this was not the only solution. To control inflation in the short term, a firm monetary policy was crucial.

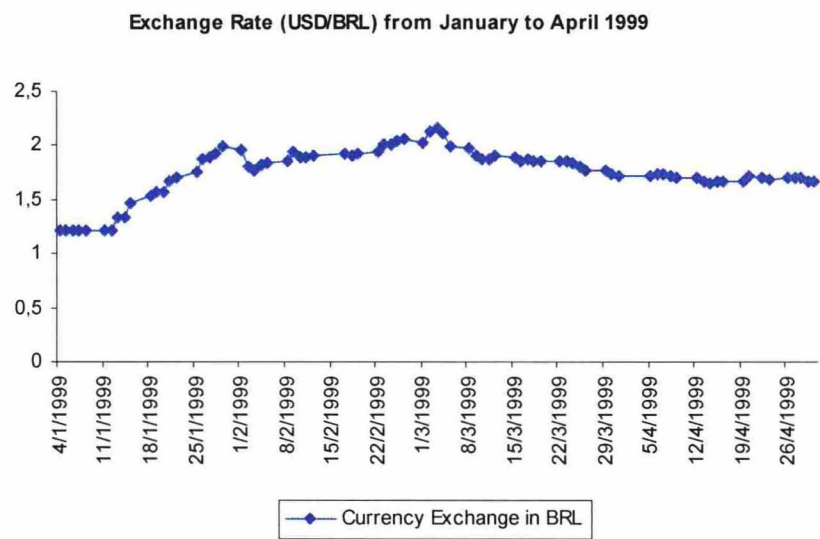
### *2.2.2 March 4<sup>th</sup>, 1999*

If inflation is not to take off again, the currency must be stabilized, which in turn implies a period of high interest rates.

THE ECONOMIST, After Brazil, 1999.

It was under these circumstances that on March 4<sup>th</sup> 1999, Mr Fraga, the newly appointed President of Central Bank, decided to raise interest rates to 45% from 39%.

This was his first attempt to control the devaluation of the exchange rate, and the rising inflation rate. Furthermore, with the heightening in interest rates, the flight of money to more stable markets could be decelerated as foreign and local investors would have a greater compensation for keeping the money invested in the country. From this day, the exchange rate clearly started a valuation pattern (Figure 3).



Source: Brazilian Central Bank - <http://www.bacen.gov.br>

**Figure 3: The USD/BRL Exchange Rate during the crisis**

According to the article "That sinking feeling" from The Economist (1999, p. 67), Mr Fraga's plan was Brazil's last hope:

Brazil must hope that all this can stop its currency from collapsing until April, when export revenues should increase, partly thanks to a bumper grain harvest. The risk is that before then the weak currency, inflation and high interest rates will combine to suck the economy into a whirlpool.

Therefore, the risk was still present.

### 2.3 What is interesting about this decision?

The decision to raise interest rates is the core focus of this thesis. Brazil needed to restore confidence and preserve stability. The new 45% rate was set to preserve much needed foreign investment. Yet, numerous circumstances involved in this decision, we claim, point to a deviation from the standard rational actor model, and towards a model of decision through recognition-primed decision, as posed by Klein (1999).

Notice that an insufficiently high enough rate could trigger massive capital outflows, by not rewarding investors for increased risk exposure. On the other hand, a rate too high could trigger fears that Brazil might rapidly become insolvent, also triggering massive capital outflows.

As the massive outflows were successfully avoided, we know, *a posteriori*, that this has been a successful policy. But the circumstances in which the decision was taken suggest a model of recognition-primed decision rather than a rational actor model, as will be argued in Chapter 4.

*Sources of Power* examines how experts make decisions in real-world environments where time is short and stakes are high. Klein has amassed an impressive quantity and range of evidence that erodes the myth of the expert decision-maker who behaves according to classical rational models, and he suggests that traditional definitions of both rationality and expertise need to be re-examined.

