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EXPECTATIONS, COORDINATION FAILURES
AND MACRO CRISES

Juan **Brichetti** - Daniel **Heymann** -
Pedro **Juarros** - Gustavo **Montero**



Instituto Interdisciplinario de
Economía Política de Buenos Aires
(IIEP-BAIRES)

Universidad de Buenos Aires, Facultad de Ciencias Económicas
Instituto Interdisciplinario de Economía Política de Buenos Aires
Av. Córdoba 2122 - 2º piso (C1120 AAQ)
Ciudad Autónoma de Buenos Aires, Argentina
Tel +54 11 5285-6578

<http://iiep-baires.econ.uba.ar/>

Consejo Nacional de Investigaciones Científicas y Técnicas
Ministerio de Ciencia, Tecnología e Innovación Productiva
Av. Rivadavia 1917 (C1033AAJ)
Ciudad Autónoma de Buenos Aires, Argentina
Tel +54 11 5983-1420

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EXPECTATIONS, COORDINATION FAILURES AND MACRO CRISES

Juan Brichetti

UNIVERSIDAD NACIONAL DE LA PLATA, ARGENTINA.
juanbrichetti86@gmail.com

Daniel Heymann

UNIVERSIDAD DE BUENOS AIRES. FACULTAD DE CIENCIAS ECONÓMICAS. BUENOS AIRES, ARGENTINA.
CONICET-UNIVERSIDAD DE BUENOS AIRES. INSTITUTO INTERDISCIPLINARIO DE ECONOMÍA POLÍTICA DE BUENOS AIRES (IIEP), ARGENTINA.
UNIVERSIDAD DE SAN ANDRÉS, ARGENTINA.
dheymann2010@gmail.com

Pedro Juarros

GEORGETOWN UNIVERSITY, UNITED STATES.
pedro.juarros@gmail.com

Gustavo Montero

UNIVERSIDAD DE BUENOS AIRES. FACULTAD DE CIENCIAS ECONÓMICAS. BUENOS AIRES, ARGENTINA.
CONICET-UNIVERSIDAD DE BUENOS AIRES. INSTITUTO INTERDISCIPLINARIO DE ECONOMÍA POLÍTICA DE BUENOS AIRES (IIEP), ARGENTINA.
g_montero@economicas.uba.ar

FALLAS DE COORDINACIÓN Y CRISIS MACROECONÓMICAS

ABSTRACT

Deep recessions and disruptions in credit markets have caused worries and motivated research for a long time. They still challenge macroeconomic analysis. We first map some observable features of a set of such episodes, trying to find common elements of the whole family of events. The different macroeconomic experiences show a high degree of heterogeneity. Given that, what emerges as a central element of crises is their character as a life-changing episode for the people concerned, which remains in their memory and triggers a search for lessons, as they frustrate past expectations and force widespread reevaluations of wealth and income prospects. Critical periods involve dynamics at different time scales, as economic changes with lasting implications take place in an environment of dramatic day-to-day variability. Crises tend to be associated with breaks in the growth trends of the economies in question, in a way that may surprise not only agents inclined to eccentric behavior, but also those who held beliefs based on prevalent economic analysis. Macroeconomic disturbances of this sort raise strong questions about the pertinence, and the logic, of usual rational expectations assumptions and modeling practices.

RESUMEN

Los episodios asociados con profundas recesiones y perturbaciones en los mercados de crédito han sido causa de preocupación y han motivado la investigación académica por un largo tiempo. No obstante, estos tipos de eventos aún plantean desafíos para el análisis macroeconómico. Este trabajo busca mapear algunas características observables de un conjunto de tales episodios, tratando de encontrar elementos comunes para toda la familia de eventos. Las diversas experiencias bajo estudio muestran un alto grado de heterogeneidad. Dado esto, sin embargo, lo que emerge como un elemento central de las crisis es su carácter saliente en la vida de las personas afectadas, el cual permanece en la memoria y desencadena la búsqueda de lecciones, al frustrar expectativas pasadas y forzar revaluaciones difundidas de las perspectivas de ingresos y riqueza. Por otro lado, las crisis involucran dinámicas a diferentes escalas de tiempo, donde transformaciones económicas que conllevan implicancias duraderas ocurren en entornos de dramática volatilidad diaria. Las crisis tienden a estar asociadas con quiebres en las tendencias de crecimiento de las economías en cuestión, de una manera tal que puede sorprender no sólo a agentes caracterizados por comportamientos excéntricos, sino también a aquellos que mantenían creencias basadas en el análisis económico prevaleciente en su momento. Las perturbaciones macroeconómicas de esta naturaleza plantean fuertes dudas acerca de la pertinencia, y la lógica, del supuesto usual de expectativas racionales y de las prácticas de modelización comúnmente implementadas.

Keywords: BIG RECESSIONS - MACROECONOMIC CRISES - WEALTH MISPERCEPTIONS - COORDINATION FAILURES

Palabras claves: GRANDES RECESIONES - CRISIS MACROECONÓMICAS - PERCEPCIONES ERRADAS DE RIQUEZA - FALLAS DE COORDINACIÓN

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1 Introduction: analyzing large-scale economic pathologies	2
2 On the logic of rational expectations and sustainability analysis: a brief discussion	3
3 Big recessions and crises: a brief overview	5
4 Common features: failures of intertemporal coordination, search for lessons	11
5 Multiple time scales: varying growth trends and day-to-day turbulences	13
6 Concluding remark.....	20
References.....	21

1 Introduction: analyzing large-scale economic pathologies

More than half a century ago, Hicks (1967) pointed out that: “*Monetary theory... belongs to monetary history... Monetary theories arise out of monetary disturbances*”. The literature on economic crises was already vast when those lines were written, and it has grown considerably since then. But crises keep challenging macro analysis.

These notes are motivated by the search for understanding severe macroeconomic malfunctions (like the recurrent crises experienced by Argentina). The discussion that follows is preliminary in nature: it belongs to an abductive phase of research, where one tries to explore the field of interest in order to look for broad hypotheses in the anticipation that they may subsequently be made precise and developed. We concentrate on certain aspects of crises, particularly in connection with the features of decision-making processes in the buildup phase, leaving aside other highly important elements such as the mechanisms that may operate as deviation-multipliers, or as potential buffers to limit the effects of macro disruptions.

In everyday speech, a crisis represents a situation where the configuration of the system of interest undergoes a sudden change, with potentially dramatic implications for the people concerned, which forces a reconsideration of plans in view of the emergence of unforeseen circumstances. That applies also for economic crises. As such, the analysis of those events call for a consideration of how economic agents form expectations in practice, how their plans get to be disturbed, and how they adapt modifying beliefs and decisions.

Crisis may be triggered by non-economic events which disrupt existing patterns of behavior in the manner of a black swan (in these days, coronavirus comes readily to mind). In most instances, however, such shocks can hardly be found: the disturbance appears to be generated by the economic system itself. In those boom-bust fluctuations, one can often find indications of economic actions driven by manias, panic; deceit or overconfident gullibility. However, on the road to crises, behaviors that eventually lead to unpleasant outcomes may have been rationalized by sober opinions, based on arguments of economic analysis prevalent at the time. As phenomena that take many (most) agents and analysts by surprise, without the trigger of a well-defined outside shock with a generally understood likelihood, crises put into question assumptions of rational expectations (RE). Moreover, we suggest, the notion itself of RE is ambiguous, and its implementation in macro analysis raises non-trivial logical issues. These are commented briefly in the next section.

Big recessions come in several types, as documented below. One class of particular analytical interest is that where the fall in real activity is combined with perturbations in asset markets, involving government liabilities, private debts or both. In section 3 we examine some observable features of those episodes and of the economies concerned,

trying to discriminate between special characteristics of time and space and those that may form part of the common elements of the family of episodes. These commonalities are found to include, prominently, a considerable discrepancy between the outlook of economic opportunities that many agents had expected in the past, and which were incorporated in financial promises, with the scenario revealed by the crisis, signaling a widespread downward revision of wealth perceptions and debt-repayment capacities. Thus, the salient features of crises recall traditional macro themes, regarding the variability of wealth estimates, and the difficulty of building “a practical theory of the future” for the purpose of grounding, and analyzing, economic decisions “concerned with remoter consequences” (Keynes, 1937), or relying on such consequences for other agents, in direct or indirect economic connection with the individuals in question.

In section 4 we argue that crises represent large-scale failures in intertemporal coordination, in the sense of inconsistencies in the plans drawn by agents. The consequent frustration is associated with the impossibility of maintaining the terms of big masses of financial claims, along with a downward revision of the profitability of many real enterprises, possibly putting in action aggregate demand multipliers. We briefly comment on the nature and the emergence of those inconsistencies, which involve as a central feature a disruption in the expectations of agents about the growth in their incomes and about the trend of the aggregate economy. In the peak of a crisis, that switch in attitudes about longer-run prospects is accompanied by a dramatic succession of day-to-day events. In section 5 we present a short discussion of the interaction of processes at different time-scales which characterizes crises.