**Valerie M. Chase for Nature, review of Sources of Power, 1998.**

This could be a textbook for managers, emergency service personnel, or the military but it is more than that. It has relevance to decision-making researchers...while being written in such a compelling way that you are drawn into the subject like a whodunit...

**Patrick Tislington for Applied Cognitive Psychology, review of Sources of Power, 1998.**

Most studies of decision making treat humans like rats in a laboratory. But Dr. Klein, a cognitive psychologist, spent a decade watching fire commanders, fighter pilots, paramedics, and others making split-second decisions on the job, and this book is a clear and engaging account of his findings.

**Thomas Petzinger for The Wall Street Journal, review of Sources of Power, 1998.**

### **Chapter 3. The Recognition-primed Decision Model**

How do people make decisions? Most studies have focused attention on the rational actor model, in which an actor (a person, a firm, a government, etc.) examines the set  $A$  of actions and maximizes an utility function  $U: A \rightarrow R$ . This utility function is assumed to be representative of the actor's preferences.

This mathematical framework has been widely deployed in many fields, and is a core underlying assumption of economic theory (including game theory). There is, however, considerable evidence that people do not behave as rational actors would be expected, and even a number of Nobel prizes in Economics have been awarded, stemming from this work: both Herbert Simon and Daniel Kahneman are laureates from the "bounded rationality paradigm".

Bounded rationality suggests that people are not capable to maximize a preference function. This notion has spawned a field generally called “*behavioral economics*,” which collects heuristics and biases that show people departing from expected rational behavior. A good source for recent work on the subject has been, for instance, Plous (1993).

Though these studies have provided a fresh perspective on real, human decision-making, they can be classified as Petzinger did in the Wall Street Journal: studies of humans as rats on a lab. They are usually conducted inside a university's walls, with undergraduate or graduate students, who are not involved in the pressures of a particular real-world setting, do not have a serious desire for the best possible outcome, and quite simply know that they will finish a questionnaire and move on to something else. There is a lack of high-quality studies concerning real humans in real-world scenarios, and how decisions are made under these circumstances. As we have seen in the previous chapter, these are the circumstances under which Mr Fraga was operating on March 4<sup>th</sup>, 1999, and here is where we enter into Gary Klein's work.

### *3.1 Gary Klein's research*

As we have seen, there are two major schools of thought in what concerns decision-making: the rational actor model and the behavioral models. However, in the last decade, a new school of thought, of which cognitive psychologist Gary Klein (1993) is one of the leaders, has been gaining momentum. These studies usually are

placed under the umbrella of a *naturalistic decision-making* school, under which the recognition-primed decision model lies in, and which has the following characteristics:

- Decisions under time pressure
- High stakes
- Experienced decision makers
- Inadequate information
- Unclear goals
- Poorly defined procedures (as opposed to lab studies)
- Dynamic, rapidly shifting, conditions

The below table demonstrates under which conditions both recognition-primed decision model and the rational choice strategy are more likely to be used.

Task Conditions	Recognition-Primed Decisions	Rational Choice Strategy
Greater time pressure	More likely	
Higher experience level	More likely	
Dynamic conditions	More likely	
Ill-defined goals	More likely	
Need for justification		More likely
Conflict resolution		More likely
Optimization		More likely
Greater computational complexity		More likely

Source: KLEIN, G., (1999) Sources of Power: How people make decisions. MIT Press, Cambridge

**Figure 4: Boundary Conditions for Different Decision Strategies**

As Klein (1999, p.3) puts it:

The sources of power that are needed in natural settings are usually not analytical at all -- the power of intuition, mental simulation, metaphor, and storytelling. The power of intuition enables us to size up a situation quickly. The power of mental simulation lets us imagine how a course of action might be carried out. The power of metaphor lets us draw on our experience by suggesting parallels between the current situation and something else we have come across. The power of storytelling helps us consolidate our experiences to make them available in the future, either to ourselves or to others.