2 On the logic of rational expectations and sustainability analysis: a brief discussion

The rational expectations (RE) notion has ruled in one way or another mainstream macroeconomic analysis for decades. However, it is a tricky concept, whose definition itself has been unclear from the start. In the seminal paper that introduced the notion, Muth (1961) stated the meaning of RE as “... *expectations...* (or more generally, the *subjective probability distribution of outcomes*) *tend to be distributed, for the same information set, about the prediction of the theory (or the ‘objective’ probability distribution of outcomes)*” But the two propositions are not equivalent: “prediction of the theory” refers to a dated analytical construct, which did not exist in the past and is likely to be superseded in the future, while the “*‘objective’ probability distribution of outcomes*” is associated with an actual condition of the world, which determines the apex of attainable knowledge about the likely behavior of the variables of interest. Thus, as a matter of logic, there should be a distinction between those concepts: (RE1), the equivalence between the actual probabilistic law of motion of the system and the perceived law of motion on which the agents base their expectations; and (RE2), a correspondence between the expectations of agents and those that would be generated by the relevant economic theory.

But, in fact, neither one of those concepts is implemented by the standard practice of describing expectations as derived from the current model proposed by the analyst, be it in the past (for validation purposes) or in forward-looking exercises¹. That representation does not contemplate the superiority of the practical knowledge of agents compared with that of the analyst implicit in the RE1 assumption. An economist fully committed to RE1 has resigned all aspiration of providing useful instruction to agents. Rather, she should strive to adjust her model to the wisdom of agents revealed in their actions or pronouncements, and must tackle the difference between the error terms in models as “measures of ignorance” (which the RE1 agent would not share) and the “true stochastic shocks” (whose nature and distribution have been identified by the agents, but not by the analyst)². On its side, the usual procedure does not follow the RE2 criterion either, since it attributes to agents in the past expectations derived from the current model, which does not correspond to “relevant economic theory” of its time.

Those distinctions have practical implications. The usual procedure may lead to paradoxical situations when some event (such as a crisis) leads economists to revise their working models. Assume that the old model (MB: before) did not contemplate the potential of event E when combined with expectations compatible with the same model (MB, MB). Thus, E is unexplained by the old analytical scheme and was unanticipated by agents who believed in it and used it as a forecasting device. The analyst now proceeds to modify the specification of the model to MA (after), which has new features (financial multipliers, say) corresponding to properties suggested by the observation of E. If the economist specifies the model with expectations that use the current scheme (MA) to determine behavior in the past, she is making the agents aware of elements of the new model that she did not consider relevant in its time, with the likely consequence that the agents being represented may have seen ahead the eventuality of E, and taken precautions against its occurrence.

By contrast, the notion of (historical) model-consistence which corresponds to the proposition that agents know as much as the analyst (but no more), would lead to a (MA, MB) combination for describing the past, where the old model was the incumbent framework from which agents derived their plans. This would make them as unaware of the gestation of the crisis as the economist with her past model, an ignorance which would be an important element of the ex-post explanation of the event. In such cases, the evolution of influential economic analysis, with its changes and oscillations, could be seen as a relevant part of the actual performance of the system under study.

¹The arguments presented here are discussed in more length in Heymann and Pascuini (2018) and Heymann and Montes Rojas (2018).

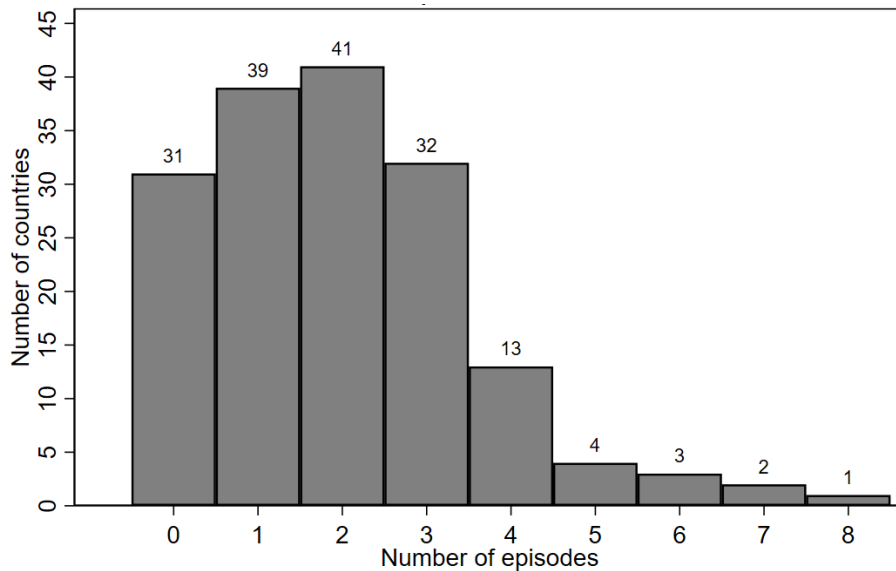
²It may be noted here that the RE1 agent should be presumed to act as if she had identified the correct model of her environment in all the relevant dimensions. In particular, such an individual living in an open country would then include in her operational cognition kit a working representation of the pertinent aspects of the international economy. In this regard, “external impulses” would not be treated as exogenous by the agent unless they are truly random.

The potential analogies and discrepancies between the models proposed by economists over time and the implicit ways of understanding their environment on the basis of which agents formulate their plans emerge particularly in the evaluations of debt sustainability. The analysis of sustainability presupposes putting in doubt the hypothesis of efficient markets: otherwise, whatever the beliefs of the analyst about the likelihood of repayment, the natural conclusion would be that agents have correctly evaluated outcomes and risks, and have consequently priced the assets in question. Thus, engaging in the exercise of evaluation necessarily implies contrasting the expectations of the economist against those of the market participants (Guzman and Heymann, 2015). In the event of crises, the frequent reaction of somehow searching for lessons makes agents and analysts, at least implicitly, challenge past modes of understanding the economy.

3 Big recessions and crises: a brief overview

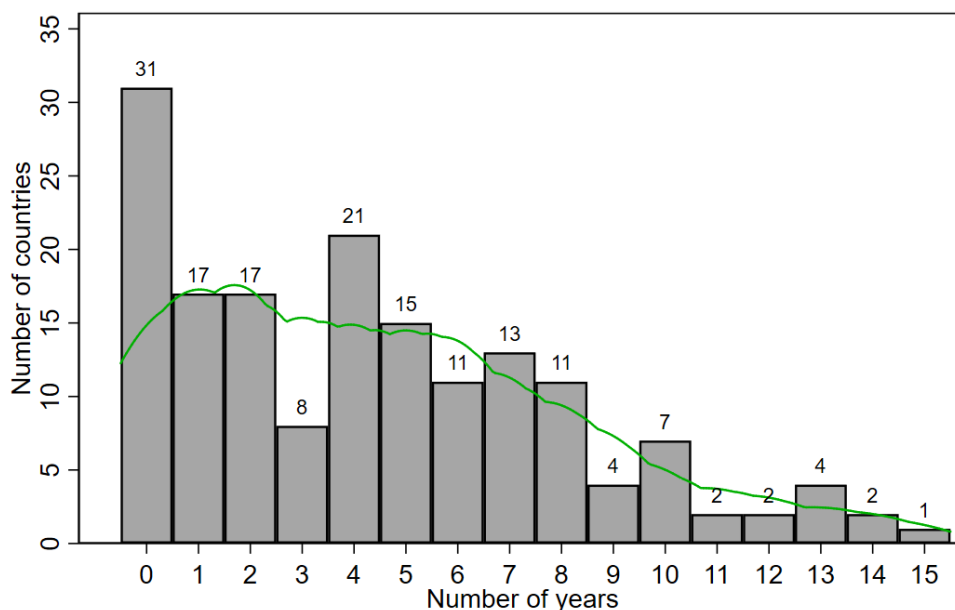
Instances of substantial falls in real activity have not been uncommon over the world. With data spanning the period 1970-2016³, there were 329 cases of recessions with accumulated drops in GDP exceeding 4%. Of the 166 countries surveyed, 135 (more than 80%) experienced at least one episode; for some economies, big contractions were a repeated event, up to a maximum of eight in less than 50 years (Figure 1). Almost 20 economies spent ten or more years in such recessions (Figure 2).

Figure 1: Distribution of Number of Big Recessions



³Sources: World Bank and IMF.