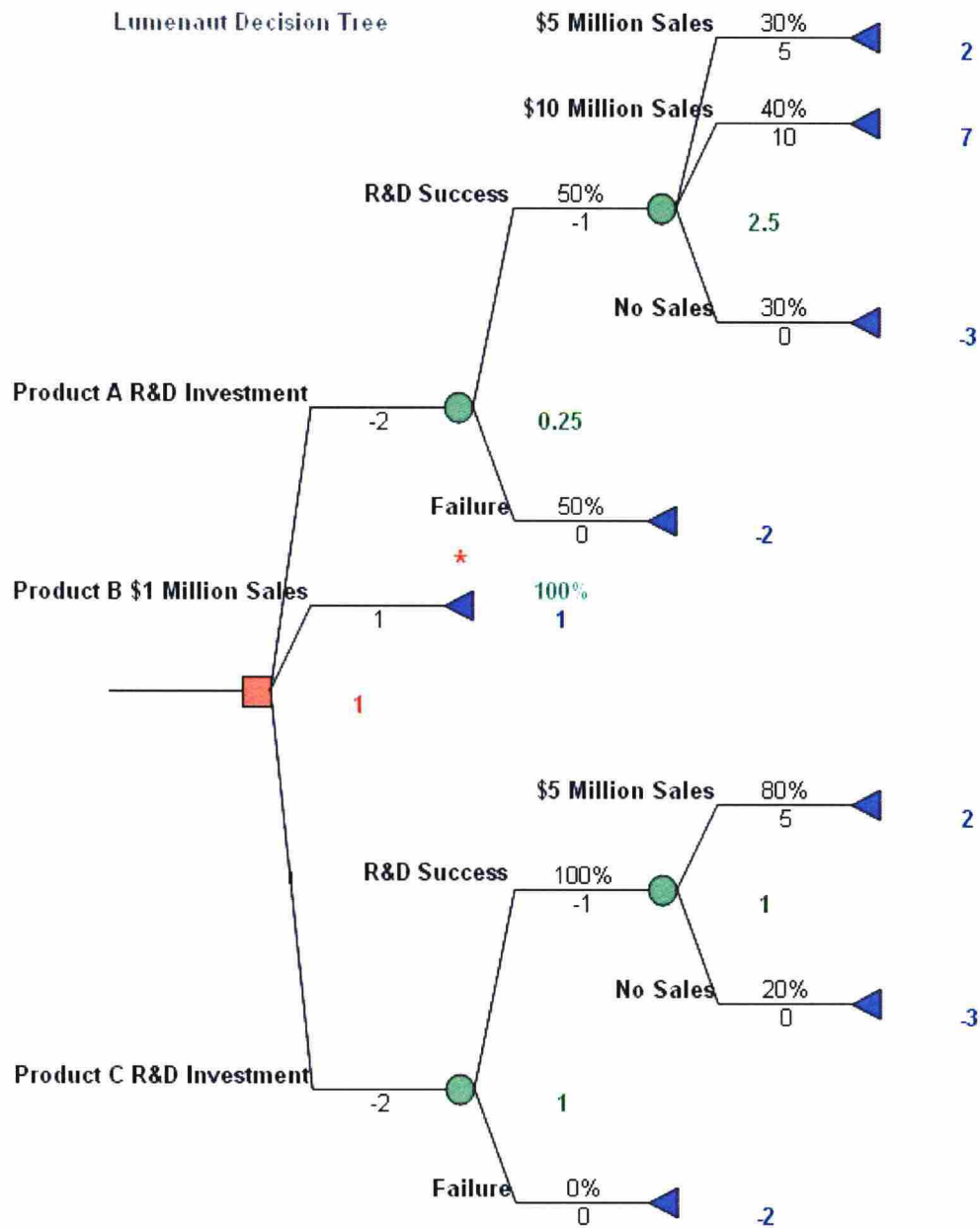
From the sources of power cited by Klein, the power of intuition intertwines with the recognition-primed decision model, as the author himself puts it:

The simple version of the RPD model is a model of intuition. [ ] at least some aspects of intuition come from the ability to use experience to recognize situations and know how to handle them. (1999, p.34)

As we deepen our discussion on the RPD model, it is easier to view the similarities exposed by Klein.

### 3.1.1. *Intuition, decision, and trees*

Consider for example a classical model of decision-making. The decision-making literature is used to modeling decisions with *decision trees*, such as this one:



**Figure 5: Lumenaut Decision Tree**

These trees are key underlying mechanisms in many areas of decision-making; a significant part of *operations research*, *game theory*, *symbolic artificial*

*intelligence and management science*. They are deeply associated with the rational actor model, and with the supposition of rationality. At each step, the tree branches out some possible paths, from which one can work out the consequences of each of these different choices. In due course, all possible courses of action are (theoretically) enumerated in the tree, such that a rational actor would maximize a utility function  $U$ , over all possible decision courses of action, in order to select the best one. As noted by Klein (1999), "decision theorists like this choice because they can show how it will lead to optimal choices, as long as the decision makers fill in the data accurately."

Consider, for example, the game of chess. On an average position of the game, there will be 30 possible moves. This means that the tree will expand thirty-fold (on average) at each play one analyzes. Standing at a crossroad with 30 alternatives, all theories in management science, operations research, game theory, computer science, would assume the following:

***The Choice Assumption.*** *If there are  $N$  choices at a branch point, they will be compared against each other.*

In this way, the best will be chosen. Beautiful to model mathematically, easy to implement computationally, this *choice assumption* has been, historically, a non-brainer in the decision sciences, as it brings real results; theoretical and industrial. Perhaps this success explains why it took quite a while for psychologists to start questioning it. Gerd Gigerenzer (2007) was one, by presenting what he calls the "fast and frugal tree": a tree with  $N$  nodes, and  $N+1$  leaves. At each node, the decision is

binary, akin to questioning oneself "is this solution satisfactory?" A yes will bring it to a leaf; a no will bring it to a further decision node: "how about this one?"

This is where intuition enters the question. Intuition is the information processing between any two nodes. With only  $N+1$  leaves, the topology of the "intuition tree" is quite distinct from that of a traditional one (See, for instance, figure 3 of Hutchinson and Gigerenzer, 2005).

Klein (1999, p.33) draws parallels between the RPD model and intuition and claims that "intuition grows out of experience." He also points out that "intuition depends on the use of experience to recognize key patterns that indicate the dynamics of the situation." From this perspective, both intuition and the RPD model connect as they might originate from experience. In fact, by expanding one's experience base, the use of intuition and the RPD model can be of greater use, as the person will benefit from a large experience to recognize situations and to handle them appropriately. The brain can be basically seen as an experience-recognition machine, matching each new situation to its encoded experience.

Where is the psychological evidence that people face a "take-it-or-leave-it" decision at each point, instead of a comparison of multiple choices? Besides Gigerenzer, Gary Klein's recognition-primed decision model also brings up this model (personal communication with Gigerenzer). Moreover, Barry Schwartz (2004) discusses many examples in which the choice assumption does not seem to hold.

So, if people do not compare options at each point, how is a good course of action selected? Gary Klein, Barry Schwartz, and Gigerenzer converge on the same solution: it is not the best alternative; it is just the one that may be workable. It is not about optimizing, it is about satisficing (as proposed originally by Herbert Simon). As Klein observes, “satisficing is different from optimizing, which means trying to come up with the best strategy. Optimizing is hard, and it takes a long time. Satisficing is more efficient” (1999, p.20). Satisficing, thus, underlies the recognition-primed decision model.

### **3.2 The nurse, the firefighter and the recognition-primed decision model**

In this section we will explain the recognition-primed decision model. Prior to explaining the model, it is easier to illustrate it with some examples of decision making in natural settings, which is what the model intends to elucidate. One example is the baby whose heart was not pounding 80 beats/minute, as described by Klein (1999).

#### *3.2.1 A nurse's immediate knowledge*

A nurse (KLEIN, 1999, p.178-179) in a neonatal intensive care is providing primary care for a baby, and is uncomfortable about another baby, who seems to be having subtle color changes. Sometimes the baby will fade a bit; sometimes it will come back to a healthy pink. Due to her slight concern, she remarks the fact to the primary nurse, who agrees with her.