Figure 2: Distribution of Years in Big Recessions

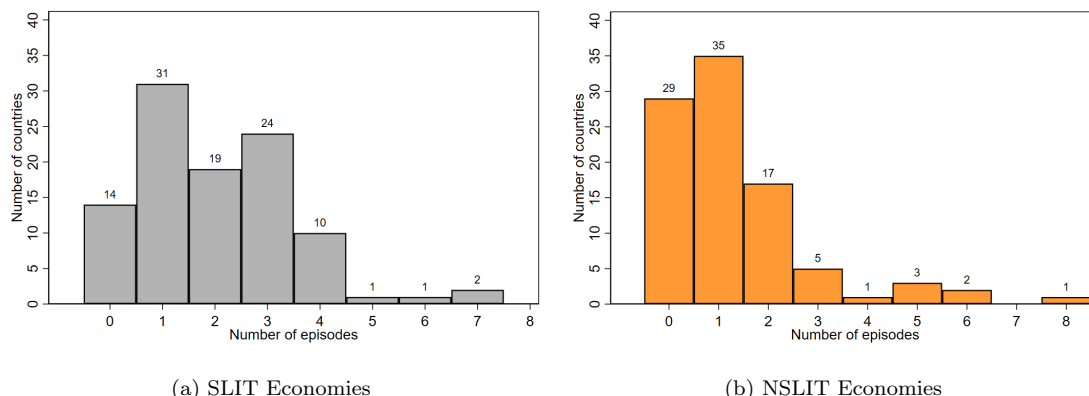


Within the whole set of economies under consideration, it seems useful to distinguish between two large groups. The first set of countries (*SLIT*) includes nations of small size (population less than 1.5 million) and/or low-income (less than \$755 GNI per capita in year 2000)⁴, as well as countries which undergo transitions away from centrally planned systems. In the small/ low-income cases, one would expect to find a particularly strong sensitivity to idiosyncratic natural shocks and to international conditions, while transitions would be characterized by large effects of the disorganization brought about by the breakdown of an economic system before an alternative mode of organization gets to function. On their side, the fluctuations of the economies in the complementary group (*NSLIT*) would raise questions about the stability and self-correcting properties of established systems with dense networks of economic interactions⁵.

⁴Based on The World Bank (WB) criteria. See Appendix Table 1 for a definition of *SLIT* and *NSLIT* economies. Table 2 in the Appendix presents descriptive statistics of Big Recessions for each group.

⁵It should be noted that, while countries are classified as small/low-income once-and-for all according to the WB classification for the year 2000, transitional economies are defined as countries exiting from a centrally planned regime during the period between the late 1980s and the mid-late 1990s when the transition was taking place; while the same nations go into the *NSLIT* group later on. For that reason, there is a double counting of those countries, so that the sum of the number of *SLIT* and *NSLIT* countries (Figure 3) is larger than the number of countries that appears in Figure 1.

Figure 3: Distribution of Number of Big Recessions by Type

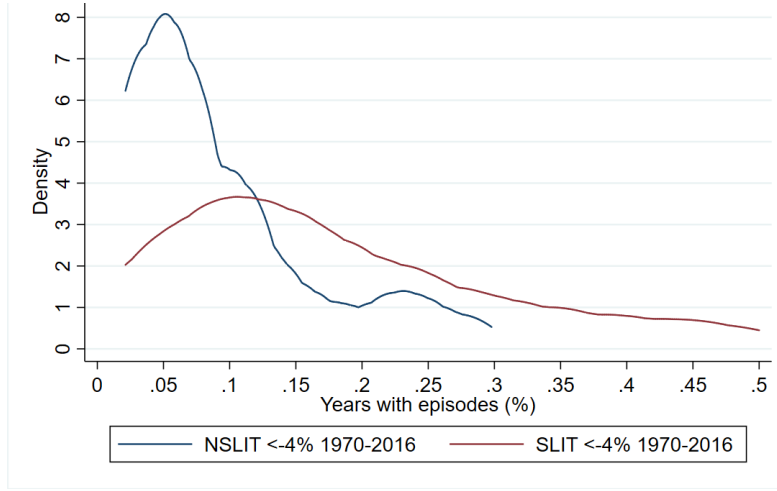


It can be seen (Figures 3 and 4) that *SLIT* countries are more prone to experience big recessions⁶, and typically have spent more time in those conditions than *NSLIT* economies. In addition, the disruptive phenomena observed in big recessions show differences in kind between the two groups. We have examined three types of disturbances: (i) impulses from the world economy (international recession), and falls in the terms of trade of the respective country of more than 20% during the recession); (ii) “non-economic perturbations” (armed conflict, natural disaster), and (iii) economic malfunctions typically associated with “crises”: banking troubles, collapses of stock-market prices, abnormalities in the servicing of the public debt, sharp depreciations of the currency, and high inflation⁷. We characterize as a big recession with crisis an episode where the country in question experienced at least one disturbance of this last group.

⁶The difference between the two groups of countries is more pronounced if the comparison is made over more extreme recessions. For example, considering cumulative falls of GDP of more than 10%, there are still around 100 *SLIT* events, while the number of *NSLIT* episodes falls below 50, of which 40% of those correspond to Middle Eastern economies.

⁷The definitions of those events and the assignment of countries to the different categories of disturbances in each episode were drawn mainly from secondary sources. See Table 3 in the Appendix for a definition of each type of perturbation.

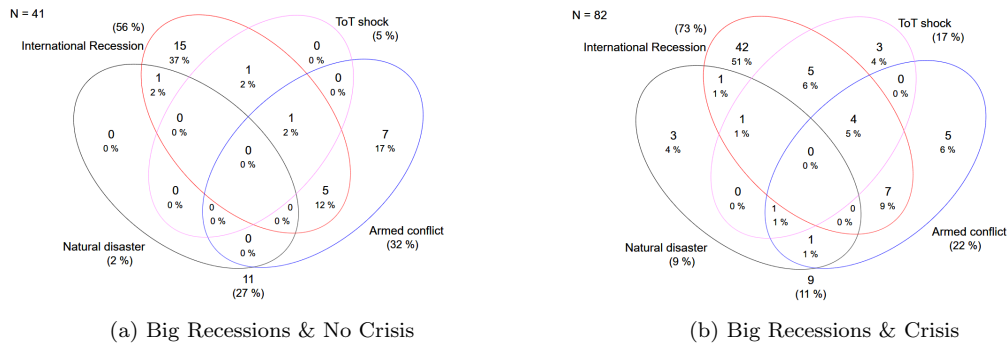
Figure 4: Density Functions, Distribution of Years in Big Recessions
SLIT and NSLIT Economies



More than half of the big recessions in *SLIT* economies do not appear to be related with crises as here defined. Large contractions in those economies coincide in many cases with international recessions, and with events like armed conflicts and natural disasters; in a substantial number of cases (around 30%), the contraction of the economy cannot be matched with any of the disturbances contemplated here.

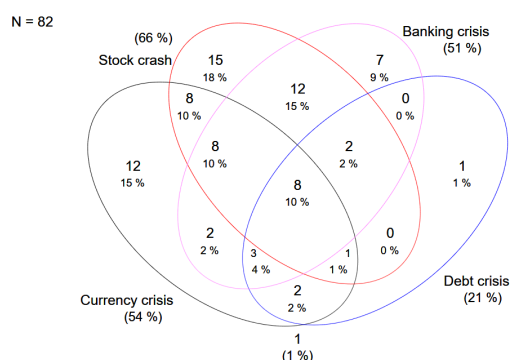
The episodes in *NSLIT* economies with crises show different combinations of financial perturbations, with 8 cases (10%) where stock market crashes, banking panics, sharp currency depreciations and defaults on sovereign debts were all observed together. The high incidence of armed conflict in the *NSLIT* group of big recessions, especially when not associated with financial crises, is mostly due to cases in Middle Eastern countries (e.g. Libya 2012-2016, Lebanon 1974-1976, Syria 2011-2016).

Figure 5: NSLIT Economies by Type of Disturbances
Numbers and Percentages of Episodes



NSLIT big recessions marked by (conventionally defined) crises are thus a particular subset of a quite diverse larger ensemble characterized by sharp declines in economic activity. That subgroup includes salient episodes like the Latin American crises in the early 1980s which preannounced the “lost decade” of the region; the Nordic crises in the 1990s, the sudden interruptions of strong growth of Asian economies in the second part of that decade, the succession of crises of “emerging economies” in the late 1990s and the first years 2000, and the widespread effects of the Great Recession centered in the North Atlantic⁸. In what follows, we concentrate our attention on this family of events.