Suddenly, the baby turns blue. The monitor shows that the blood pressure has bottomed out completely and there is a heart rate drop. Surprisingly, however, the heart rate goes back up to 80 beats/minute. This, supposedly, should make the nurse think that this is evidence the baby did not suffer from a heart condition. However, as she was an experienced nurse, she told everyone around the room she believed the baby had a *pneumopericardium* (a condition in which air fills the sac that surrounds the heart and the pressure prevents it from moving blood to the body).

If the nurse is right, the baby will die in minutes if the air is not released. She had seen this happen before to a previous baby and she instantly knew it was the exact same situation. The primary nurse, however, does not agree with the diagnosis — and arguments ensue: the heart monitor keeps displaying 80 beats/minute, so she believes it is a collapse of the baby's lungs. Thus, they discuss whether it is in the heart or in the lungs the ultimate cause of the baby's condition.

As the single nurse points to the heart as the real cause, the whole team points to the monitor, which still shows the heart rate stable at 80 beats/minute. So, she pushes them away from the baby for a minute and asks them for silence so she can listen to the baby's heart rate, which is just absent. She realizes that the heart is not beating but the monitor is still displaying the same heart rate. What, then, is happening?

She begins doing compressions on the baby's chest as the doctor comes. The doctor has confirmation of a *pneumopericardium* when the x-ray technician shouts

across the room that the baby's pericardium is indeed filled with air. The doctor releases the air; the baby's life is eventually saved.

Afterwards, the team discussed about why the heart monitor kept displaying healthy levels of activity. As it turns out, the monitor responds to electrical activity and not to muscular activity. Since the electrical activity was fine, it did not respond to the lack of mechanical activity, due to the air pressure.

What theory can explain this kind of decision, in which a nurse had an immediate intuition about the real cause for the baby's condition? Going against “hard” evidence, how does she know immediately that it was a heart problem? This type of decision-making in naturalistic settings, where immediate responses are needed, has led to Klein's theory of recognition-primed decision. Let us see another example before delving into the model.

### *3.2.2 Fireground decision making*

In this next case, Gary Klein (1999, p. 2-3), followed firefighters in their natural settings, trying to see how they behaved, how they made decisions on the spot of an accident, of a major fire, or whichever situation they were dealing with.

In the summer of 1985, Klein's research team followed a group of firefighters when an alarm call comes in at 3:21 p.m. Three minutes later, their truck is already approaching a house in a residential neighborhood. Lieutenant “M” sees a man laying on the ground, and the first implicit decision facing him is to diagnose the

problem at hand. As he approaches the man, he makes an instantaneous diagnosis. From the amount of blood surrounding the man, he infers that he has an open artery; by the position of the dishcloths restraining blood loss he assumes which artery is open. Now that a diagnosis of the problem is made, which goals should be pursued? And how?

Any decision-making theory needs to explain how goals are determined. Thus, in this particular setting, he applies firm pressure to the open artery and starts to look for other injuries which could prevent him from moving the man. However, the fireman realizes there is no time for continuing such procedure. He cannot wait any longer because the injured man has a few minutes left to live. Lieutenant M assigns his strongest man to assist him in moving the man, even though he knows that the fireman he chooses to help him is not the most experienced member of the crew. The Lieutenant understands that strength, in this case, is more important than experience. This is a focal point of Klein's work. He attempts to demonstrate how this kind of decision is made very rapidly.

On the way to the hospital, the crew puts inflatable pants on the man's legs to raise the blood pressure and stabilize the man. If they had waited to put on the pants before starting driving they could have lost precious time and the man could have died. They arrive in the hospital a mere ten minutes after the original alarm. The whole situation happens and all these decisions are made in ten minutes.