Figure 6: Big Recessions & Crisis, *NSLIT* Economies
Numbers and Percentages of Episodes



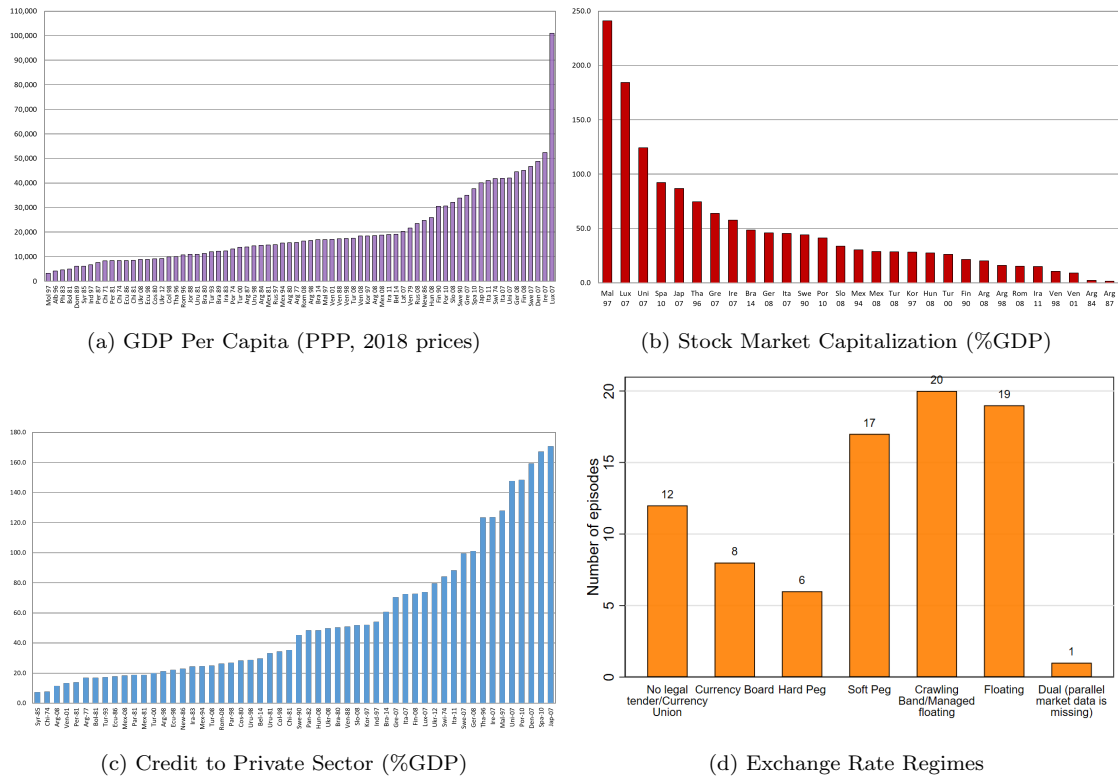
Big recessions marked by credit disruptions constitute themselves a set of heterogeneous events. As illustrated in the following graphs (Figures 7 to 10)⁹, these episodes occurred in economies with very different configurations: large and small; central and peripheral; with big or relatively small financial sectors, with credit instruments of different degrees of sophistication; with or without widespread use of foreign currencies as units of debt denomination, with a broad range of monetary and exchange rate regimes¹⁰, with external/fiscal surpluses or deficits before the perturbation.

⁸At the same time, some conspicuous episodes are left out of the list. In particular, the US in 2007-2009 and the “balance-sheet recession” of Japan in the 1990s (Koo, 2003) are not included because the fall in GDP did not reach 4%.

⁹For Figures 7 to 10, with exception of Figure 7 (d), “Before Big Recessions” is defined as a five year average of observations including the corresponding peak; “After Peaks” indicates an average of observations in the five years following the peak. For Figure 7 (d), “Before” refers to the reported exchange rate regime in the previous peak year.

¹⁰The classification of exchange regimes is based on a de-facto criterion drawn from Ilzetzi et al. (2017).

Figure 7: NSLIT Crises - Heterogeneity Before Big Recessions



Crises coupled with big recessions tend to happen in economies with current account deficits, but cases with surpluses in the previous expansion are also found (Figure 8). In the recession, with lower domestic demand, the distribution of the current account shifts towards the right.

Figure 8: NSLIT Crises - Current Account (%GDP)

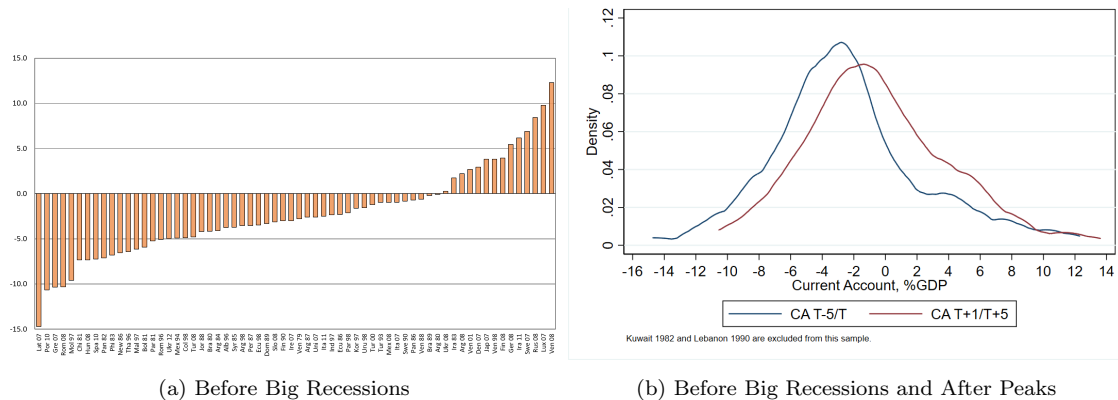


Figure 9 shows that crises are often preceded by fiscal deficits, but not always, and they have taken place in economies with very different levels of public debt. The fiscal balance typically falls in big recessions, while debt ratios tend to worsen (Figure 10).

Figure 9: NSLIT Crises - Public Sector Before Big Recessions

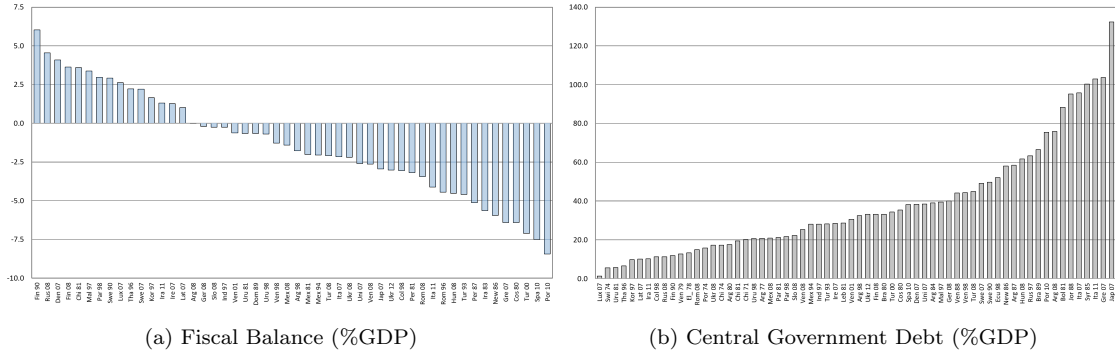
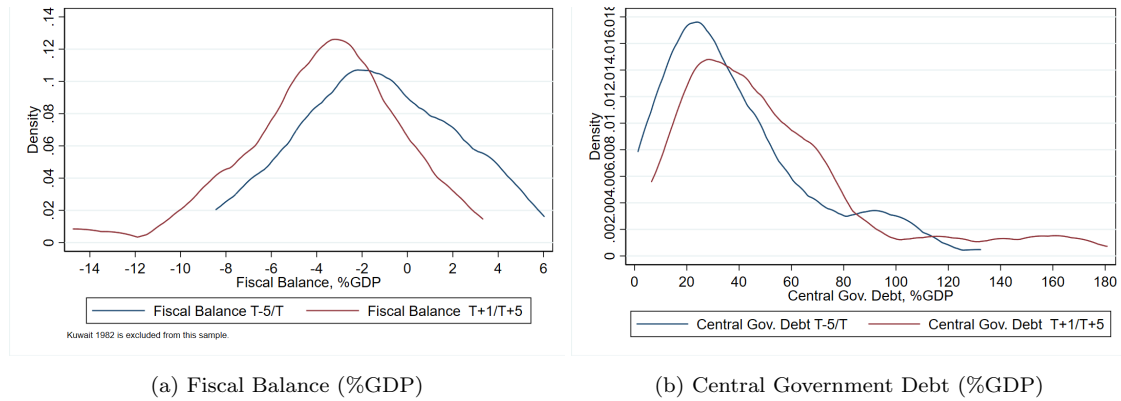


Figure 10: NSLIT Crises - Public Sector Before Big Recessions and After Peaks



4 Common features: failures of intertemporal coordination, search for lessons

Despite their heterogeneities, the different episodes have substantial similarities, given by large volumes of unfulfilled financial promises throughout the economy, without a well-defined external shock to impute the generation of large-scale difficulties in the repayment of debts.