This is what the theory needs to explain: how situations are assessed, how goals are determined in very rapid scenarios, and how decisions can be made in a

split of a second. How did the commander know immediately how to act? The recognition-primed decision theory, proposed by Gary Klein, assesses this question and proposes an answer.

Before reviewing Klein's model, let us comment on the inadequacies of the postulations of rationality in this case. It seems extremely unlikely, of course, that, at each brief instant in time, a fireground commander, or a nurse, would generate a large number of plausible hypotheses, and compare them against each other -- in an utility function manner. This is highly improbable.

For example, in games such as chess, we know that humans do not search the game tree, and "think ahead" rather sporadically (de Groot 1965, Gobet 1998, Gobet et al 2001, Klein 1999). Strong evidence points to the fact that high-level chess playing comes from a deep, meaningful, perception of a position (Chase and Simon 1973, Gobet 1998, Linhares 2005, Linhares and Brum 2007). This process of understanding an scenario is extremely fast and robust, to the point of making deliberate "thinking ahead" processes unnecessary: consider, for example, the case of Ron "Suki" King, a world checkers champion, which played in 1998 a simultaneous game against 385 opponents. He beat them all (Myers, 2002). Suppose he had an average of 2 seconds for each position. A mere two seconds; barely enough time to look at the board, have an initial idea, then make a movement. That would give each of his opponents 12 minutes and 30 seconds to consider the reply. In chess, José Raoul Capablanca once said: *"I see only one move. The best one"*.

It seems, in fact, that these specific actors had only one choice to choose from. And this single, specific, choice is a core component of Klein's model.

### **3.3 Recognition-primed decision**

In his search to explain this kind of "obvious" decision-making, Klein came up with the theory of the recognition-primed decision model, described in this section. Klein's starting point was Soelberg's thesis. Soelberg (1967) taught his students at MIT Sloan School of Management how to perform the rational choice strategy, in which the decision maker:

1. Identifies a set of options;
2. Recognizes the way of evaluating these options;
3. Weights each evaluation dimension;
4. Does the rating;
5. Picks the option with the highest score.

In Soelberg's PhD thesis he studied the decision strategies his students used to select their jobs as they graduated. But he was mistaken; his students did not systematically compare options. Soelberg found that they were using their "gut feelings", and he could predict with 87% accuracy their ultimate choice, three weeks prior to the students' decisions.

Thus, Soelberg's thesis was:

1. Students had a gut choice, an initial preference for a job, and their decision had already been made, though unconsciously—as they would keep on claiming that "they are still deciding";
2. Students would, then, find another option to use as a basis for comparison;
3. They would, finally, construct a justification for their gut decision—which had already been made previously.

The irony in Soelberg (1967) was that he was involved in teaching students the rational method, only to find out that, in reality, they would not apply it, not even a variation of it. So Klein also initially hypothesized that fireground commanders would be comparing, instead of various options, only two. Let us call this the two-choice hypothesis.

During their research, Klein's team questioned the fireground team about their decisions, "*Can you tell us about difficult decisions you've faced?*" Surprisingly, the answer they heard repeatedly was, "*I don't make decisions. I don't remember when I've ever made a decision.*" Another consistent response would be that "*it's always obvious what to do*". With that in mind, Klein's 2-choice hypothesis started to collapse; as fireground commanders did not seem to be comparing options at all. At first, that seemed "unhappy news" for the researchers. The subjects insisted that commanders **never** made decisions. Commanders agreed that there were options. But it was just obvious what to do in any situation. But how could that be? Options, but no decisions? What kind of theory could explain that? What if we change definitions? Then, according to Klein (1999, p. 16), a decision would now become "a

**choice point** where reasonable options exist and the commander might have selected a different option” as opposed to a “selection between previously compared alternatives.” As it turned out, “the commanders were not refusing to compare options; they did not have to” (1999, p. 17). Klein observes that he “had been so fixated on what they were not doing that [he] had missed the real finding: that the commanders could come up with a good course of action from the start” (1999, p. 17). He continues noticing that “[the commanders’] experience let them identify a reasonable reaction as the first one they considered, so they did not bother thinking of others. They were not being perverse. They were being skillful.” When facing a complex situation, commanders would immediately respond in appropriate fashion without conscious thought. They were **primed to act**. This became the basis for the recognition-primed decision model.