Coordination failures may occur in two kinds: socially undesirable self-fulfilling equilibria of individual actions, or mutually inconsistent behaviors. Crises seem to show the

mark of failures of the second type (cf. Leijonhufvud, 2000). On the way towards a financial crisis, masses of people make commitments that they eventually find themselves troubled to fulfill, or accept promises that now seem unlikely to be carried out. Broken contracts are a definite sign of frustrated expectations. Income and wealth expectations prove falsified for large masses of agents, either direct participants in what now seems an unsustainable economic path or innocent bystanders who are hit by the propagation effects on asset values and real activity. Individual decisions are shown to have been based on assumptions about the behavior of other agents that prove to be wrong. The allocation of economic losses and the reorganization of resources of failed projects are laborious processes, with strong social and political implications.

One may certainly imagine a world of well- defined possible impulses that may hit the economy, in the fashion of a physical phenomenon. In this setting, one can conceive that agents share a precise evaluation of the respective probabilities of those events and can put themselves accurately in the place of other relevant decision-makers and anticipate correctly their behavior in the set of future potential circumstances. The repercussions of shocks would then be presumed to be well understood by agents from the start.

The space of assets may be incomplete, but in the scenario, people would still anticipate actual payoffs in all states of the world (so that “defaults” on certain promises would in fact implement tacitly agreed contingent payments). Then, from the point of view of the resident of the economy, an unfavorable macroeconomic shock may cause complaints about the bad luck in the draw of external conditions, but agents would actually get immediately back to business and implement the actions contemplated beforehand if the realized contingency was to materialize. Past choices do not motivate regret here: they were optimal given the information available at the time which, by assumption, was processed in the best possible way. The pre-reconciliation of plans and their mutual consistency would hold under the (extraordinary) conditions assumed for the data-processing capabilities of agents even if the economy operates suboptimally due to the existence of incentive problems, or to effects like macro externalities, when individuals disregard the impact of their actions on financial constraints, which depend on collective behavior via prices¹¹.

But things seem quite messier in actual crises. The disappointments caused by those events are deeper and more fundamental, since they lead to generalized redrawing of plans and, for many people, they cause a reconsideration of economic beliefs. These revisions in attitudes and opinions may vary much between individuals and groups, but as a whole they signal the existence of a state of alert, indicating the perception that the events being observed carry new information on the working of the economy. On the part of analysts, crises induce work looking for new conclusions to be extracted from the episode in question and they motivate discussions on the matter. The abundance of

¹¹Arnott et al. (1994); Greenwald and Stiglitz (1986); Jeanne and Korinek (2018).

academic meetings organized under titles such as “Lessons from Crisis X”¹² has implicit a presumption that there are new propositions about the economy to be learned from a fresh consideration of the events in question –even if the models that analysts build to that effect presuppose that there is no room for learning. Despite this contradiction, and whatever the willingness of the participants in those activities to change their minds, there is a tacit admission that existing modes of thought have been placed on the table for examination. The big North Atlantic recession of the last decade did not cause deep changes in standard macro theory, but it did shatter the belief that advanced economies were immune to such disruptions and it signaled to many observers the existence weaknesses/limitations in existing models¹³.

Crises are salient events, with potentially life-changing effects for those concerned. They remain in the collective memory for potentially long periods, perhaps in a latent state as time passes, and are brought back to attention when the state of the economy suggests an analogy (which, indeed, may be more or less warranted in fact)¹⁴. The assignment of burden of proof can undergo rapid swings: the argument “*this time is different*” (cf. Reinhart and Rogoff, 2011) which supported confidence on the sustainability of a boom may be replaced quite suddenly by a gloomy “*this is it again*”.

5 Multiple time scales: varying growth trends and day-to-day turbulences

The association of macro crises with changing macro trends, and with the processes of learning about the economy’s growth potential has been considered in the literature for quite some time¹⁵. Effects go in both directions: on one side, exaggerated perceptions about attainable income growth leading to excessive debt levels, the emergence of solvency issues and ultimately to a crisis and, on the other, the lasting consequences of a deep recession and the potential disorganization induced by bankruptcies and the breakdown of productive units (a not-so-creative destruction). In any case, the evidence shows that countries that go through crises may not recover previous trends, or take a

¹²For instance: fbf.eui.eu/event/online-seminar-lessons-for-central-banking-from-the-euro-area-crisis/; www.banque-france.fr/en/conferences-and-media/seminars-and-symposiums/research-conferences-and-symposiums/workshop-monetary-policy-and-asset-prices-lessons-crisis-and-new-tools-3-4-may-2018; www.imf.org/external/np/seminars/eng/2012/fincrisis/index.htm; www.belfercenter.org/event-series/belfer-center-economic-crisis-seminar-series-lessons-current-crisis.

¹³See for example Stiglitz (2014, 2018); Blanchard (2009, 2010); Caballero (2010); also Sargent (2010). For a particularly instructive exercise in drawing analytical lessons from a specific crisis, see Jonung (2010).

¹⁴To mention a recent case: the sharp depreciations of the currency during 2019 in Argentina, an economy with a record of a strong pass-through to domestic prices, motivated widespread references to the hyperinflationary episodes of 1989/1990; memories of the 2001/2002 debt crisis and breakdown of a hard peg to the dollar were also actualized. The recall of historical experiences of extreme price instability may still play a role in the strong dislike of inflation in Germany (for an example with Mephistophelic overtones, see Weidmann (2012)).

¹⁵See, Aguiar and Gopinath (2007); Boz et al. (2011); Heymann et al. (2001).

long time to do so (see Cerra and Saxena, 2008, 2013). Crises have durable effects, in the levels and composition of real activity, in the distribution of wealth, in social conditions, and also in behaviors, as agents metabolize the experiences they have gone through.

The following graphs illustrate features of big macro disruptions in some concrete instances. Figure 11 depicts the evolution of aggregate output and price inflation in Argentina over a period of around three decades. The variability of the medium-term growth performance can be readily appreciated, together with the intensity of cyclical fluctuations. Also visible are sudden events like the eruption of hyperinflation over some weeks in 1989, and the extreme price instability that followed, in the midst of deep recession. This episode took place some years after a program that achieved initially a sharp disinflation, but could not be sustained. Hyperinflation led to a program based on a hard peg to the dollar, which induced price stabilization with an intense recovery of output, but ended in a dramatic debt crisis after ten years of being applied. This episode is considered later in some more detail.

The next graphs, in Figure 12, depict a simple exercise of calculating recursively HP filters of GDP series in Argentina and Greece, hinting at the difficulties that agents and analysts may have had in identifying the income trends of those economies. Graph 13 shows professional medium-term projections of GDP in Greece (source: IMF), showing large discrepancies between the sustained growth anticipated before the crisis and the deep recession that materialized with the crisis.

Figure 11: Argentina: GDP constant prices and Inflation (monthly rates)
Quarterly data