Therefore, in the **recognition-primed decision making**, decision-makers would look at several options, but never compare them. But how? Commanders thought about one option at a time, judged it, discarded it, then turned to the next possible rescue technique. This strategy, based on satisfying rather than optimizing, seen earlier, is called a *singular evaluation approach*.

However, there was a second puzzle: if they did not compare one course of option with another, how did they evaluate the options? How did they know, without comparing, that a course of action was any good? They used a **simulation heuristic**, *running the action through in their minds*.

If they spotted a potential problem, they would move on to the next option, and then the next, until they reached something that would seem to work in that particular situation.

Klein's research team (1999, p. 21) concluded the following:

Before [they] did this study, [they] thought that: 1) Novices impulsively jumped at the first options; and 2) Experts carefully deliberated about the course of action. Now, it seemed that it was the experts who could generate a single course of action, while novices needed to compare different approaches.

There are times for deliberating about options, usually when experience is inadequate and logical thinking is a substitute for recognizing a typical situation. This explains Capablanca's remark about chess: "*You figure it out what to do. I see only one move. The best one.*"

Decision-makers recognize the situation as typical and familiar, and proceed to take action. Thus, they [immediately] understand:

- A. What types of *goals* make sense;
- B. Which *cues* are important;
- C. What to *expect* next;
- D. Immediate access to a *typical course of action*.

Decision-makers do not start with goals or expectancies and figure out the nature of the situation. Instead, they find themselves *immersed* into a situation, and rapidly gather information in order to make a diagnosis.

In the following Chapter, we will learn how the recognition-primed decision model can be used to better explain the decision to raise interest rates made by Armínio Fraga on March 4<sup>th</sup>, 1999.

## Chapter 4. Discussion

### 4.1 Why the recognition-primed decision model should explain this (type of) decision.

As we have seen in the last chapter, the naturalistic decision-making school of thought studies:

- I. Decisions under intense time pressure
- II. High stakes
- III. Experienced decision makers
- IV. Inadequate information
- V. Unclear goals
- VI. Poorly defined procedures (as opposed to lab studies)
- VII. Dynamic, rapidly shifting, conditions

Let us look once again at the rate-rise decision, this time considering the above list.

**I. Decisions under time pressure.** Brazil was on its third President of the Central Bank in two weeks. Mr Fraga had to publicly show that he was capable of avoiding disaster, and also, that Brazil's finances were manageable. Reserves were leaving the country at a rate of billions of US dollars per day. Default would become inevitable if conditions remained constant. Time was crucial.

**II. High stakes.** Mr Fraga had declined his job as George Soros's top economist to take the position at the Central Bank. For him personally, there were large stakes at hand. For Brazil, its government and its economy, the stakes were even higher. The risk of default could bring the economy down for years, and isolate Brazil from the world's economies precisely at a time when the world seemed to be under a major process of globalization and integration of services and supply chains. As a comparison, Argentina defaulted in 2001 and suffered enormous consequences, including a dramatic fall in GDP, rises in unemployment, rises in poverty, and inflation. Even the devaluation of the *Real* did not bring the same consequences seen on Argentina:

Devaluation in 2002 prompted a temporary spike in inflation, and a lasting increase in food prices. As unemployment surged to 25%, real wages fell by an average of 30%. By June 2002, 56% of Argentines had fallen below the official poverty line.

THE ECONOMIST, Argentina: Another country, 2005.

**III. Experienced decision makers.** The involved parties in this case were Mr Fraga, the Central Bank's President, Mr. Pedro Malan, the Finance Minister, and President Fernando Henrique Cardoso. It is highly unlikely that even one of these three would be unaware of the rate-rise, the potential unintended effect of decreasing overall market confidence and, consequently, increasing the money outflows, in an autocatalytic, self-reinforcing way. The three had PhDs, had either studied or taught outside Brazil, and President Cardoso, the only one with a PhD in a field other than economics, had been finance minister prior to being elected--and the key figure behind Brazil's *Real* stabilization plan.