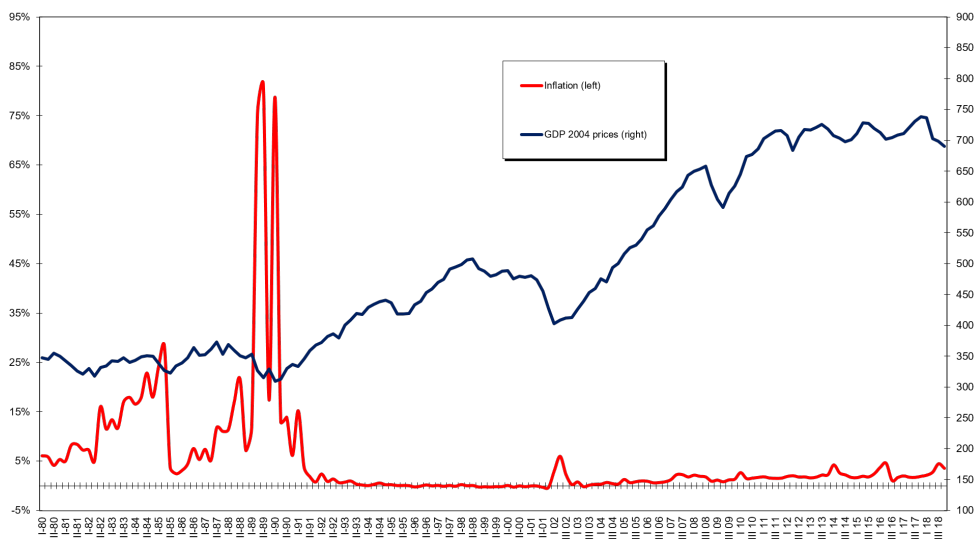
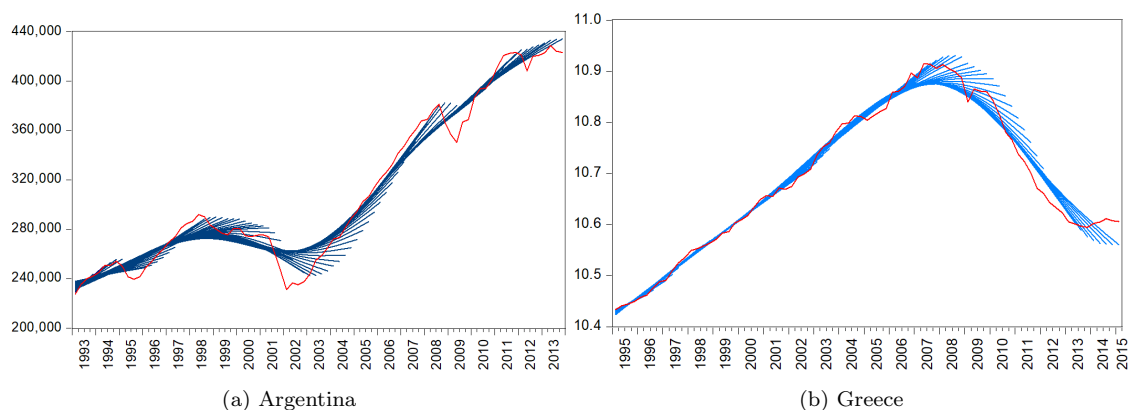
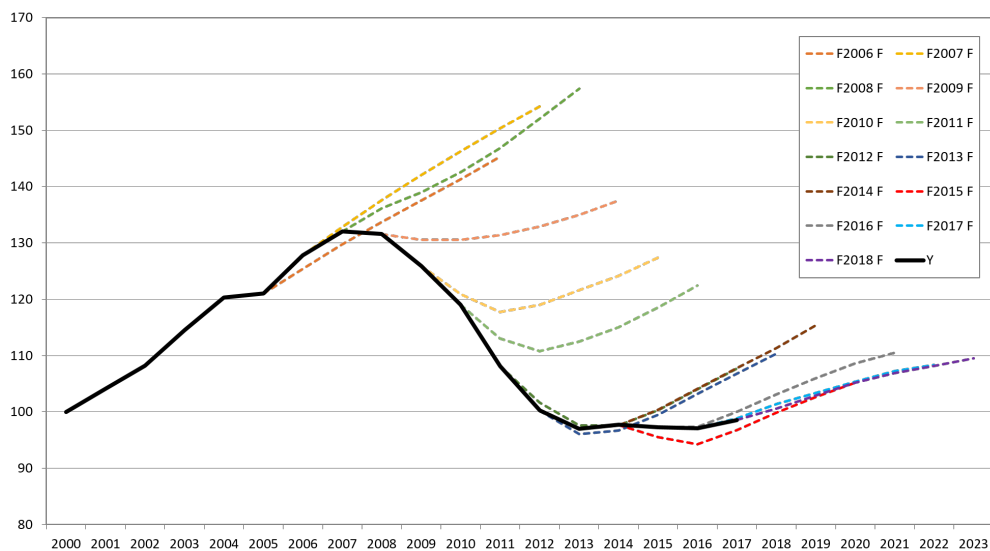


Figure 12: GDP and Recursive Hodrick-Prescott Filter



The frustration of expectations about trends brings back themes treated with brio in Chapter 12 of the GT (1936), especially regarding the difficulties in predicting the prospects of individual and aggregate incomes over more or less long horizons, struggling with the “dark forces of time and ignorance”. These difficulties have strong roots. Certainly, along the road to a crisis, one can find indications of “irrational exuberance” on the part of economic agents and commentators; economic bubbles, with their lure of large gains, are also conditions apt to exacerbate incentive problems in financial markets and to promote outright frauds. Still, the problem seems more fundamental, and grounded in the nature of the system under consideration.

Figure 13: Greece: GDP and Projections WEO IMF



Forecasting the potential prosperity of nations, the grand dynamics of economic and social evolution, is a highly tricky endeavor, also for cool-headed, well –informed people. The problem involves translating a historical process into some kind of (perhaps as if) statistical construct. Weitzman (2007) has remarked that in systems like economies undergoing structural change, so that relevant parameters change over time, as new information is gathered, old data become obsolete: thus, learning does not converge to definite knowledge, and the potential for misperceptions always remains. As for lies and deception, not only highly gullible agents will be caught by cheats¹⁶. As a matter of fact, what eventually will be regarded generally as behaviors based on illusions or deceit may well have been rationalized in its time by influential and reputedly honest and prudent observers or analysts.

The realization that large-scale mistakes have been made and that they menace to disrupt the economy can proceed gradually at first, but reach at some moment a break-point where the disturbance turns abruptly into a rapid spiral. People who normally would simply go about their business now nervously watch high-frequency financial indicators (perhaps several times a day), and act upon their interpretation of those swings, likely to be influenced by the moods they observe around them. This is the realm of “peso problems” (Krasker, 1980). Such reactions indicate that people perceive that life-relevant variables may experience large and possibly persistent shifts, as if the system was approaching a bifurcation¹⁷. And, in effect, one can find quite different outcomes of those situations, near misses and recoveries as well as collapses.

The following set of graphs (Figures 14 to 19) depict the evolution of a set of macro/financial variables in two disturbances quite close in time (mid-1990s and early 2000s) in Argentina. Both events were associated with the implementation (April 1991-December 2001) of the convertibility regime that fixed rigidly the exchange rate with the US dollar: the first episode was a sort of halfway disruption, while the other marked the collapse of the experiment. The crisis episodes had in common a combination of recession, internal drain, with considerable reductions of bank deposits, substantial losses of international reserves and sharp increases in the yields of dollar-denominated bonds, while peso/dollar interest rate differentials indicated substantial expectations of devaluation.

Gradually, then suddenly, as the phrase goes. It can be seen in the graphs that the acute phase of the crises developed over relatively small time spans, with moments marked by sharp differences in behavior, from relatively tranquil times characterized by a comparatively slow deterioration to others with a very intense turbulence (marked by

¹⁶Cf. Fisher (1933): *“When it is too late, the dupes discover scandals... But probably these frauds could never have become so great without the original starters of real opportunities to invest lucratively. There is always a very real basis for the ‘new era’ psychology before it runs away with all its victims”.*

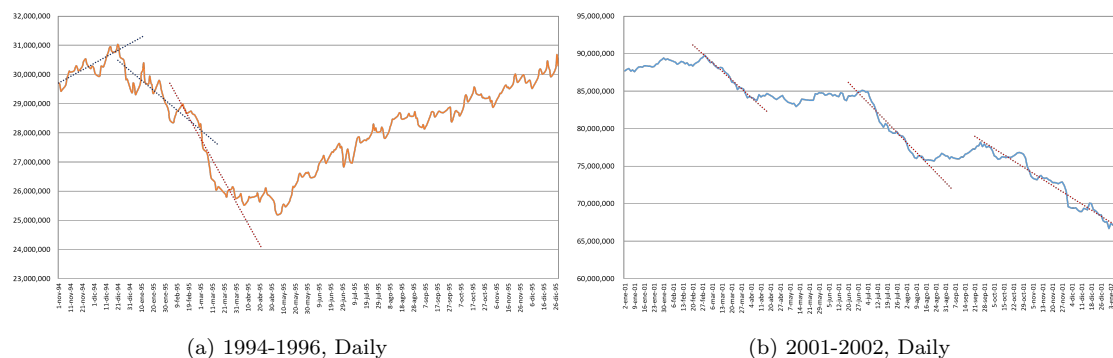
¹⁷The pattern is also observed in other social contexts. See for example this headline: “An Unprecedented 10 days: how UKs Brexit drama became a crisis”, The Guardian: <https://www.theguardian.com/politics/2019/sep/13/an-unprecedented-10-days-how-uks-brexit-drama-became-a-crisis>

accelerated runs on deposits and currency reserves, very large high-frequency volatilities of variables like interest rates and a deepening of real recessions). Notwithstanding their common features, both episodes had very different outcomes. These features were present in the two Argentine crises considered in this section: a “midterm” disturbance in the mid- 1990s and a definitive crash some years later.

While at some moments the 1995 disruption seemed to menace a breakdown of the financial system and a crash of the fixed exchange rate scheme, these fears were not realized, and the economy regained momentum over the following three years¹⁸. Indeed, for some time after the fact, the experience was widely interpreted as a strong indication of the resiliency of the economy and its policy regime, provided some aspects like bank supervision were strengthened (as they did). But eventually this reinforced confidence, manifested in a new willingness to lend by foreigners and to borrow by residents, ended up being shattered in the dramatic solvency crisis which evolved in a few years.

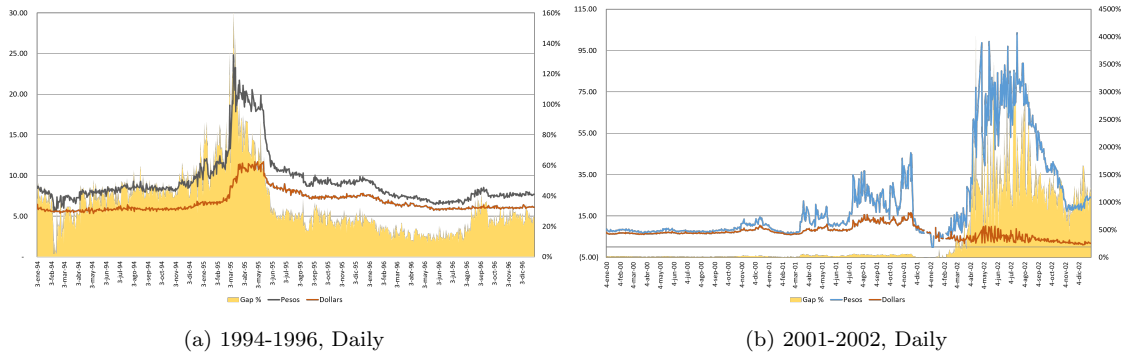
The following graphs depict aspects of the dynamics of those two episodes, and illustrate the variable velocity of the deterioration along the process. Figure 14 shows the evolution of bank deposits in both bank runs: the sudden accelerations of the perturbation can be observed in the two episodes, a pattern also indicated in the sharp movements of interest rates (Figure 15).

Figure 14: Argentina: Bank Deposits



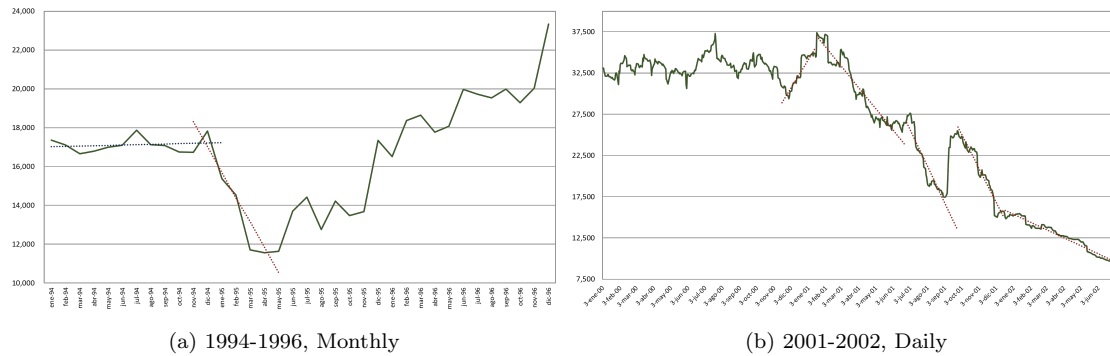
¹⁸The policy implemented during that period stressed the determination to reinforce the link between the currency and the US dollar and to strengthen public finances; the central bank operated actively as lender of last resort, aided by a large package of official international loans. The foreign debt of the government had been restructured a few years before, and did not create a severe liquidity stress. Exports increased significantly in 1995, at growing external prices. For a discussion of the episode, and the convertibility era as a whole, see for example Galiani et al. (2003).

Figure 15: Argentina: Interest on Short-Term Deposits in pesos and dollars
(at annual rates)



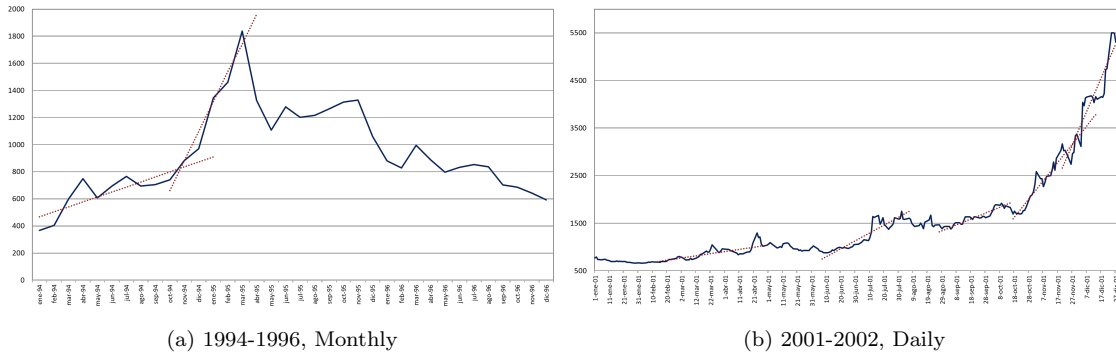
The speed of the loss of foreign reserves by the Central Bank went through phases of strong acceleration, with different endpoints: in one case, a reversal with a maintained fixed exchange rate; in the other, a depreciation of extraordinary magnitude (Figures 16 and 19).

Figure 16: Argentina: International Reserves (millions of usd)



In both instances, the market for sovereign bonds showed sudden eruptions in the perceived risk of non-payment, which were somewhat dissipated in the earlier case, but ended with actual default in 2001 (Figure 17).

Figure 17: Argentina: Yield spread of dollar-denominated sovereign bonds over US Treasury



Not only high-frequency financial indicators showed sharp inflections: these could also be found in real activity, and particularly in moments where the economic decline gained rapid speed.

Figure 18: Argentina: GDP Estimator

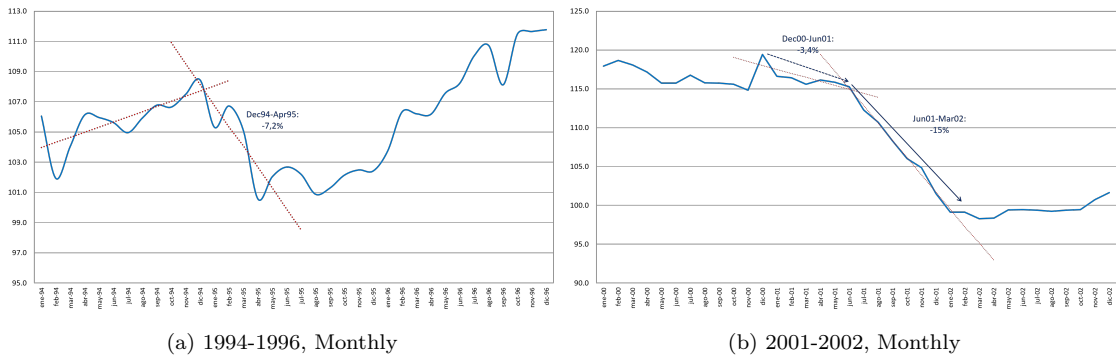
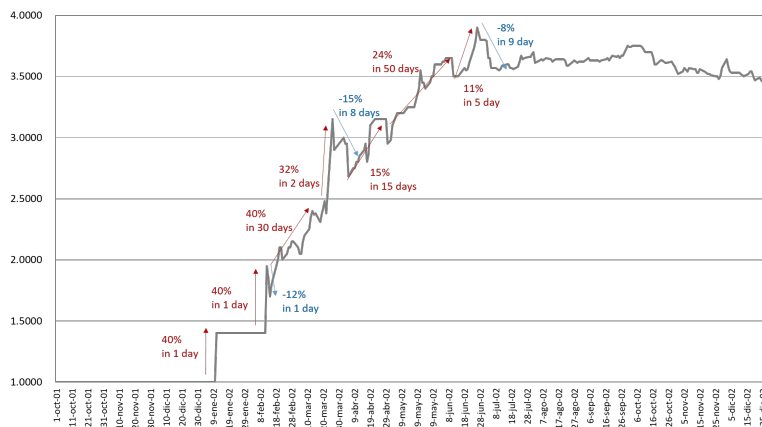


Figure 19: Argentina: Nominal Exchange Rate, Daily, 2001-2002



6 Concluding remark

There is hardly anything more commonplace than the arguments pointing out the state of flux of technologies and economic arrangements, with their impact on the performance of individuals and nations. Commonplace, but necessarily. Behaviors and views about the workings of economies will keep evolving. Economists will necessarily be engaged in a continued learning about the learning processes of agents and their factual impacts. This activity of “applied epistemology” would reasonably form an integral part of the macroeconomists theoretical work, and the associated evaluations of systemic fragilities.