**IV. Inadequate information.** There was inadequate information at the elite decision-makers, for numerous reasons. Volatility was at high levels, making forecasts rapidly obsolete. It was impossible, for example, to predict whether other Brazilian governors would follow Itamar Franco's steps and default on the state's debts. It was impossible to predict whether rating agencies would intensify the downgrading of Brazilian assets. It was even more unclear how the international markets would respond to such rapid changes.

**V. Unclear goals.** Here the goals seemed to be clearer than under most naturalistic decision-making settings. The goal was to restore confidence in the market. But how to do that in such rapidly changing conditions? What procedure, for example, would do such? There are no predefined procedures to establish lower volatility and higher confidence in a scenario like this.

**VI. Poorly defined procedures (as opposed to lab studies).** There are no clearly defined procedures to "restore market confidence". This is by nature a fluid, blurry, dynamic problem in which each situation will have its own set of particularities.

**VII. Dynamic, rapidly shifting, conditions.** Finally, as we have seen, the conditions under which such decisions have been taken were those of extreme volatility and rapidly changing circumstances. A governor of Minas Gerais or an event in Asia could instantly affect the ongoing crisis in so many unpredictable ways. The recognition-primed decision model accounts for this immensely rapid change of circumstances, while the rational actor model is oblivious to it.

## 4.2 Discussion

Under which decision-making framework should we place the March 4<sup>th</sup>, 1999 decision? We have argued in this work that the recognition-primed decision model would provide a more realistic framework to deal with all issues involved (as opposed to the traditional rational agent model of most economic theories).

In the paper *Notes on the Brazilian Crisis of 1997-1999*, written by Francisco L. Lopes, who at the time was Fernando Henrique Cardoso's assistant and later would become the Brazilian Central Bank President, he recalls that Gustavo Franco, who was the Central Bank President at the time, mentioned in one of the COPOM meetings in September 1998:

History teaches that abnormal external conditions require unorthodox policy responses. He explained that, given that external financing for emerging economies had collapsed, it was time to think on less orthodox solutions.

(LOPES, 2003, p. 53)

This illustrates that the rational actor model was being put aside from the beginning and not only Mr Fraga, but all the prior decision makers were considering less traditional answers, which is what the recognition-primed decision model postulates.

If the recognition-primed decision model hypothesis is correct, then we predict that the decision-makers involved would not mention to have considered many numeric alternatives to the 45% rate rise, and, moreover, would mention that the trade-off between 40% and 200% is just "a matter of judgment" (experience and

recognition). Notice that, in the strict abstract form that the rational actor is postulated, all numeric alternatives should be considered, an infinite set.

With this, we come to our closing remarks. Markets operate at a furious pace. A large set of variables fluctuates widely across the spectrum of prices. There is much uncertainty involved. The decisions involved are usually of high stakes. Conditions change suddenly and dynamically. There are no established procedures for success, and efficient market theory postulates that there can be none.

We propose that recognition-primed decision should be considered as a psychologically plausible framework for understand the decisions involved in markets. We have selected here the case study of the 1999 Brazilian crisis, but many others could be considered, including the current devastating crisis triggered in 2008 by the U.S. housing collapse; the sequential collapse of large financial institutions (such as Lehman Brothers), and government bailouts of unprecedented scale.

The rational actor model has been much applied because it is a simple model and leads to some interesting results. It does not, however, consider the numerous issues dealt with in the recognition-primed decision framework. It ignores the timing of decisions, uncertainty concerning problem diagnosis and ultimate goals, rapidly shifting scenarios, and high stakes (deciding to go to war might as well take as much effort as choosing an ice cream flavor). It will be hard to devise a mathematical model that is more applicable and more realistic. But this seems to be a fruitful avenue for further research, and we postulate that the recognition-primed decision framework can provide a serious starting point.

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