References

- Aguiar, M., & Gopinath, G. (2007). Emerging market business cycles: The cycle is the trend. *Journal of political Economy*, 115(1), 69–102.
- Arnott, R., Greenwald, B., & Stiglitz, J. E. (1994). Information and economic efficiency. *Information Economics and Policy*, 6(1), 77–82. <https://ideas.repec.org/a/eee/iepoli/v6y1994i1p77-82.html>
- Blanchard, O. (2009). The state of macro. *Annu. Rev. Econ.*, 1(1), 209–228.
- Blanchard, O., Dell’Ariccia, G., & Mauro, P. (2010). Rethinking macroeconomic policy. *Journal of Money, Credit and Banking*, 42, 199–215.
- Boz, E., Daude, C., & Durdu, C. B. (2011). Emerging market business cycles: Learning about the trend. *Journal of Monetary Economics*, 58(6-8), 616–631.
- Caballero, R. J. (2010). Macroeconomics after the crisis: Time to deal with the pretense-of-knowledge syndrome. *Journal of Economic Perspectives*, 24(4), 85–102.
- Cerra, V., Panizza, U., & Saxena, S. C. (2013). International evidence on recovery from recessions. *Contemporary Economic Policy*, 31(2), 424–439.
- Cerra, V., & Saxena, S. C. (2008). Growth dynamics: The myth of economic recovery. *American Economic Review*, 98(1), 439–57.
- Fischer, S., Sahay, R., & Végh, C. A. (1996). Stabilization and growth in transition economies: The early experience. *The Journal of Economic Perspectives*, 10(2), 45–66. <http://www.jstor.org/stable/2138481>
- Fisher, I. (1933). The debt-deflation theory of great depressions. *Econometrica: Journal of the Econometric Society*, 337–357.
- Galiani, S., Heymann, D., Tommasi, M., Servén, L., & Terra, M. C. (2003). Great expectations and hard times: The argentine convertibility plan [with comments]. *Economia*, 3(2), 109–160.
- Greenwald, B. C., & Stiglitz, J. E. (1986). Externalities in economies with imperfect information and incomplete markets. *The quarterly journal of economics*, 101(2), 229–264.
- Guzman, M., & Heymann, D. (2015). The imf debt sustainability analysis: Issues and problems. *Journal of Globalization and Development*, 6(2), 387–404.
- Heymann, D., Kaufman, M., & Sanguinetti, P. (2001). Learning about trends: Spending and credit fluctuations in open economies, In *Monetary theory as a basis for monetary policy*. Springer.
- Heymann, D., & Montes Rojas, G. (2018). On model-consistent expectations in macroeconomics. *Económica*, 22–45.
- Heymann, D., & Pascuini, P. (2018). *On the (in) consistency of re modeling* (Doctoral dissertation). Universidad de Buenos Aires. Facultad de Ciencias Económicas.
- Hicks, J. (1967). Monetary theory and history: An attempt at perspective. *Critical Essays in monetary theory*, 155–173.
- Ilzetzki, E., Reinhart, C. M., & Rogoff, K. S. (2017). *Exchange arrangements entering the 21st century: Which anchor will hold?* (Tech. rep.). National Bureau of Economic Research.

- Jeanne, O., & Korinek, A. (2018). Managing credit booms and busts: A pigouvian taxation approach. *Journal of Monetary Economics*.
- Jonung, L. (2010). Lessons from the nordic financial crisis, In *Aea meeting in denver*.
- Keynes, J. M. (1937). The general theory of employment. *The quarterly journal of economics*, 51(2), 209–223.
- Koo, R. (2003). *Balance sheet recession: Japan's struggle with uncharted economics and its global implications*. John Wiley & Sons.
- Krasker, W. S. (1980). The 'peso problem' in testing the efficiency of forward exchange markets. *Journal of Monetary Economics*, 6(2), 269–276. <https://ideas.repec.org/a/eee/moneco/v6y1980i2p269-276.html>
- Laeven, L., & Valencia, F. (2013). Systemic banking crises database. *IMF Economic Review*, 61(2), 225–270.
- Laeven, L., & Valencia, F. (2018). *Systemic banking crises revisited*. International Monetary Fund.
- Leijonhufvud, A. (2000). *Macroeconomic instability and coordination: Selected essays of axel leijonhufvud*. Edward Elgar Publishing.
- Mbaye, S., Badia, M. M. M., & Chae, K. (2018). *Global debt database: Methodology and sources*. International Monetary Fund.
- Muth, J. F. (1961). Rational expectations and the theory of price movements. *Econometrica: Journal of the Econometric Society*, 315–335.
- Pettersson, T., Högladh, S., & Öberg, M. (2019). Organized violence, 1989–2018 and peace agreements. *Journal of Peace Research*, 0022343319856046.
- Reinhart, C. M., & Rogoff, K. S. (2009). *This time is different: Eight centuries of financial folly*. princeton university press.
- Sargent, T. (2010). Interview with thomas sargent. *Federal Reserve Bank of Minneapolis*, [www.minneapolisfed.org/publications_papers/pub_display.cfm].
- Stiglitz, J. E. (2014). The lessons of the north atlantic crisis for economic theory and policy. *What have we learned*, 335–347.
- Stiglitz, J. E. (2018). Where modern macroeconomics went wrong. *Oxford Review of Economic Policy*, 34(1-2), 70–106.
- Weidmann, J. (2012). Money creation and responsibility, In *Speech at the 18th colloquium of the institute for bank-historical research in frankfurt on*.
- Weitzman, M. L. (2007). Subjective expectations and asset-return puzzles. *American Economic Review*, 97(4), 1102–1130.

7 Appendix

Table 1: Definition of SLIT economies

Union of	SLIT
Small	Population < 1.5 million
Low-income	GNI per capita (2000) < \$755
Transition	Countries of Eastern and Southern Europe and the former Soviet Union in relevant period (Fischer et al., 1996).

Table 2: Descriptive Statistics of Big Recessions episodes

Variable	SLIT	NSLIT
Mean GDP drop - All	-16.2%	-12.7%
Mean GDP drop - Crisis	-20.0%	-10.4%
Mean GDP drop - No Crisis	-13.1%	-17.1%
Mean Duration (years) - All	2.4	1.9
Mean Duration (years) - Crisis	3.0	1.9
Mean Duration (years) - No Crisis	1.9	1.7
Recovery of Peak GDP (years from trough) - All	6.3	3.6
Recovery of Peak GDP (years from trough) - Crisis	7.2	3.5
Recovery of Peak GDP (years from trough) - No Crisis	5.5	3.9

Table 3: Definition of Types of Perturbation

Perturbation	Definition	Source
Stock market crash	More than 40% fall in the market index over a yearly period	Reinhart and Rogoff (2009)
Banking crisis	Significant signs of financial distress in a banking system indicated by bank runs, losses in the banking system and bank liquidations; and significant banking policy intervention	Laeven and Valencia (2013); Laeven and Valencia (2018)
Currency crisis	Depreciation of the currency against the dollar at least 30% and also 10 points higher than the depreciation rate in the year before	Laeven and Valencia (2013); Laeven and Valencia (2018)
Sovereign debt crisis	Sovereign default to private creditors and/or restructuring	Laeven and Valencia (2013); Laeven and Valencia (2018)
Sovereign domestic debt crisis	Failure to meet a principal or interest payment on the due date; instances where rescheduled debt is extinguished in terms less favorable than the original obligation; freezing of bank deposits and/or forcible conversions of foreign currency deposits to local currency	Reinhart and Rogoff (2009)
Inflation crisis	Annual inflation rate greater than 20%.	Reinhart and Rogoff (2009)
Terms of trade shock	Downturns greater than 20%, in a year, or accumulated in two consecutive years	World Bank, ECLAC and OECD
International recession	Growth of less than 2% in world GDP or growth of less than 2% in world trade	World Bank and World Trade Organization
Armed conflict	A contested incompatibility concerning government and/or territory where the use of armed force between two parties, of which at least one is a government of a state, results in at least 25 battle-related deaths in a calendar year	Uppsala Conflict Data Program
Natural disaster	Based on human and economic losses, if at least one of the following criteria is satisfied: more than 10% of the population affected in a year; deaths of more than 1% of the population by natural disasters in a year; more than 10% of GDP damage in a year by natural disasters	Emergency Events Database: Centre for Research on the Epidemiology of Disasters (CRED)

Table 4: Number of Episodes by Perturbation

Perturbation/ Economy	# of Episodes	Currency	Sov. Debt Default	Sov. Debt Domestic	Banking	Stock Market	Inflation	Natural Disaster	Armed Conflict	ToT	Intern. Rec.
NSLIT - Crisis	82	44	17	13	42	54	33	7	18	14	60
NSLIT - No Crisis(*)	41	-	-	-	-	-	-	1	13	2	23
NSLIT - All	123	44	17	13	42	54	33	8	31	16	83
SLIT - Crisis	93	52	26	7	30	4	23	19	34	24	73
SLIT - No Crisis(*)	113	-	-	-	-	-	-	21	31	6	64
SLIT - All	206	52	26	7	30	4	23	40	65	30	137
Crisis	175	96	43	20	72	58	56	26	52	38	133
No Crisis	154	-	-	-	-	-	-	22	44	8	87
All	329	96	43	20	72	58	56	48	96	46	220

(*) For 11 NSLIT and 31 SLIT big recessions, no correspondence could be found with the perturbations listed in the table.